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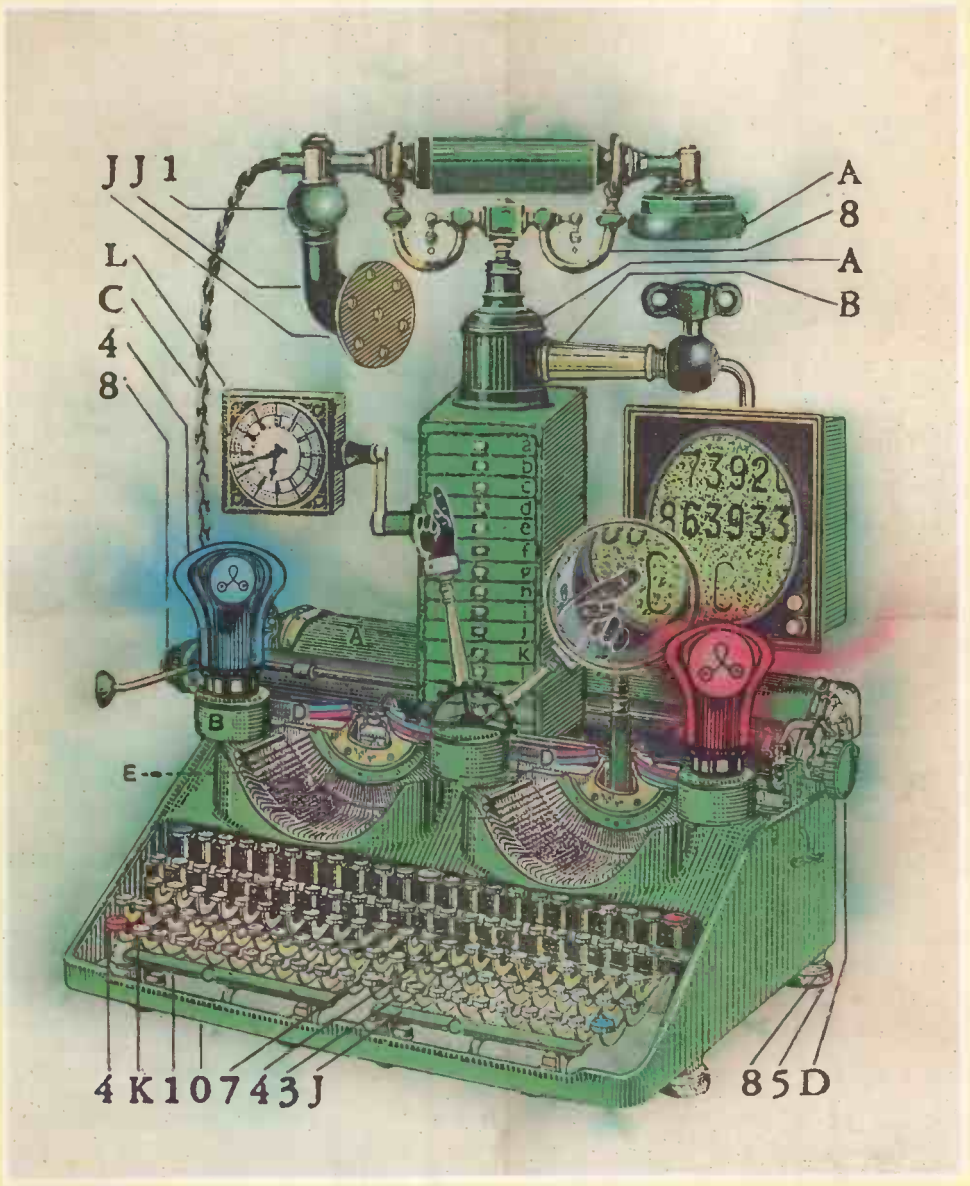

THE INTEGRATED OFFICE

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SOFTWARE Gem DTP • DOS helpers

FEATURES The Cray 2

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- ☑ Compiler. One-pass compiler generating linkable object modules and inline assembler. Included is Borland's high performance "Turbo Linker". The object module is compatible with the PC-DOS linker. Supports tiny, small, compact, medium, large, and huge memory model libraries. Can mix models with near and far pointers. Includes floating point emulator (utilises 8087/80287 if installed).
- ☑ Interactive Editor : The system includes a powerful, interactive fullscreen text editor. If the compiler detects an error, the editor automatically positions the cursor appropriately in the source code.
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- ☑ ANSI C compatible.
- ☑ Start-up routine source code included.
- ☑ Both command line and integrated environment versions included.

Sieve benchmark (25 iterations)

	Turbo C	Microsoft® C	Lattice C
Compile time	3.89	16.37	13.90
Compile and link time	9.94	29.06	27.79
Execution time	5.77	9.51	13.79
Object code size	274	297	301

Benchmark run on a 6 Mhz IBM AT using Turbo C version 1.0 and the Turbo Linker version 1.0 ; Microsoft C version 4.0 and the MS overlay linker version 3.51 ; Lattice C version 3.1 and the MS object linker version 3.05.

YES ! I want the best !

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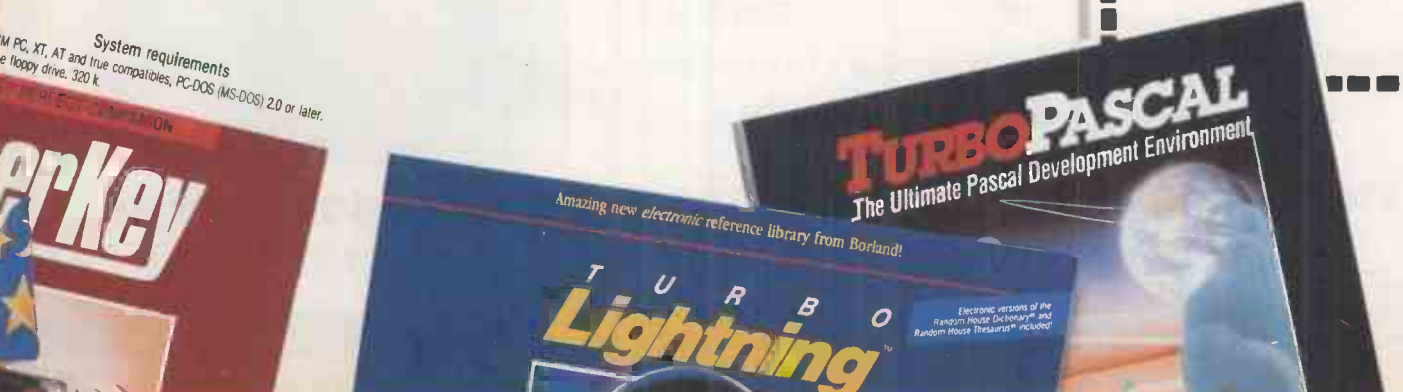
IBM PC, XT, AT and true compatibles, PC-DOS (MS-DOS) 2.0 or later.
One floppy drive. 320 k.



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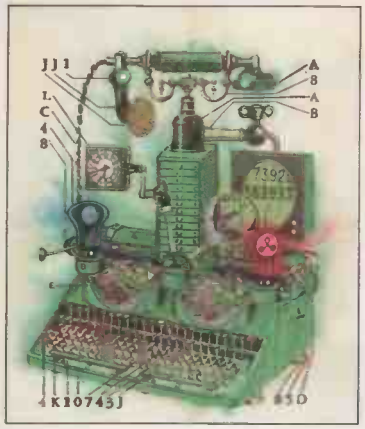

COVER ILLUSTRATION: SIMON FELL

THE INTEGRATED OFFICE

The micro is no longer alone in the electronic office. Fax and telex are becoming intelligent, telephones are growing up with ISDN, and optical storage is replacing filing cabinets. We look at how it will all fit together in the office of the future. 85

INSIDE

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PRACTICAL COMPUTING

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NEWS

REGULARS

DAZZLING REPERTOIRE.

A Canon Laser Beam Printer paper cassette has a capacity of 200 sheets. So you waste less time re-loading. It can handle varying weights from 60 to 135 gsm, plus envelopes, and there are face-up and face-down modes for easy collating.

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THE MICRO AND SERENDIPITY

The battle seems to have been won. No longer is it necessary to argue at length the case for micros. Increasingly it is a matter of preaching to the converted. And no wonder; everywhere you go there is a growing presumption that a business without micros is business without a future. Advertisements assert it, magazines analyse it and Western society acquiesces in it.

But just as the tide of computerisation is flowing with apparently unstoppable force, doubts are beginning to form. Companies that try to justify the introduction of micros on a rigorous cost-saving basis are bumping up against the painful realisation that any such benefits may be marginal. This cannot be dismissed as cold feet or special cases. A US study completed some while back suggested that the introduction of executive computers actually lowers productivity. This negates the vision of efficiency and low costs conjured up by the adherents of the digital faith. If it is a real problem — and it seems likely that it is — it needs explaining, or else disillusioned companies are going to turn away from technology altogether.

The benefits from the introduction of the older computer technology were real and quantifiable. Mainframes and departmental minis were usually brought in to automate a pre-existing function. Often those functions were labour-intensive, slow and prone to error. An automated version of essentially mechanical tasks is relatively straightforward to implement and produces very clear gains in terms of increased speed, efficiency and reduced staffing levels.

Compare the equivalent situation for the micro. As its name suggests, the personal computer is by its very nature a tool for individuals. The tasks it supports tend to be far more multifarious than those found on mainframes and minis, which means that it is harder to translate across from the manual to the micro system. Since micros are normally introduced on a large scale, compromises must be made in the provision of software. Unlike the bespoke mainframe software, which is written with the intention of mapping the old tasks on to the new technology, off-the-shelf packages like dBase or 1-2-3 may be poor substitutes for personal filing or budgeting systems which have been honed over the years. This is not a reflection on the quality of such micro software but of the simple fact that you cannot be all things to all people.

Even where a company has conducted a seemingly thorough costing exercise on the introduction of micros, with positive apparent benefits, it may find that in practice things do not quite work out as intended. Again, this flows directly from the very nature of the personal computer, which is decentralised and ultimately uncontrollable.

For a start, people may get carried away by the technology. Luddites are few and far between these days; far more dangerous are the enthusiasts. Given their own shining new micro, they take to it with such alacrity that it becomes a distraction. They become obsessed with perfection where before they would have made do with bare working solutions. They get sidetracked into exploring interesting but ultimately irrelevant avenues of the micro world. None of this happens with the mainframe or mini. Nothing could be more dull than the terminal, nothing so restrictive as the software which lets you do one thing only — the job in hand.

Allied to this dissipation of time, with its resultant lowering of efficiency, the over-keen adoption of technology can have knock-on effects, all of them bad for the bottom line. Once you use a micro, you find you soon need more memory or disc storage or better graphics or perhaps a faster machine altogether. Since many of these purchases are relatively small-scale, they may well be within the budget of individual managers who can authorise them without reference to higher, more sceptical powers. Taken across a company, such creeping upgrades can cost worryingly large sums.

And yet most of us are sure micros are good for you — and for the company. So what is it that they offer if cost-saving is doubtful at best? The answer has already been hinted at. The enthusiasm which people often manifest, and their willingness to experiment with ideas, is perhaps the most valuable benefit of PCs, though the least obvious and quantifiable.

To justify large-scale computerisation at the personal level, companies must learn to sustain and harness that enthusiasm, and to be alert to the brilliant ideas when they appear. In the end, micros turn out to be all about serendipity — the happy chance discovery. The great new challenge for business is not just working with new technology, which is relatively straightforward but learning to cope with the disconcertingly open-ended type of creativity it engenders.

5 YEARS AGO...

Top Apple people were in London recently for a series of briefings to prepare the way for what they term their Fourth Generation machines.

Rumour has it that the new Apple IV will be a 68000-based 16-bit machine, clearly aimed well up-market for Apple. It comes with 1Mbyte of RAM and 1.5 Mbyte of built-in floppy storage.

The most interesting thing about it is the operating system, which is not the ubiquitous Unix but a special Apple-written product. The user interface resembles that of the cult language Smalltalk, developed at Xerox's Palo Alto Research Centre.

The very high-resolution graphics are not in colour. But the Apple printer will be able to dump the 400-by-800 resolution graphics directly to paper, which may be more important to professional users.

The system is likely to come with a considerable body of software included in the price; this probably means word processing, spreadsheets, communications and some accounting applications, as well as software development aids. Apple believes that fourth-generation machines will only sell on the back of good software.

Volume 5 Issue 9

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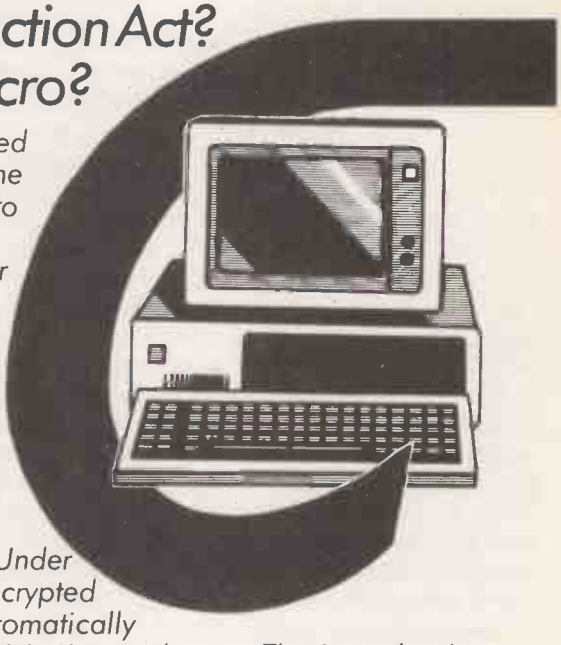

If the answer to either of these questions is NO then you need CLAM from MICROFT TECHNOLOGY. CLAM, as the name implies, provides a software 'shell' around your computer to prevent unauthorised access to programs and data. It can be used to protect either individual files or subdirectories or both. Each copy of CLAM includes a copy of Microft's popular menu generator MENUGEN, so that users, if required, can be presented with a friendly menu interface.

On starting the computer users are asked for a password. They will then be presented either with a menu or the normal DOS prompt. In either case they will only be able to access those files and subdirectories for which they have authority.

Files are protected using 'Dynamic File Encryption'. Under this technique the files are held on disk in a permanently encrypted form. When an authorised user reads the file the data is automatically decrypted by CLAM after it is read from the disk but before it is given to the user. The time taken is imperceptible. When a file is updated the data from the user is automatically encrypted before it is written. This is the only failsafe way to secure data.

CLAM is available for most micros with PC/MS DOS version 2.0 or later. These include the IBM PC and all compatibles. CLAM costs £148 + VAT for a single user licence. Site and corporate licences are available. Existing MENUGEN users may upgrade to CLAM for £110 + VAT.

CLAMNET, the network version will run on all PC/MS DOS based networks. The cost is £580 + VAT per ten or part of ten workstations on the network.

CLAM may be purchased from MICROFT TECHNOLOGY LTD, The Old Powerhouse, Kew Gardens Station, Kew, Surrey TW9 3PS or from most dealers. To order or obtain further information telephone 01-948 8255.

MAIN FEATURES

1. All data held on a hard or floppy disk or a network can be kept secure from unauthorised access.
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CLAM

THE DATA PROTECTOR

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NEXT MONTH

HARDWARE

Removable discs are old hat, but **Tandon** has come up with a new variant: removable hard-disc units. Is this just a gimmick, or a real boon for people who need to take large chunks of data from place to place? We also take a look at some of the new large screens that are becoming available.

SOFTWARE

Word Perfect seems to be going great guns. The latest in the range is **Word Perfect Executive,** an all-in-one package which offers word-processing, a spreadsheet, and a cardbox plus other features. Is it the one we have been waiting for?

FEATURES

There is a new breed of micros around — the work stations. We look at the principal players and the likely spillover into the mainstream market. Plus an introduction to the intelligent building.

SPECIAL SECTION

KNOWLEDGE AND INFORMATION

Computers have led to a proliferation of data. The trick lies in turning it into information. The burgeoning CD-ROM industry could provide the answer. And beyond information lies knowledge: we find out how far expert systems are along the road.

TOP 10

Comms are all the rage so we pick out 10 of the best communications add-ons.

Don't miss the October issue of

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On Sale at W H Smith and all good newsagents after 16 September.

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

Apricot upgrade

APRICOT COMPUTERS has announced a special £999 upgrade for purchasers of its 80286-based Xen and Xen-i machines. For machines bought after 15 June and until 31 August, upgrades to the standard of the new Xen-i 386 machine will be available for £999.

The upgrade will be to the nearest equivalent: for example, the 20Mbyte 80286 system will go to the 30Mbyte 386. Although the 386 machines do not usually offer mono display circuitry as standard, a mono adaptor card can be added for an extra £199 when upgrading the machine.

For full details contact Apricot Computers, Apricot House, 111 Hagley Road, Edgbaston, Birmingham B16 8LB. Telephone: 021-456 1234

Hercules for PS/2

HERCULES COMPUTER TECHNOLOGY, the manufacturer of the Hercules graphics card, has announced that it will be producing a version for the PS/2 system. Unlike many other manufacturers who have announced cards for the new system, Hercules has a tricky task since the Hercules graphics must work with the new VGA standard without impairing it. No details have been given of price; availability is from this autumn.

More information from Hercules Computer Technology, 2550 Ninth Street, Berkeley, Ca 94710, USA. Telephone: (US area code 415) 540 6000.

Sirton PC Mirror

SIRTON COMPUTER SYSTEMS has launched PC Mirror, a device which allows video images to be captured and stored. The board interfaces with standard CCTV equipment. It can digitise images in real time, displaying them on a standard monitor. At any instant images can be frozen and filed. Each image requires 64K, and is resolved into 256 grey levels.

PC Mirror comes with software enabling images to be modified in various ways. The cost is £775. Details from Sirton Computer Systems, 7 Greenlea Park, Prince George's Road, London SW19 2PT. Telephone: 01-640 6931.

AMSTRAD PCW-9512

AMSTRAD has announced that it will be launching an upgraded version of the PCW-8512 word processor in September, both in the UK and the US. No UK prices have yet been released, but in America the price will be $799.

The main points that distinguish the new product from the old are a daisywheel printer and a white screen. Both are intended to endear it to secretaries and other office staff. A newly styled keyboard takes advantage of some of the new features of the Locoscript word-processing program.

The daisywheel is rated at 20 cps, and has a 15in. platen, allowing it to handle paper up to 15.5in. wide. The parallel interface allows other printers to be connected; printer drivers for the Epson FX-80 and Diablo printers are supplied. The machine comes with 512K memory as standard, and one 1Mbyte disc, with a second optional drive.

Locoscript II has a number of new features. There is now a 78,000-word spelling checker and user-definable dictionary. A mail-merge program called Locomail is supplied with Locoscript II.

The PCW-9512 will be launched at the PCW Show at Olympia on 23 September. For more details contact Amstrad, Brentwood House, 169 King's Road, Brentwood, Essex CM14 4EF. Telephone: (0277) 228888.

New modems from Hayes

HAYES has launched a new modem and cut the price on its current models. The Smartmodem 1200 now offers V-21 300 baud, full-duplex, V-22 1,200 baud, and V-23 1,200/75 baud. The last option is an addition designed to allow users to log on to viewdata services. The external version of the 1200 costs £499, not including software. The internal card version, the 1200B, costs £449.

A new comms software package, Smartcom III, can be supplied with the modems and operated using either menus or commands. There is also a simple communications programming environment (Scope), which allows repetitive and unattended operations to be automated by writing a script which is stored for future use.

Following this launch, Hayes's older models have been reduced in price. The external and internal versions of the V-22 Smartmodem 1200 cost £449 and £399 respectively. The upgrade to Smartcom III from Smartcom II costs £20 until the end of the year, and £50 after that.

For more information contact Hayes Microcomputer Products, 1 Roundwood Avenue, Stockley Park, Uxbridge, Middlesex UB11 1AE. Telephone: 01-848 1858.

Low-cost network card

MICRO PERIPHERALS has announced an eight-bit token-ring adaptor card for £399. It uses the Texas TNS-380 chip set, which was jointly developed with IBM, and operates at a data speed of 4Mbit/s. There is also a multi-access unit (MAU) which can support eight adaptor cards, and has the ability to daisy-chain with other MAUs. The price is £499.

For more information contact Micro Peripherals, Intec Unit 3, Hassocks Wood, Wade Road, Basingstoke, Hampshire RG24 0NE. Telephone: (0256) 473232.

HARDWARE SHORTS

- DEC has reduced the price of its Vaxmate product. The basic system is down 24 percent to £2,315, while the hard-disc add-on unit is down 18 percent to £1,113. Details on (0734) 868711.
- The Taxan Multivision 770+ will work with the new IBM VGA adaptors and the Mac II. The cost is £699. Details on (0706) 217744.
- Compaq has announced that disc cacheing will be standard on all its 80286-based models as well as its 80386 machines. Details on 01-940 8860.
- Computers Unlimited is offering 2Mbyte RAM Simms for the Mac family for £499 and 4Mbyte Simms for £998. Details on 01-349 2395.
- Mekom Computer Products has cut the price of the Kyocera F-1010 laser printer from £2,795 to £2,495. Details on 021-454 2288.
- The Viglen family is another group of low-cost clones. Prices start at £499 for a PC and £2,995 for an 80386. More on 01-843 9903.

Apple Telex

APPLE has introduced a telex facility for the Macintosh. Called Apple Telex, the system consists of Vitex software from AM Technology, and a hardware telex manager from Trend Communications. Apple Telex uses the standard pull-down menu approach to control the programs.

The cost is £1,995 for the single-user version, and £2,995 for a multi-user system. Full details from Apple Computer, Eastman Way, Hemel Hempstead, Hertfordshire HP2 7HQ. Telephone: (0442) 60244.

Kudos cards 30

KUDOS SYSTEMS has launched a 30Mbyte hard disc on a card for £299. It is claimed to fit into one expansion slot on most compatibles without encroaching on the space above the slot next door.

Another product from the same company is the Stradcom V-21/V-22 modem offering Hayes compatibility. It is BT approved and costs £159.

More information on these products can be obtained from Kudos Systems, Capitol House, Capitol Way, London NW9 0EQ. Telephone: 01-200 6511. PC

New add-ons for Lotus 1-2-3

THE NUMBER of add-ons aimed at Lotus 1-2-3 spreadsheet users continues to grow. Seemore lets you cram more information on your screen in a variety of compressed display formats. You can thus see double, triple or quadruple the number of 1-2-3 cells displayed on your screen.

The £85 utility requires no special hardware and works with CGA, EGA and Hercules adaptors on old-style IBM-compatible machines, as well as with the VGA graphics of the PS/2.

Contact: In Touch, Fairfield House, Brynhyfryd, Caerphilly, Mid-Glamorgan CF8 2QQ. Telephone (0222) 882334.

Deja is a pop-up that gives 1-2-3 users access to dBase III Plus files without leaving their worksheet. It lets you transfer data both ways and gives you 11 new 1-2-3 functions that allow you to reference dBase information from within a cell formula. Deja costs £100 from Softsel dealers.

More information is available from Softsel, Softsel House, Syon Gate Way, Great West Road, Brentford, Middlesex TW8 9DD. Telephone: 01-568 8866.

Low-cost DTP

WITH a UK price of £59.95, Newsmaster is one of the cheapest desktop publishing packages on the market.

Newsmaster supports over 170 different matrix and laser printers, and comes with 34 built-in typefaces and its own library of over 280 pre-drawn images. Designed mainly for producing newsletters and notices, it can cope with layouts of up to 10 columns. You can import existing ASCII text into the package, but it also has its own text editor built-in.

More details from Polyrom, 2A Davis Road, Poole, Dorset BH12 2BA. Telephone: (0202) 673777.

Meanwhile Fontasy, an established low-end DTP product, has been enhanced. The bare program still sells for £70, but you can now buy add-ons which provide extra features, more founts, images for the image library or let you use EMS extended memory effectively.

Details from Ctrl Alt Deli, 44 Brownbaker Court, Neath Hill, Milton Keynes, MK14 6JH. Telephone: (0908) 662759.

EASIER WAYS TO DEAL WITH SECURITY

TWO NEW encryption packages and a backup system all attempt to make the business of making things secure less irksome.

Secret Disk works by setting up a part of your hard disc as a security area; you then access it as drive D or whatever in the normal way. You can put programs as well as data on your secure disc and run them from there.

The advantage of this approach is that everything in the secure area is encrypted, including programs and temporary files. Without the right password no access is permitted. Secret Disk was developed by Lattice Inc. of Lattice C fame, and is available in the UK for £85 from Roundhill Computer Systems, Axholme, London Road, Marlborough, Wiltshire SN8 1LR. Telephone: (0672) 54675.

MS/Crypt also adopts a memory-resident approach. It will automatically encrypt and decrypt designated files as you access them. In addition to its security function MS/Crypt provides several other disc utilities, including the ability to compress files, to search through your sub-directories for a particular file, and to display your directory tree structure on screen. MS/Crypt costs £195 from Javelin Systems, 29 Bell Street, Sawbridgeworth, Hertfordshire CM21 9AR. Telephone: (0279) 726525.

Easyback is not designed for encryption, but instead enhances security by encouraging you to take backups regularly. The £140 package consists of a software utility and a box of colour-coded discs to go with it. You can get Easyback in a PC version with 360K discs, in AT format with 1.2Mbyte discs or in PS/2 format with 3.5in. discs.

You set the backup software up in various ways. For example, you can choose only to back up files that have been changed since the last use. On-screen prompts guide you through the procedure.

Easyback is available from RPS, High Street, Houghton Regis, Bedfordshire LU5 5QI. Telephone: (0582) 867222.

Pagemaker upgrade

ALDUS has announced a major new release of its Pagemaker DTP software for the Mac. Along with new features like kerning, automatic hyphenation and support for facing pages, Pagemaker 2.0a offers file compatibility with the PC version of Pagemaker. In companies with mixed hardware setups you will also be able to transfer pre-formatted text files from IBM word processors like Word Perfect and WordStar across to the Pagemaker 2.0a running on a Mac.

Pagemaker 2.0a costs £450 and is available now. Contact Aldus UK, Craigcrook Castle, Craigcrook Road, Edinburgh EH4 3UH.

SOFTWARE SHORTS

- Xenix System V for the IBM PS/2 Model 50 and 60 will begin shipping in the third quarter of this year, according to the Santa Cruz Operation. For further information contact Santa Cruz Operation on 01-439 2911.
- Smart-pad is a £49 desk accessory which is a kind of souped up version of the Mac's existing notepad with fast search and retrieve facilites. You can store 32,000 characters on each page and copy, cut and paste text to and from other applications. For more details contact Blyth Software on (0728) 3011.
- Microsoft is offering users of all other word-processing packages a chance to move over to Microsoft Word 3.1 for £200 — which is £250 less than the normal price. For details telephone Microsoft on (0734) 500741.
- In Touch has produced a specialist catalogue containing around 150 different add-on products for dBase III plus. It is free from In Touch, telephone: (0222) 882334.
- Supadupadir works just like the MS-DOS Dir command but it keeps a master list of all your files on all your discs. It costs £10 from S&S Enterprises. Telephone (02403) 28095.
- PC Blast II is a £195 comms program which emulates most standard terminals. It claims to be particularly good at transferring files across bad telephone lines or satellite links. Further details available from Software Ltd. Telephone 01-278 2377.

Stronger rival for dBase

ASHTON-TATE's dBase III Plus application generator and database is likely to run into renewed competition from Foxbase Plus with the release of new versions of the clone product. The high-performance version for 80386 machines, price £595, runs with the processor in Protected mode.

SCO Foxbase is a new multi-user implementation running under Xenix; it costs £795. For ordinary MS-DOS users the new £395 Foxbase 2.00 has several enhancements, including a claimed doubling in speed.

Contact: In Touch, Fairfield House, Brynhyfryd, Caerphilly, Mid-Glamorgan CF8 2QQ. Telephone: (0222) 882334. PC

• PC USER SHOW •

AS THE IBM bandwagon assumes unstoppable proportions, so the show based around it grows in importance. And yet this year, despite self-confident trumpetings from the organisers, the feeling on the ground was surprisingly subdued. Perhaps part of the problem is that all PCs are essentially the same, and pretty dull too when lined up in rows.

Mostly it was a case of first public displays for equipment that had already been announced. For example, Amstrad was showing the PC-1640, and its stand was probably one of the most popular at the show. Not far away was Dell Computer Corporation, already bidding fair to become Alan Sugar's *bête noire*.

Olivetti was also displaying its new machines, reported in our last issue. Alongside the established names there were countless hordes of low-cost clones. Some stands were unabashed box-shifters: they even had the boxes there to prove it — all of them. Some of the more interesting products are described below.

Sharp is the sharpest

ONE OF the best showings of new equipment was made by Sharp on a stand that was rather tucked away to the side. In addition to old machines, new versions and new products, there were also several future peripherals being shown for the first time in this country. Perhaps the most exciting was the MZ-1V01 image-processing terminal which could function as a fax machine, image scanner and copier — see page 91 for more details.

Another exotic beast was the JX-450 colour scanner with a resolution of 300 dots per inch. Each RGB element can recognise 64 shade variations, and the colour tone capacity is over 260,000 shades. The price is expected to be about £5,000.

The QA-25 is an LCD projection device, similar to the Kodak Datashow reviewed in the June issue of *Practical Computing*. It weighs 6lb. and is just over 12in. square. The cost is around £750.

Sharp also showed its new portable, the PC-4501. This compact unit uses the standard flip-up LCD, supported rather precariously on one side only. The LCD is back-lit, and there is one 3.5in. floppy and up to 640K of RAM. The V-40 processor runs at 7.16MHz. Parallel and serial interfaces come as standard. The twin-floppy version will be available later this year, while the 20Mbyte hard-disc version will not be around until early 1988.

Finally, an upgrade to the PC-7000 series was launched. Called the PC-7200, it is an AT compatible with a 20Mbyte hard disc. The internal expansion slot will take full-size PC or AT cards. It weighs 21lb. and costs £2,995.

For details on all Sharp products at the show contact: Sharp Electronics, Sharp House, Thorp Road, Manchester M10 9BE. Telephone: 061-205 2333.

PC-based typsetting

ALONG with 80386-based machines, desk-top publishing (DTP) dominated the show. This was apparent not only from the software exhibited, but the hardware too — particularly high-resolution monitors. One indicator of how seriously the printing industry is taking DTP was the presence of a typesetting company, Itek Graphix, at the exhibition.

Itek announced an enhanced version of its Personal Typesetting Workstation (PTW) software package for the IBM PC and comatibles. PTW is a capable of composing text at speeds of up to 6,000 characters per second. It offers menus, prompts and over 100 help screens, which together with a tabbing capability designed to simulate an electric typewiter, are aimed to make the program simple enough for those not experienced in typesetting to use it.

PTW costs £35,000. It includes over 100 typefaces on-line with the ability to mix 128 faces in any job. A 50,000-word dictionary contains data for hyphenation and spell checking. It is also available with the PTW laser printer which uses the same type library as the Digitek typesetter.

For details contact Itek Graphix, Westlink House, 981 Geat West Road, Brentford, Middlesex TW8 9DN. Telephone: 01-568 9297.

PS/2 Model 60 for hire

CCA MICRO RENTALS was exhibiting an IBM Personal System/2 Model 60 at the show. The company will be renting the machine, with options ranging from one day to a year.

The marketing director at CCA, Graham Hallett, claimed that the Model 60 had attracted a vast amount of speculation in the industry about its capabilities and the impact it is likely to have on the market. CCA's rental option scheme for the Model 60 is designed to allow users to test its capabilities before purchasing.

The Model 60 will be available at a rental price of £220 per week or £500 per month. The rates for the Model 50 are £140 per week or £350 per month. The Model 30 is also available at £95 per week or £225 per month. Similar rental options will be offered for the PS/2 Model 80 when it appears.

For further details contact CCA Micro Rentals, Unit 7/8, Imperial Studios, Imperial Road, London SW6 2AG. Telephone: 01-731 4310.

Taxan LCD printer

ALSO tucked away was a new printer on the Taxan stand. It looks like a laser but uses LCD technology instead. The Crystal Jet has a speed of eight pages per minute, and can emulate nine other printers. The resolution is 300 dots per inch and it comes with 2Mbyte of RAM. The cost will be less than £3,000, and the launch date will probably be in the autumn.

For further details contact Taxan (U.K.) Ltd, Taxan House, Cookham Road, Bracknell, Berkshire RG12 1RB. Telephone: (0344) 484646.

Autoscan monitor

MICROVITEC launched an autoscanning monitor and a range of graphics system at the show. The 14in. Autoscan colour monitor can adjust automatically to different scan rates. This means that users can upgrade to better graphics standards or to one of the PS/2 micros without buying a new monitor.

The Autoscan handles CGA, EGA and PGC graphics standards as well as the MCGA and VGA standards used by IBM's PS/2 range. It costs £600. For further information contact Microvitec, Futures Way, Bolling Road, Bradford, West Yorkshire BD4 7TU. Telephone: (0274) 390011.

Ellinor's Voicekey

ELLINOR PERIPHERALS launched a voice-recognition package called Voicekey. It is designed to enable IBM PC and compatibles to recognise words and convert them into keystrokes.

The system consists of an expansion board, a floppy disc and a microphone. Ellinor claims that Voicekey's one-pass entry system allows users to train and have the system recognise words by repeating them only once.

The system can also recognise and edit voice commands without exiting the current applications. This means that users can enter and edit new commands while in an application program. Voice key costs £995.

For more information contact Ellinor Peripherals, Arkwright Road, Reading, Berkshire RG2 0LS. Telephone: (0734) 863417.

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And with Miracle, you also get modem features like 'auto-dial' and 'auto-answer', so you can send and receive messages when it suits you.

That's really just the beginning. There's also software for telex, file transfer and access to Prestel and over 200 independent databases. (All this, because Miracle modems support Hayes protocols, the industry standard.)

Perhaps most remarkable of all is the price. You can have a Miracle modem complete with software for as little as £226. And if you buy now, we'll give you a year's subscription to an electronic mail service absolutely free.

To demonstrate exactly what Miracle modems can do, we've produced a booklet: '70 new tricks to teach your computer.'

For your complimentary copy, complete and mail the coupon. It'll be with you as quickly as the post office allows.

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You may not have expected a computer this powerful to have come from the Apple family, but try it out and we think you'll be glad it has.

Please send me more information about the Macintosh II. Post to: Apple Computer (UK) Limited, FREEPOST, Information Centre, Eastman Way, Hemel Hempstead, Hertfordshire HP2 4BR or Dial 100 and ask for Freefone Apple.

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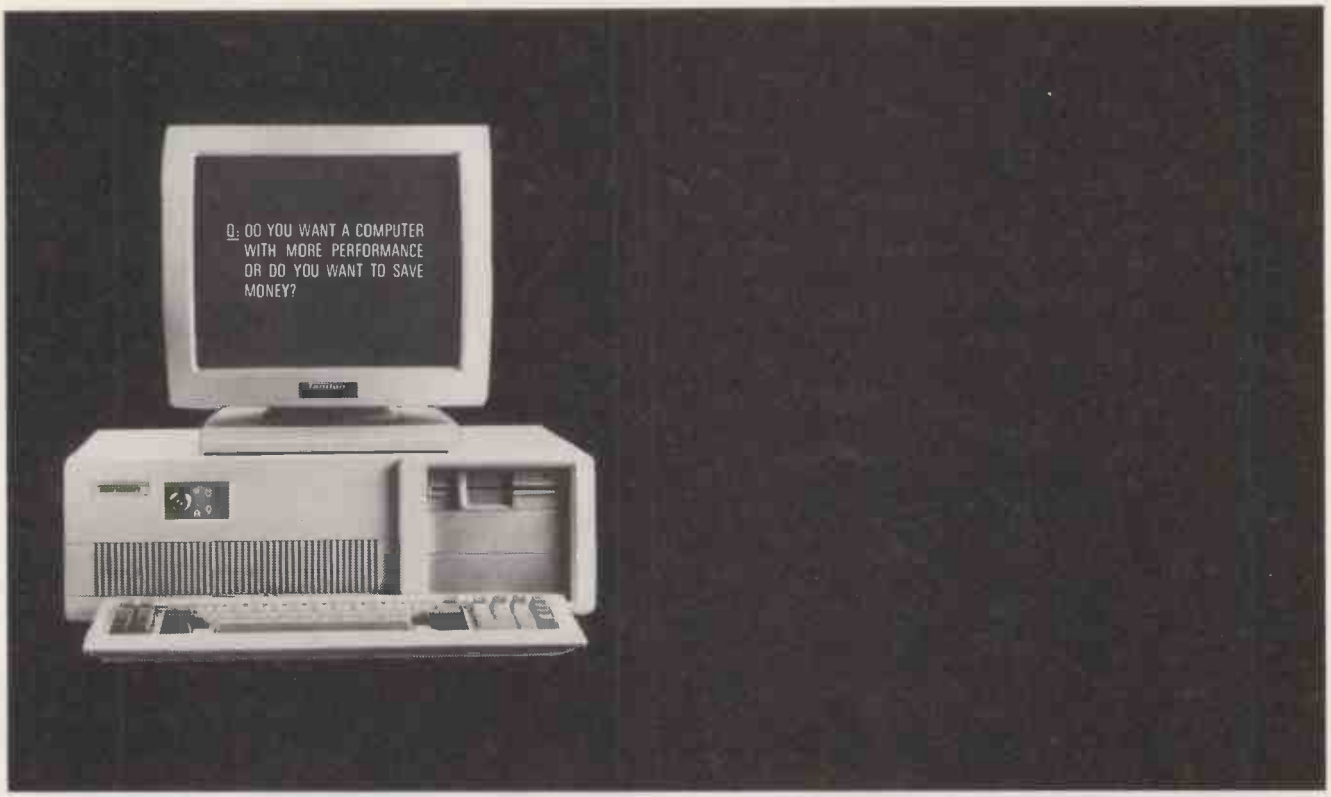

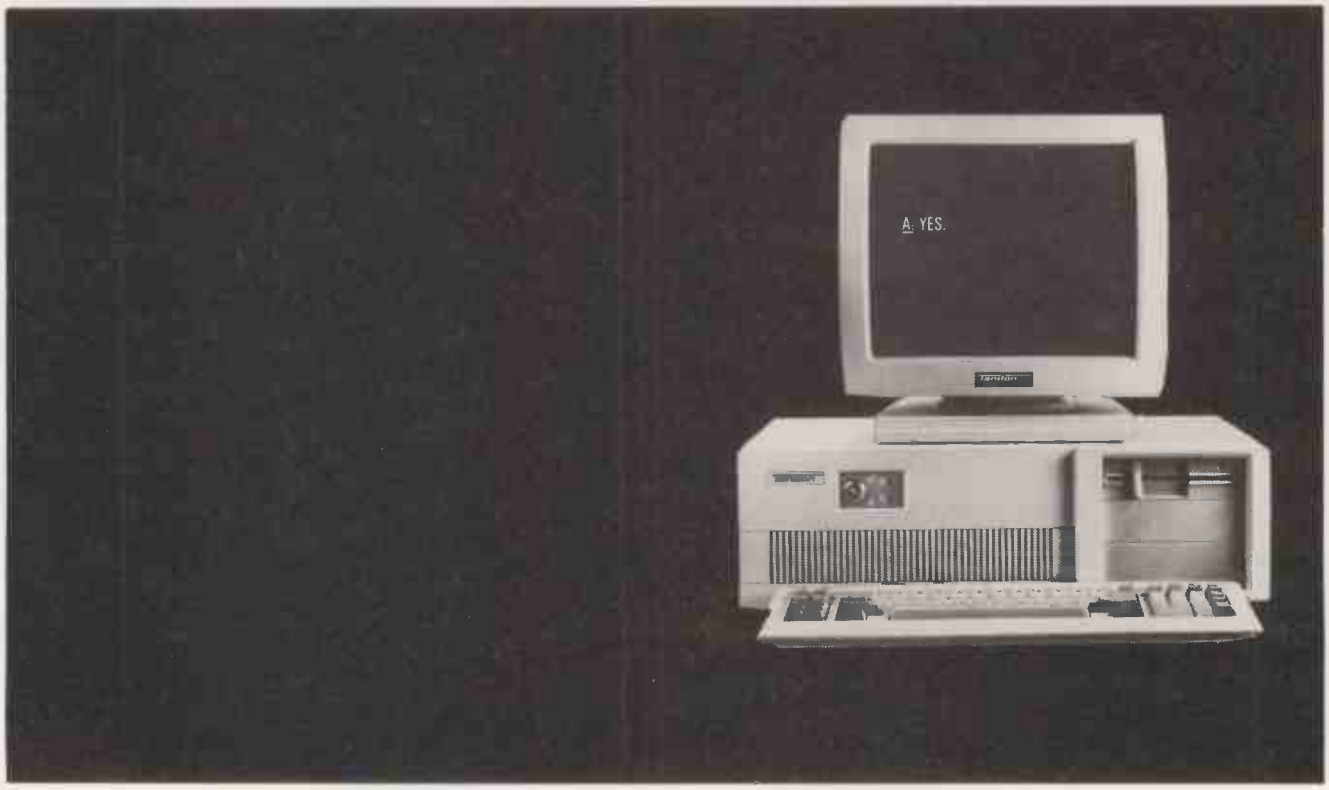

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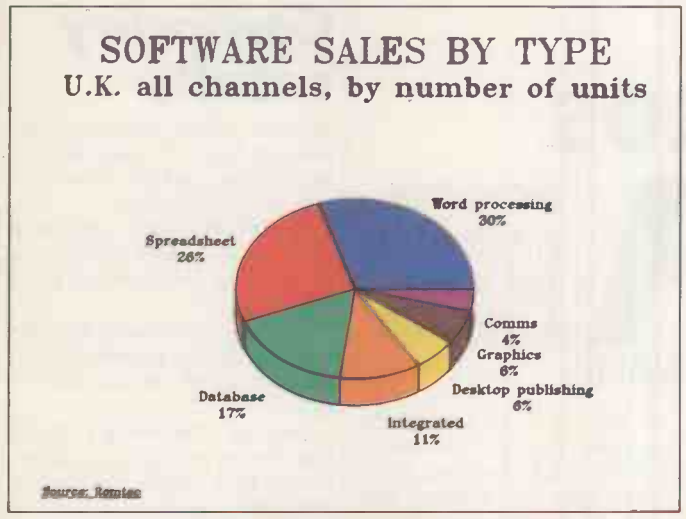


BRITAIN's TOP-SELLING SOFTWARE

WORD PROCESSORS and spreadsheets still dominate the PC software market, making up half the non-accounting packages sold in the UK, according to Romtec's latest figures. Word Perfect is the leading high-end word processor, with WordStar 1512 taking the low-end Amstrad market. Lotus 1-2-3 continues to dominate the spreadsheet scene, although Computer Associates' Supercalc also makes a strong showing.

Desk-top publishing packages now represent nine percent by value of non-accounting software sales, although only five percent of the unit sales. Aldus Pagemaker and Ventura Publisher hold the number 1 and 2 positions respectively, way out in front of anything else.

Romtec's figures refer to sales made in the month of May, and cover all the main distribution channels. They exclude the highly fragmented accounting market, where a large number of vendors continue to offer products, often through highly specialised channels.

SOFTWARE BRAND LEADERS
U.K. all channels, unit sales for May '87

Type	Top seller
WP	Wordstar1512
Spreadsheet	Lotus 123
Database	dBase III +
Integrated	Symphony
DTP	Pagemaker
Graphics	Freelance
Comms	Chit-Chat

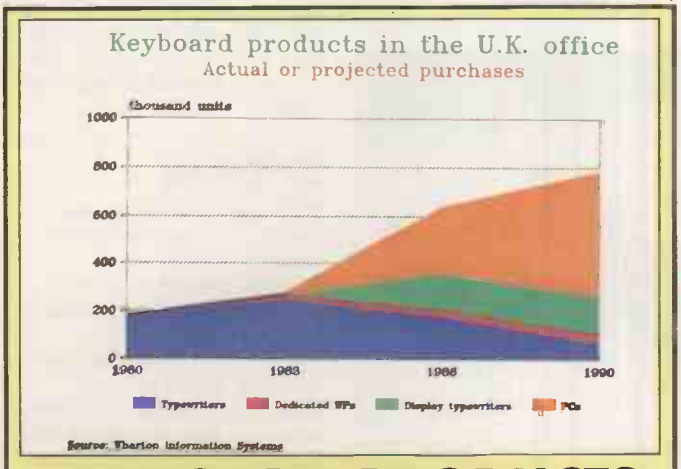
Source: Romtec

In all categories the top-selling package by volume also leads in terms of value, except in the case of word processing, where WordStar 1512 sells more copies than anything else but cannot match the revenue raised by the more up-market products.

More details about the UK's favourite word processors are provided by another market-research company, Context. Monitoring sales through 700 UK outlets, Context confirms that WordStar 1512 is the top-selling product. Word Perfect is in the number 2 slot by units sold but has a far greater share in value terms.

Context's figures, which are collected on a quarterly basis, show that Word Perfect's position is improving. It was number 4 in value terms in the last quarter of 1986, but moved to number 1 in the first quarter of this year.

While the low-end WordStar 1512 sells well, it is not its publisher's biggest earner. It is too cheap to generate as much revenue as Micropro's more expensive products such as WordStar 2000 and WordStar Professional, the current incarnation of traditional WordStar. But even these Micropro products are only at positions 5 and 6 in the earnings league. Word Perfect, Ashton-Tate's Multiplan, Microsoft Word and IBM's Displaywrite 3 all take more of the purchasers' money.



KEYBOARD PRODUCTS

BY 1990 around 25 percent of British office workers will use some kind of keyboard product to process information, according to Wharton Information Systems. Wharton's report is based on interviews with leading corporate users and panels of dealers. One of the most interesting things to emerge is that it is not the PC alone which will be fuelling this growth. Simpler products, dubbed display typewriters by Wharton, will also play a role. The Amstrad PCW is one example of this type of system, but machines from traditional office-equipment companies like Olympia and Olivetti resemble a typewriter even more closely and are also likely to be important.

SPREADSHEET SKILLS

RESEARCH conducted jointly by Lotus and the temp agency Manpower suggests that substantial numbers of secretaries now use spreadsheets. Over half of the 92 organisations contacted needed temporary secretaries who could use Lotus 1-2-3, and just under 10 percent hired them frequently. According to Lilian Bennett of Manpower, in most cases the temporary is only expected to be able to enter information into a model that someone else has built, but 10 percent of the firms surveyed expected the temporary worker to be able to design the model as well.

HARD DISCS

AT LEAST 80 percent of the PCs going into UK corporates have a hard disc, according to Wharton Information Systems. The average disc size is 20Mbyte and the PCs typically have 640K of memory. Around 40 percent are AT-level machines. The PS/2 has not yet shown up in Wharton's figures, but the company thinks the strong trend already evident among users towards more powerful machines is likely to continue.

NEC COLOUR MONITORS

NEC now commands 40 percent of the UK market for 14in. colour monitors according to Romtec, not 14 percent as we incorrectly stated last month.

Charts this month prepared with the new Harvard Presentation Graphics. It costs £295 from Softsel; telephone 01-568 8866.

RITA SOFTWARE PRODUCT AWARDS

PRACTICAL COMPUTING is sponsoring one of this year's Recognition of Information Technology Achievement (Rita) awards. There are four categories in all, covering software, hardware, peripherals and users. *Practical Computing* is sponsoring the software category.

This year's judges are Douglas Eyeions, Director General of the Computing Services Association; Edward Cluff, Secretary General of the Institute of Data Processing Management, Ernest Morris, President of the British Computer Society, John Griffiths, Group Marketing Director of the National Computing Centre, and Ian MaNaughi-Davis. The awards will be made at a dinner to be held in Birmingham's Metropole Hotel on 19 January 1988, at the time of the Which Computer? Show.

Last year the joint winners in the software category were Ansa's Paradox and Direct Technology's PC Automator. To determine this year's winners needs input from you. While the judges make the final decision, it is based on a range of software companies which can be nominated by anyone. *Practical Computing* therefore invites you to submit the name of either an entirely new software package or one which is a substantial improvement to an established product and which was in use in the UK during 1986/87. Entry is free.

RITA AWARD Recognition of Information Technology Achievement

In addition to the name of the nominated product, you should give brief details of why you feel it should win the software Rita award. Also give your own name and company, as well as your address and telephone number.

All nominations must reach us by 30 September 1987. They should be sent to Practical Computing, Room L309, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Envelopes should be marked "Rita" in the top left-hand corner.

More Telecom Gold facilities

TELECOM GOLD has added Kompass Online to its range of on-line databases. An electronic business directory containing information on 110,000 UK companies, it is compiled from directories such as Kompass, Kellys, Directory of Directors, Dial Industry, British Exports and UK Traded Names.

Kompass Online provides access to marketing and sales leads, product and service availability, and the contact names of agents and representatives. The information can be searched by company name, product, county or number of employees. The service currently offers 45,000 product categories. It allows mailing lists to be created which may be stored on a Telecom Gold text file.

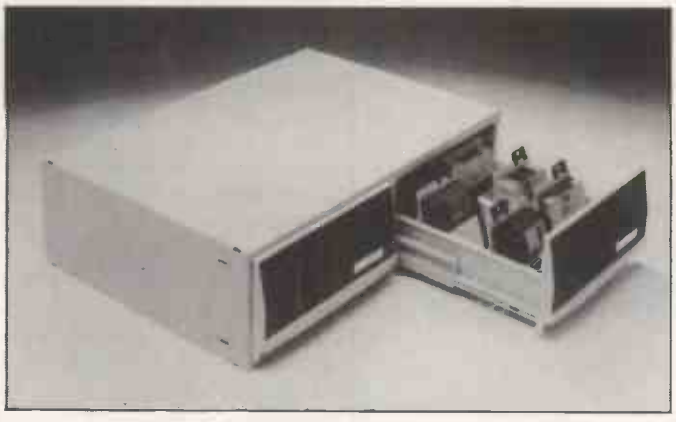
Telecom Gold has also announced that Italy has joined the Dialcom stable, and is contactable via Telecom Gold. Finland will be joining in the autumn.

For more details contact Telecom Gold, 60-68 St. Thomas Street, London SE1 3QU. Telephone: 01-403 6777.

World agreement on piracy

A STATEMENT from the World Computing Services Industry Forum held in Munich has been signed by 15 nations. The main thrust of the statement is simply that international copyright laws should form the basis for protecting software, which in itself is hardly earth-shattering. It does, nonetheless, represent something of an achievement, since Japan is one of the signatories. Japan has in the past been rather sceptical of pushing copyright as the panacea for piracy, but it has now fallen into line with the rest of the world.

The countries taking part were West Germany, United Kingdom, Switzerland, Denmark, Belgium, Sweden, Spain, France, Finland, Austria, United States, Australia, Canada, Japan and Taiwan.



Floppy-disc filing

ONE OF the problems with the increasingly standard 3.5in. discs is that they are untidy to store. The Multiform range of cabinets from Action Computer Supplies allow large numbers of discs to be stored in a compact and economical way. Each unit is capable of holding up to 100 discs.

The Multiform cabinets cost £34.75 for a non-lockable version and £39.95 for a lockable one. More details can be obtained from Action Computer Supplies, Abercorn Commercial Centre, Manor Farm Road, Wembley, Middlesex, HA0 1WL. Telephone: (0800) 333333.

Company results

OLIVETTI's end-of-year figures show revenues were 19.2 percent up to £3.45 billion, and profits rose 12.3 percent to £267 million.

Apple's third-quarter sales were up 42 percent to $637 million; profits were up 65 percent to $53.5 million.

Lotus's second-quarter sales also rose 42 percent to $94 million; profits were up 38 percent to $16.3 million.

Software Publishing's third-quarter sales were up a cool 80 percent to $8.3 million. Profits were $860,000, against a loss of $737,000 in the previous quarter.

For Micropro sales rose by to 65 percent in the third quarter to $11.4 million. Profits stood at $1.5 million, against a loss of $2.4 million last time.

In its second quarter, newly merged **Unisys** reported a profit of $76.2 million on a turnover of $2.3 billion.

Apple names subsidiary

APPLE COMPUTER'S recently formed software subsidiary is to market applications under the name Claris Corporation. Apple claims no significance for this name, other than that it can be registered worldwide without problems.

The new company will take on all the existing packages currently published by Apple. According to industry analysts, these alone will give Claris starting revenues sufficient to place it among the top five personal computer software companies.

SHORTS

- Amstrad has announced that it is forming an Italian subsidiary. Contrary to Amstrad's usual practice it will be wholly owned by the British company.
- Lotus is still on the acquisition trail. Latest in line is Datext, a provider of business reference information on CD-ROMs. This fits in with Lotus's One Source CD-ROM product.
- Autodesk has announced that sales of Autocad have passed the 100,000 mark.
- Javelin Software, the designer of the Javelin advanced spreadsheet, is making its first public share offering in the US. There will be 8.5 15,000 shares, priced between $6 and $8 each. PC

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BY JACK SCHOFIELD

WHAT FUTURE FOR TELECOM EMAIL?

JUST AS THE EMAIL SERVICES ARE GOING FROM STRENGTH TO STRENGTH, ALONG COME ANNOUNCEMENTS THAT CHARGES ARE TO INCREASE. WILL THE USERS STAY FAITHFUL?

Only a month or so ago I was happy about the future of email. Telecom Gold had celebrated its fifth birthday, improved all its documentation and was growing strongly. Gateways had been opened up to Kompass Online, and to allow Micronet users on Prestel direct access to the Gold computers, promising to enlarge the user base still further. File transfer was nearly here. The X-400 message-handling software was being installed to allow the public email system to be linked to private ones, like DEC Vax networks and Data General CEOs.

In the more mature US market, The Source was taken over by venture capitalists with big ideas. MCI Mail linked up to Compuserve, British Telecom moved its Dialcom subsidiary to new headquarters, had a royal opening and looked to be doing well. Internationally, Japan and Italy started to get their Dialcom services together — Mastermail was used during the Venice summit in June — while Finland signed up for the network.

If you can connect the major public email systems together, link in the big corporations, and make a few international connections over the X-25 packet switched network then suddenly the global village is in sight. What could possibly go wrong?

Well, plenty. In the UK, Telecom Gold's new boss, Phil Madden, dropped a bombshell by shifting to a character-based charging system from 1 August. I did a bit of crude arithmetic on my 1,200/1,200 baud access and found that the worst-case increase was some 570 percent. Even though Gold argues that average increases will be nothing like this, I face the horror of a monthly bill, currently running at around £30, maybe hitting £150. In addition, individual but not corporate users have been landed with a new £5 a month subscription charge, hitting light users proportionally harder.

As I wrote in the *Guardian* article "Panning for Gold" on 9 June, it is impossible to work out how real users are going to be affected by the new prices. Efficient users who upload files at 1,200 baud will certainly see their bills go up a lot; inefficient ones who enter text at two characters a second might see them go down.

Personally, I object to a charging schedule that penalises the efficient user at the expense of the wally who sits typing on-line, degrading everyone else's response time. Furthermore, charging for all the characters that go either to or from the Gold computers will make it very hard to work out the cost of any particular session, something that is easy to do with a time-based charge. In my experience, confusion about the cost of using a service is not good for business.

Suppose Telecom Gold's new charges put its growth into reverse? The recent rescue of One to One — which I never found of any use when I had a box on it — the gingering up of Easylink under its new Mercurylink 7500 label, the management buyout of Istel and other market activity may mean that the UK email battle is not over yet, as Gold's effective monopoly had led me to think. In the US, the email market is much more balanced between different players — see table below. In addition, I believe The Source has over 60,000 mailboxes, though it is mainly used by individuals rather than businesses.

With a number of strongly competing services, and firms that have no compunction about switching from one to another, the customer must benefit. However, in this case, the financial fly in the ointment also comes from outside. It comes literally in the form of a document known as *Interstate Access Charges Exemption for Enhanced Service Providers* CC Docket 87-208, from the US Federal Communications Commission (FCC). The FCC plans to stick around $5 an hour on top of data users' bills as from 1 January next year. If you are on-line for, say, 20 minutes a day or 10 hours a month, this will mean finding an extra $50 a month or $600 a year.

The FCC originally introduced such charges on long-distance phone traffic in 1982. Data services were excluded at the time because it was feared that rate shock would stunt the growth of national data networks and important value-added services like databases and electronic mail. Now, however, the FCC says that since data goes down the same twisted-wire cable as voice, data users must also pick up the tab.

The FCC argues that the extra charges go mainly to the Bell Operating Companies to cover their fixed network costs. This will enable overall charges to be brought down in the long run — and indeed, another drop in long-distance call rates is already scheduled for next July.

Nevertheless, there is going to be a rate shock when the extra charges are introduced. This will mean that some email and data users will drop out of the market, and some service providers will suffer. In particular, the little companies and individuals will get hurt most, since no charges are applied to the private lines used by the big corporations. As GTE Telenet's Philip Walker put it, "Large companies and information providers are exempted, while those not able to afford their own networks get banged on."

Walker points out that value-added network service (VANS) providers buy ordinary phone lines at standard business rates, "typically $30 a month; it's an all-you-can-eat type arrangement". The FCC's access charges will have a staggering effect on them, making many services uneconomic.

Whatever the arguments, it is certainly true that providing VANS, electronic mail and database services has not proved to be a licence to print money, even in America. Easylink is reported to be losing money, and services like Dialcom and The Source cannot have made much.

This means there is an argument for a sort of enlightened national self-interest. Information industries are the key to the future, so countries ought to encourage the growth of a computer-literate, data-friendly, network-using population. In France they take this idea seriously enough to lend out millions of free Minitel terminals. The vast amount of data traffic this now creates means that from the operator's point of view the terminals probably pay for themselves.

Neither the Bell companies in the US nor British Telecom in the UK are exactly on the breadline. Indeed, BT turned in over £2 billion in profits this summer. The extra cash that might temporarily be generated by network access charges in the US, and the character-based charges on Telecom Gold, is going to be invisible on that sort of scale. If Telecom Gold users drop out in droves, or defect to the much cheaper Mercurylink 7500, BT will soon find itself with lots of expensive, newly upgraded Prime minis and a reducing revenue to pay for them. And that won't be much fun at all.

US EMAIL MARKET

Service	Mailboxes
Western Union Easylink	155,000
British Telecom Dialcom	120,000
US Sprint's Telemail	100,000
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PARALLEL WORLDS

ONLY BY ADOPTING COMPLETELY NEW METHODS FOR HANDLING DATA WILL IT BE POSSIBLE TO BREAK OUT OF THE LIMITATIONS OF TODAY'S MACHINES.

We all think a lot of our PCs — well, most of us anyway — and we are always impressed by the seemingly endless stream of innovations which bring wider words, more storage and higher operating speeds. Such were the thoughts that came to me recently when I visited a travel agent to enquire about some cheap airline tickets. During the interminable delays while the helpful assistant endeavoured to access the often unobtainable databases, I had time to ponder on the state of the art in data-processing technology.

I forced myself to be objective, and to imagine what a visitor from another planet or another time might think of the tortuous procedures to which we humans willingly submit ourselves in order to obtain the most basic kinds of information and services. I quickly decided that despite our Worm drives and our high-resolution graphics we are really still in the paleolithic stage of data-processing development. There has to be a better way.

At present our horizons only extend as far as improved versions of basically the same machine architectures and programming tools that we have been using for the last 40 years. While this limited thinking persists, improvements will be incremental and unspectacular. So I decided to take a look beyond the limits of current technology and practice to see if the future can indeed be made to work.

The most obvious route to data-processing utopia is already being exploited by chip designers. Microprocessors perform calculations faster, memories get bigger and faster, and there seems to be no end in sight to the improvements being brought by the shrinking geometries laid down on the silicon wafers. Physical limits do exist, however, and already there are signs of a slowdown in the breakneck pace of size reduction and speed increase.

Another route is provided by parallel processing. Replacing a big, expensive microprocessor with teams of simple, inexpensive ones working together sounds like a great idea until the problems of co-ordination are considered. Using conventional microprocessors in this way is possible so long as the problem can be structured to suit, but few systems exist which can use more than a dozen or so devices effectively, and the costs of interfacing are high.

Alternatively, perhaps the answer to my prayer will come not from the hardware designers but from the software technologists. Artificial-intelligence techniques appear to promise a lot of the things I seek, and AI programs could even be run directly on my own — or the travel agent's — PC.

Taking the three routes in turn, there is some minor cause for celebration. As speed improvements arising from feature-size reduction on the silicon chip start to falter in the next few years, a new semiconductor technology will be waiting to pick up the speed challenge.

Already with us are logic arrays and even whole processors fabricated not in silicon but in gallium arsenide (GaAs). Carrier mobility is higher in the GaAs material, which means that things happen more quickly. A typical chip using the same 1 micron design rules currently used for silicon devices offers gate delays of only 100 picoseconds, a 10-fold improvement.

Experimental GaAs processor chips running at 200 million instructions per second have already been produced in the US. Such processors, linked by optical rather than wired connections, may provide the ultimate in processing capability for current architectures. Unfortunately, GaAs is currently an expensive and power-hungry technology, and the production and packaging problems may never be overcome in a way that is economical.

Perhaps the final word on speed will be provided by the room-temperature superconductor materials now being widely sought. For many years IBM pioneered work on a high-speed superconducting logic element called a Josephson junction, only giving up when they could see no economical means of routinely cooling their creation to liquid-helium temperatures. Room-temperature superconductors could change our whole world — not just our computers — but there is a long way to go before the technology is usable.

Parallel processing has already been made feasible by the amazing Inmos Transputer, which features an architecture directly supporting the concept of concurrent processing. All the interfacing hardware is provided on the chip so that large arrays of interconnected Transputers can be built up at low cost.

Systems using up to 100 of the Inmos devices have been produced, and performance has been mind boggling. Unfortunately, the problem of writing practical code for such a system remains formidable despite the concurrency support provided by the Inmos Occam language. On the artificial-intelligence front, languages like Prolog, Lisp and Smalltalk represent the first faltering steps along a new path to smarter non-numerical applications.

Put it all together and you have a high-speed, parallel-connected, artificial-intelligence machine — the fifth generation in fact — which should make its debut in the early 1990s. While it is not the complete answer to my quest for truly user-friendly systems, such a machine would certainly be a vast improvement, equivalent, perhaps to the Neolithic stage in the development of human society.

Anyone wishing to sample the delights to come can already start writing their own programs in Lisp or Prolog. The problem is that current conventional processors are better suited to number crunching than they are to the manipulation of the incomplete symbolic information which the true AI machine — like we humans — must face.

Before long, however, it could be possible to buy a plug-in PC peripheral card which will bring a real taste of AI potential to everyday applications. An American start-up company called Symbolics has unveiled its plans to market a microprocessor-like device which will be optimised for AI programming. The new chip, code-named Ivory, will use a 40-bit word length which includes a 32-bit address and data field and an eight-bit tag field for Lisp data types. Included on the chip will be a ROM array containing a standard Lisp interpreter so that it will run AI source programs directly.

The company is aptly named, because artificial intelligence is all about the manipulation of symbolic data in the form of lists or images, rather than the numeric data which is the basic diet of conventional machines. Input data and program structure can be described in terms which are already familiar to the programmer. It will no longer be necessary to reformat the data and the problem into the numerical arrays and arithmetic solutions necessary to prod conventional processors into high-speed action.

Initially, chips like Ivory will act as peripherals to conventional processors. But as operating systems and applications programs are developed, the tables will be turned. AI processors are potentially well suited to providing the core of future systems while numeric processors provide the specialist number-crunching capability.

The Symbolics Ivory chip will not become available commercially until mid-1988, although prototypes are already running. Whether it will revolutionise my travel agent I cannot say, but it should provide a useful bridge to the fifth generation. PC

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BY MIKE LEWIS

THE SURVIVAL OF THE OLDEST

WHY IS IT THAT WORDSTAR, DESPITE ITS MANY FAULTS, REFUSES TO DIE?

One of the most difficult questions that anyone can be asked is to recommend a good word-processing package for company use. It is not that there is a shortage of good software. On the contrary, between Multimate, Microsoft Word, Word Perfect and a few others there are plenty of excellent products to choose from. The problem is to select a package that a company can standardise on without vast expenditure on training. Having to send every new operator on, say, a Word Perfect course can be a very costly business. None of this will be news to most WordStar users as it is the main argument for continuing to soldier on with this ancient package.

Now I know there is plenty to be said against WordStar; I say quite a lot against it myself. It is a product of the late 1970s that never quite made it to the 1980s. But it does have one overwhelming advantage: it is well known. When secretarial agencies offer their staff free WP training they give free WordStar training. Ask your agency for a temp who is an experienced word-processing operator and you will get an experienced WordStar operator. Advertise for an audio typist with 12 months' WordStar experience and you will probably receive an excellent response. Advertise for someone with Word Perfect experience and your phone will not ring.

It was therefore with some enthusiasm that I read about WordStar 4 earlier this year. Would this new version allow a company to capitalise on the pool of WordStar experience, and at the same time deliver the power of heavyweight products like Word Perfect and Multimate? I ordered a copy, used it for several weeks, and concluded that the answer is no.

It is not that WordStar 4 lacks improvements. At long last, you can store margin and tab settings within a document; get at files in other directories; convert documents to and from non-documents; go straight to a page number; use headers and footers of more than one line; do proper conditional printing; undo accidental deletions; and a great deal more. I especially liked the spelling checker. I used to use Borland's Turbo Lightning, which was itself miles better than the old-fashioned batch checkers. But it could only check one screen at a time. WordStar 4 lets you check the whole document in one shot. Its thesaurus is also streets ahead of Borland's.

But there was plenty that I did not like. Customisation is an even bigger hassle than before. The keyboard macros are clumsy. You can no longer switch off the page break display. And there is still no windowing, which means that you can only work on one document at a time; one of WordStar's main drawbacks has always been the contortions needed to copy a paragraph from one letter to another.

There was also a problem with speed. One of the customisation options is to remove the annoying screen flicker or snow that you get with some monitors, but this is done at the cost of slower screen updating. With the snow suppressed the screen display on my Olivetti M-24 ran very slowly. The old WordStar was faster, and snow was never a problem.

If you already use WordStar 3, the £95 needed to upgrade to version 4 is worth paying. But for those just starting a WP department the new release leaves all the old problems unresolved.

Small outfits and individual users do not have to contend with the same problems of training and compatibility. Personally, I have found no difficulty in choosing a word processor for long documents like articles and reports. But how I wish I could find something suitable for knocking off one-page letters and file notes.

My ideal would be a program that I could load quickly — preferably a pop-up. It would let me simply type a page, print it, and forget it: no menus, a default page layout, and no need to save the file to disc. Sidekick nearly meets these needs, but its lack of printer support rules it out.

One answer might be Topcopy. This is an inexpensive word processor aimed at individual users and small businesses. You can use it as an ordinary program or as a memory-resident pop-up. It lacks high-powered features, but it does have all the basics like cut and paste, find and replace, headers and footers, reasonable printer support, and word counting.

Topcopy is window-based. You can have up to six documents open at a time, either on their own screens or in windows. Copying text from one file to another is a lot easier than in WordStar. There is also a mail-merge option plus a separate program for maintaining mailing lists. This side of things is rudimentary, but would be adequate for occasional producers of mail shots.

The snag is that Topcopy refuses to run on my Olivetti M-24. I have tried it on Amstrad, Victor and Tandon machines, and it works fine on them all. But the M-24 defeats it, which is a pity because this is my main machine at present. Steve Brimley, who wrote Topcopy, has promised to try to find the bug. I hope he succeeds.

Another product I will use regularly is the Palomar Utilities. It contains the sort of little programs that everyone needs from time to time — things that should have been built into the operating system but were not. You can name a floppy after it has been formatted, move files between directories without copying them and much more. Several firms sell utilities like these for a few pounds each, or you can pick them up for nothing from a user group.

Palomar's approach is to bundle the programs into collections that they sell at £19.95 a time. My favourite is a utility called Index in the Disc Collection. All it does is print the names of all the files on your disc, in alphabetical order, showing the complete directory paths. It might not sound much, but it is a terrific help when it comes to cleaning up the hard disc. It has certainly been worth £20 of my money.

Finally, things seem to be hotting up in the market for keyboard macros. A few years ago I was singing the praises of Smartkey, a utility that redefines the keyboard and attaches sequences of keystrokes to single keys. Then Borland's Superkey came out: it does the same job, but with lots of extra features. Superkey has the big advantage of being controlled entirely from menus that pop up over your main application, while many of Smartkey's features were only available from the DOS prompt.

Now Smartkey is back in a new and improved version. It too is now a full pop-up, and it has nearly all the features of the Borland product as well as a few new ones of its own. It can, for example, format discs and copy files while another application is running. It also supports nearly twice as many redefinable keys as Superkey. If you already make heavy use of Superkey you could be better off sticking with your existing macros. But for anyone thinking of buying a macro program for the first time, the new Smartkey is well worth a look. PC

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Palomar Utilities Palomar Systems, 84 Cedar Road, Botley, Oxford OX2 9ED. Telephone: (0865) 723392
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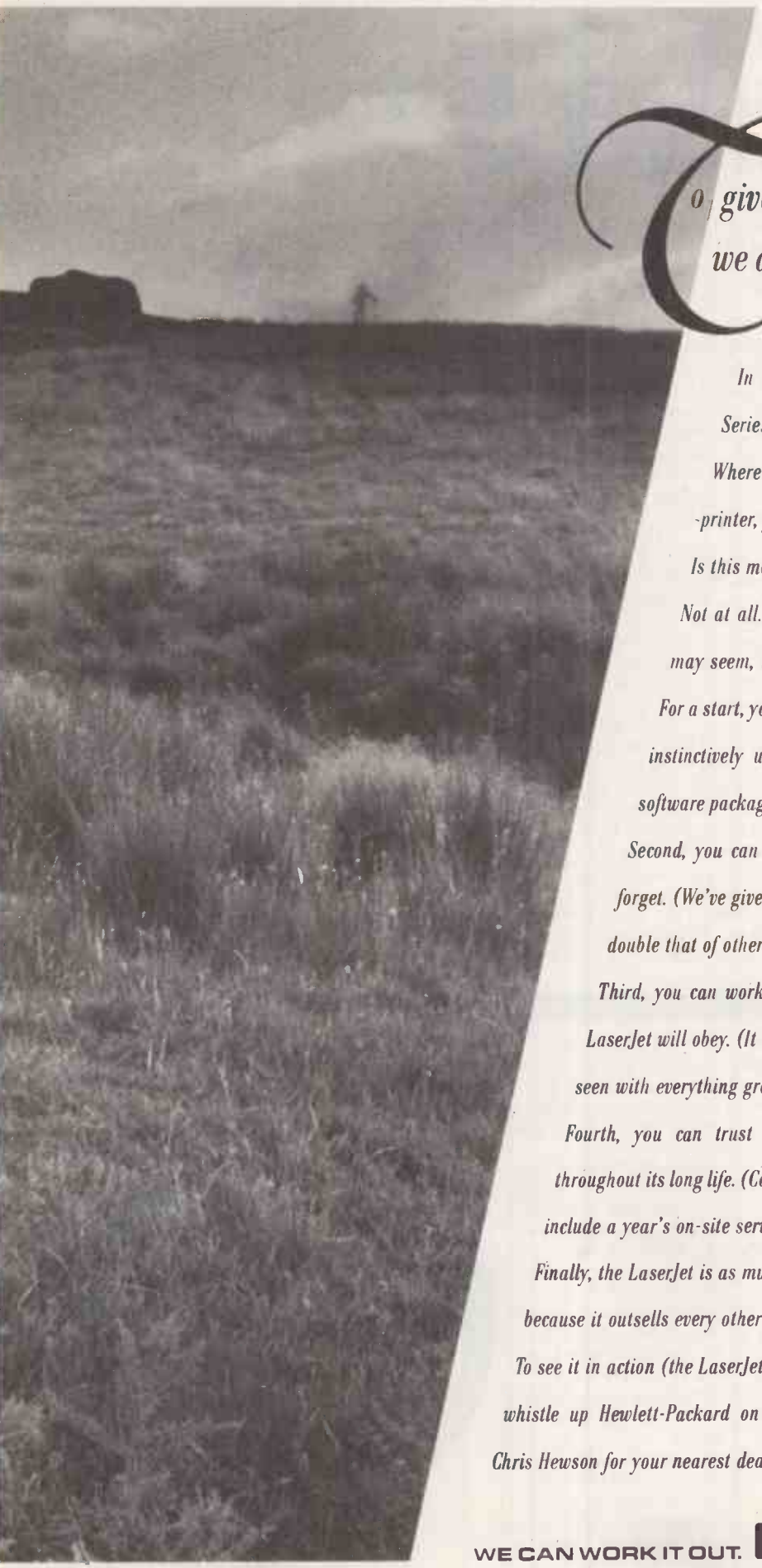

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WE CAN WORK IT OUT. HEWLETT PACKARD

Q For over a year we have been running a 20-machine IBM PC workshop using Supercalc 3. We have found that instead of using the Print Graph facility from function key f9 it is faster, more convenient and more economical on paper first to use f10 to look at the graph and then to dump graphics from the screen to the printer using Shift-Prtscr. When we considered using Lotus 1-2-3 in our workshop to widen student familiarity with spreadsheet packages, we were disgusted to find that 1-2-3 seems to disable the ability to dump graphics from screen to printer. When we tried it paper was fed continuously through the printer, printing just one character per page. Quite why Lotus would disable this useful facility I cannot imagine — particularly since 1-2-3, unlike Supercalc 3, requires both the saving of a Graph file and the loading of another disc to print a graph. How can we get round this problem?

COLIN LEWIS

A We have no first-hand experience of this problem but the Lotus Support Group provided a solution. Apparently Lotus has not disabled the facility you describe, since DOS is not by itself capable of dumping graphics to the screen. Lotus has provided a separate package for printing graphics, to support a wide range of printers.

It is nevertheless possible to dump graphics under certain circumstances. Users with an IBM colour card or Plantronics, who also have a suitable printer, will probably be able to dump the screen graph if they run the PC-DOS Graphics command first. This loads the file Graphics.Com. The situation with other graphics cards is less certain. Hercules cards may be able to dump graphics, depending on the date of the HGC file, which must be loaded before entering 1-2-3.

You can contact the Lotus Support Group on (0753) 840281.

MANAGING SUB-DIRECTORIES WITH WORDSTAR

Q I have used WordStar for some time for word processing, and Correctstar for checking spelling on an IBM XT. WordStar is fine, except that it does not understand sub-directories on the hard disc, and I have to keep copies of all three WordStar files in each sub-directory that I use. Is there any way round this?

S STEVENS

A We too use plain old WordStar more than any other program. We agree that it is a pity that most versions of the program do not recognise sub-directories, since this is important if you have a hard disc, but there are ways round this. Version 4 of WordStar does handle sub-directories properly and without any fuss. You can turn in your master discs and get the latest version for £99.

WordStar 3.4 and earlier versions require that three files — WS.Com, WSovly1.Ovr and WSmsgs.Ovr — are all in the directory you are using. The DOS command Path sets a search path so that you can find WC.Com in another sub-directory named in the Path command. Thus if you put

PATH C:\/WS

in your Autoexec.Bat file you can access WS.Com from the sub-directory WS on drive C when you are working in any drive or sub-directory. Unfortunately the Path command will only find executable files — that is those with extensions Com, Exe or Bat. It will not find the Ovr files.

There are two ways round this. If you have MS-DOS version 3.2 you can use a command called Append. It works like the Path command in that it defines a search path with the difference that it operates on data files, including those ending Ovr. You simply put the command

APPEND C:\WS

in your Autoexec.Bat file, and when a data file is requested, the computer will look for it first in the current directory, and then in C:\WS.

If you are using a version of DOS before 3.2, you will not have the Append command, but you can overcome the problem by copying the three WordStar files into a RAM disc, that you designate drive D, as part of your Autoexec.Bat file. You then change to drive D and load WordStar.

If you want to edit a file in a sub-directory on drive C you first use the CD command to change to the sub-directory on the hard disc that contains the file you wish to edit, then change to drive D if you are using the RAM disc method, load WordStar, and finally change the logged-in directory to C, which will in this case put you back into the sub-directory with the file you want to edit.

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Q I am having difficulty transferring WordStar files using Kermit. Basic files stored in ASCII will transfer, but WordStar files will not. I think that the problem may be control characters in the file, but I do not know what to do about it.

M JOHNS

A The ASCII character set comprises 128 characters, which include the alphabet in both upper case and lower case, the numbers 0 to 9, and a few extra symbols such as punctuation marks, +, −, *, / and so on. Each of these characters can be represented using seven binary bits. A Basic program stored as ASCII characters uses one byte to store each character, but only seven bits are actually used. The eighth bit is frequently wasted, but on some systems it may be used to make the parity odd or even as required by a particular machine.

Though WordStar files are mostly text that can be represented by seven-bit ASCII codes, the program sets the eighth bit for special purposes such as marking bold or underlined text. If you are using micro-justification, the end of each word also has its eighth bit set, so the program knows where it can add extra micro-spaces.

To transmit a WordStar file to another machine you can strip and discard the eighth bit, so that you are transmitting a pure ASCII file. WordStar version 3.4 includes a program called WSconvt that will strip any eighth bits that have been set, leaving you with an ASCII file that is transferable.

Another way to obtain an ASCII file is to make WordStar print the file required, but instead of sending the output to a printer, send it to a disc file. Both methods will remove print enhancements such as bold, underlining, subscripts and superscripts, as well as micro-spacing.

If you really want to preserve these attributes — for example, when transferring WordStar files produced on a CP/M system to an IBM PC where you may want to do further editing under WordStar — then you must preserve all eight bits. This means that you must instruct Kermit to send all eight bits, as for a binary file, rather than the text-file default of sending seven bits.

Exactly how to do this depends on what machine you are using, and you may need to consult the manual. If you are using Kermit-MS on the IBM PC or one of the clones, after loading Kermit type

SET EOF NO-CTRL Z

On a CP/M machine using Kermit-80 you type

SET FILE-TYPE BINARY

and on a Honeywell mainframe type

SET TEXT OFF

It is best to set both machines to eight-bit transmission, before using the Send and Receive commands as usual. We commonly move WordStar files in this way.

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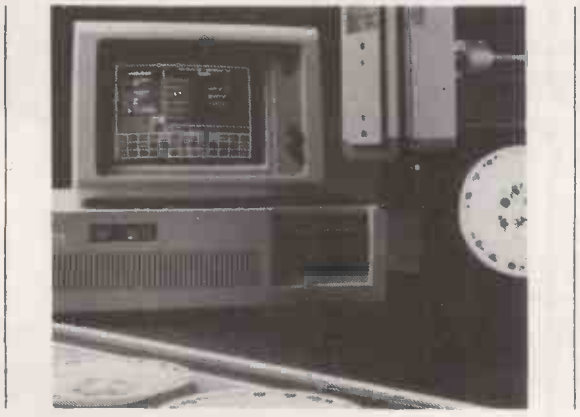

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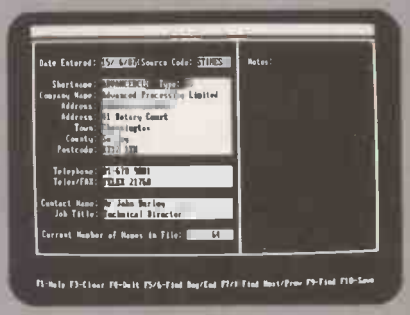

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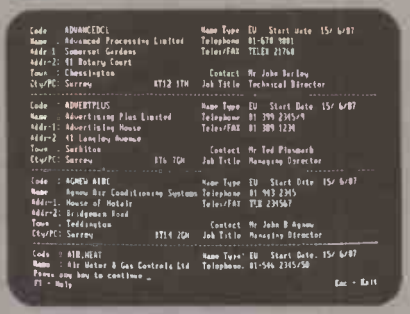

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"Excellent value for money, especially for novices wanting to learn and developers wanting economic runtime systems." **Personal Computer World Magazine**

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AMSTRAD PC-1640
MAKING AMENDS

By Glyn Moody

The unpleasant colour screen of the old PC-1512 been replaced by an EGA-compatible display, but will this be enough to give Amstrad its sought-after success in the business market?

You can switch instantly from the old CGA-style display (top) to the crisper EGA display (above).

One thing you have to grant Alan Sugar: he certainly seems responsive to customers' demands. First he added what he himself claimed was a completely superfluous fan to the PC-1512 following widespread worries about possible overheating. Now, not only has he come out with an upgraded version of the same machine, the PC-1640, but he has even brought it out in the UK well before he had originally intended — all apparently because potential customers had asked him to.

This is hardly altruism, though. Sugar has admitted that corporate sales of the PC-1512 have been disappointing; he has failed to breach the Big Blue citadel. The latest model is an attempt to address some of the criticisms which the earlier machine attracted, and in the process make it into the business-micro big time.

Those criticisms centred around the display. Amstrad chose to put the power supply for the whole PC-1512 system in the monitor. This means that you cannot upgrade to higher-resolution screens made by other manufacturers. In particular, it acted as a considerable obstacle to those who wanted to install an EGA card, which in any case is incompatible with the original system. This has proved unfortunate for Amstrad, since many companies have standardised on the EGA display. Compatibility problems apart, the PC-1512's graphics look ropey in comparison.

The PC-1640 has solved this at a stroke by offering enhanced colour graphics that Amstrad claims are fully EGA compatible. This has been achieved by buying in a design from Paradise, a firm that makes graphics boards, and incorporating the new circuitry on the main board. At the same time the on-board memory has been increased to a full 640K. Prices are pitched at around £150 more than comparable PC-1512 machines, and the top-of-the-range 20Mbyte hard-disc colour system now costs £1,199. No monochrome versions will be available.

Externally the new micro is very similar to its predecessor. The only noticeable changes over the old PC-1512 are some extra ventilation holes in the system box and a row of DIP switches at the back. The new holes are there to allow the fan to function. And to forestall any possible worries about the high-resolution monitor overheating there is even a fan in the VDU.

The DIP switches allow the video resolution to be swapped between EGA and IBM-standard CGA graphics and the same effect can also be achieved using the Display utility that is supplied on one of the discs accompanying the machine. Swapping between different resolutions is easy. From the DOS prompt you simply type.

DISPLAY EGA

to obtain EGA-compatible graphics. More than a dozen different display options can be selected in a similar way.

Apart from incorporating Paradise's BIOS for the enhanced graphics, the basic ROS — Amstrad's name for the ROM operating system — remains unchanged, bar some tidying up. There are four expansion slots, one of which is occupied by the hard-disc controller. Digital Research's DOS Plus operating system, which was bundled with the PC-1512, is no longer included but Gem Desktop and Gem Paint are still being supplied.

In operation the PC-1640 is almost identical to its older sibling, though the two fans are slightly obtrusive. Running the Basic Benchmarks produced a figure of 7.0 seconds, practically the same as we found for the PC-1512. The floppy disc also turned in a comparable figure, though it did seem much more noisy: one person in *Practical Computing*'s office compared it to the sound of knives being sharpened.

When reviewing the PC-1512 we were unable to test the hard disc. On the PC-1640 supplied this time there was a 20Mbyte hard disc from Tandon. It turned in a very acceptable time of 97 seconds running the Bagshaw Benchmarks, almost as fast as the hard disc on the new IBM PS/2 Model 30. The Amstrad is bound to be seen as one of the Model 30's main competitors, though on all but the most irrational grounds there is precious little reason to consider buying IBM's non-machine.

AMSTRAD PC-1640

PC VERDICT

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

Even better value for money than the PC-1512, but probably still not right for corporate purchasers.

The main difference between the two generations of Amstrad machines is in the graphics, and here the Paradise technology does Amstrad proud. The image shows no sign of wavering, and text and graphics are sharp and displayed in bright colours.

When the PC-1512 was launched it was available at prices that were previously undreamt-of. The down side was that the overall standard of construction was inevitably less than first class. For the personal user, this is not likely to be too much of a problem: after all, if you pay out your hard-earned money on a piece of kit, you are likely to look after it. But it is a sad fact of working life that people in large companies show precious little respect or consideration for institutional machines.

Company micros need to have a higher standard of construction to withstand daily wear and tear. The PC-1640 is certainly a successful upgrade as far as the display is concerned, making it an excellent-value budget machine. But there are no new concessions to basic company needs in the area of build quality. As a result, it cannot be recommended as a workhorse business micro unless the usage will be relatively light.

These worries about reliability are put in an interesting light by persistent rumours that Amstrad will bring out an AT compatible in the not too distant future, possibly 80386 based. The AT is well established as the standard business micro, and it could be here that Alan Sugar's chance to hit the corporate market really lies. The PC-1640 is not sufficiently differentiated from the PC-1512: both are best suited for personal use. But a rather more stoutly made AT compatible, combined with the same agressive pricing shown on the existing machines, could be a winner.

If it seems implausible that a company should bring out a machine which effectively supersedes a model launched only a few months previously, bear in mind that Amstrad did exactly that in the home market. So if you are tempted by the PC-1640, hang on a few months to see if the Amstrad AT materialises.

If you must buy an Amstrad now, by all means get the PC-1640. It is well worth the price difference over the PC-1512. Despite the company's protestations to the contrary, it is hard to see the PC-1512 still being in existence at the end of the year.

SPECIFICATION

CPU: 8086 running at 8MHz
RAM: 640K
ROM: ROS firmware
Mass storage: one or two 360K floppies, or one floppy and one 20Mbyte hard disc
Display: enhanced colour display offering both EGA and CGA compatibility
Keyboard: standard old-style IBM PC layout; separate numeric pad combined with cursor keys
Interfaces: serial and parallel as standard; mouse port and monitor output; three full-length expansion slots
Dimensions: 372mm.(14.6in.) x 384mm.(15.1in.) x 135mm.(5.3in.)
Weight: 6kg. (13lb.)
Software in price: MS-DOS 3.2, Gem Desktop, Gem Paint, Locomotive Basic 2
Prices: single-floppy version £799; twin-floppy version £899; hard-disc version £1,199
Manufacturer: Amstrad Consumer Electronics, Brentwood House, 169 Kings Road, Brentwood, Essex CM14 4EF. Telephone: (0277) 230222
Available: now

CONCLUSIONS

■The Amstrad PC-1640 is an upgraded version of the PC-1512 with EGA-compatible colour graphics and 640K of RAM.
■The colour graphics are superb. Otherwise, the performance remains unchanged.
■The biggest problem with Amstrad PCs remains their relatively low level of production quality; in the rough and tumble of company use they cannot compete with the more sturdily built machines.
■The PC-1640 seems almost certain to replace the PC-1512, which it thoroughly surpasses for little extra cost. PC

IBM PS/2 MODEL 60
AHEAD OF ITS TIME

By Ian Stobie

One day the Model 60 could become the standard business micro, but as yet it does not do much more than an ordinary PC/AT.

In April of this year IBM announced Personal System/2, the new machines on which its continued dominance of the business PC market depends. The Model 60 is one of the key members of the range, a kind of up-market replacement for the IBM PC/AT. It has just gone on sale in Britain, priced at between £4,500 and £5,000 for a typical working system.

The Model 60 is very similar to another PS/2 machine, the Model 50 which is about £1,000 cheaper and of conventional desk-top design. The Model 60 is meant to be used propped up on its side in a vertical position; feet fold out from the main system box's base so you can stand it on the floor. It is about two feet high so it will fit under some desks, though not unfortunately the ones we were using.

Both machines have sufficient power to run the new OS/2 operating system when it becomes available at the start of next year. At present IBM is shipping the machines with PC-DOS 3.3. Both also use IBM's new Micro Channel expansion system; this means they will take cards conforming to the new standard but not old PC or AT ones.

It is much easier to get all the PS/2 models apart than previous IBM machines. You can remove the whole side panel of the Model 60 by merely twisting off two large screws with a coin. For security there is also a lock on the panel which you undo with a key. Inside, the Model 60 has twice as many expansion slots as the Model 50: eight instead of four. They are the 16-bit version of the full 32-bit Micro Channel offered on the top-of-the-range Model 80. For all but specialist users 16-bit cards are likely to be the norm for the next few years.

On the PS/2 series graphics, comms and printer support are supplied on the main board, so you only lose one slot for the hard-disc controller. If you want a mouse, the IBM offering, which costs under £60, plugs into a socket on the back of the machine, so you do not need a slot for this function either.

We had the base Model 60 machine, which comes with a 44Mbyte hard disc and one 1.44Mbyte double-sided 3.5in. floppy drive. There is room for an extra hard disc inside the box, and another 3.5in. floppy below the existing one on the front of the machine. Both disc drives are fairly quick. The hard disc is about 20 percent faster than the PC/AT drive at our standard Bagshaw Disc Benchmarks, which puts it in the same league as most good AT clones.

The Model 60 and the Model 50 are also similar to the AT when it comes to processing power. They are based on the Intel 80286 chip, as opposed to the more powerful 80386 used on the Model 80 and many of the more up-market AT clones. The new IBM machines run the 80286 at a slightly faster clock rate than the AT, but they are still broadly similar in performance terms. Running the SI command in the Norton Utilities, for example, the Model 60 comes out at 10.1 as opposed to the 7.7 attained by a standard IBM PC/AT with a 8MHz clock. This makes the Model 60 only about 30 percent faster than the AT.

IBM PS/2 MODEL 60

PC VERDICT

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

☐ Possibly destined to be a top-selling office machine, but with few practical advantages at present over an AT or a cheaper clone.

The VGA display chip inside the Model 60 takes over the functions of the EGA or CGA display card used on previous IBM systems. IBM offers a range of new monitors to go with it. With our system we had the 8512, at £505 the cheapest of the new colour monitors IBM is offering.

The VGA standard has had a good press, but we were disappointed with it. The characters seem very upright on the display, and you get little distinction between letters like m and n. The screen also had a kind of grey tinge to it, which we did not like.

IBM has not preserved full compatibility with its previous character set. Loading up PFS Professional Write we noticed vertical stripes running down the opening screen. It emerges that this problem is caused by a small change in the graphics character set. Some of the grey-scale characters are one pixel narrower, hence the stripes. This problem does not appear to affect solid or line characters, and the program itself still worked quite happily. But it is irritating, as it is a completely unnecessary source of incompatibility which must be laid at the door of IBM itself.

Where the new display standard does come into its own is in graphic applications, particularly those especially written for it. We had a PS/2 demo version of a drawing package called Dr Halo, and the effects available were impressive. While the VGA maximum resolution of 640 by 480 is not that much of an advance on the EGA, what makes the difference is the range of colours you can choose from: up to 16 at a time at top resolution or 256 at 320 by 200 dots. The active colours can be selected from a palette of over quarter of a million hues.

The Model 60 keyboard is the now standard IBM type, with 12 function keys arrayed horizontally along the top and a separate set of cursor keys in addition to its numeric keypad. The layout is therefore identical with recent AT keyboards. Following normal IBM practice the keyboard is not lumped in the price, so you could buy a third-party product instead.

With the PS/2 range IBM has now fully embraced the 3.5in. floppy-disc format. IBM provides two ways of transferring data from the 5.25in. format. The first option is the obvious one — a second external floppy disc for the PS/2 machines in 5.25in. format. IBM currently only offers a 360K version, so you cannot transfer data from 1.2Mbyte AT floppies in this way.

More elegant and also much cheaper is the grandly named data migration facility. It costs £24 and consists of a small box-like adaptor that you plug into the parallel printer port on the back of the PS/2. You then use an ordinary IBM printer cable to connect up to the printer port on another PC. This system lets you transfer files from 1.2Mbyte floppies, 360K floppies or the hard disc.

We had no trouble getting both programs and data across in this way from our AT to the Model 60. It was quick too. The only problem with the migration facility is that it is purely one way. PS/2 machines have a bi-directional printer port, but most other machines and third-party printer cards can only send. If you want to send files both ways you would need to use the external drive or resort to the RS-232 serial ports and a conventional comms package.

Software is beginning to arrive now in 3.5in. format, though most of it is standard

Above: Good colour graphics are the Model 60's main claim to fame. Below: The data-migration facility.

PC-DOS stuff. Many publishers are following the lead of Microsoft and putting both discs inside the box when they sell retail packages. To get some kind of feel for how the Model 60 might look when OS/2 applications are run on it we tried out Guide, a newly written hypertext program which runs under Microsoft Windows and makes extensive use of the mouse and the PS/2's graphics. The combination had a remarkably Macintosh-like feel to it.

The documentation that IBM supplied with our copy of PC-DOS 3.3 was pretty feeble. As with the earlier PC-DOS supplied with the AT you get an introductory user's guide full of patronising pictures of parrots. But instead of the full DOS reference manual you only get an abridged version about a quarter the size. Apart from a slim manual for the monitor, we received no other documentation with the Model 60, although a DOS technical reference manual is available if you pay extra for it.

Perhaps the key distinction between the main members of the PS/2 range and earlier IBM systems is the Micro Channel expansion bus. The first cards will mainly be from IBM itself: the company has announced network adaptor cards, 3270 terminal emulation, and an optical-disc interface. So far third-party suppliers have mainly announced memory products. At the moment this shortage of expansion cards puts all the PS/2 machines above the Model 30 at a severe disadvantage compared to a conventional AT or clone. The Model 60 suffers particularly on this point, as its whole rationale is that it has more Micro Channel slots than the cheaper Model 50.

SPECIFICATION

CPU: 80286 running at 10MHz; optional 80287 co-processor
RAM: 1Mbyte, expandable to 16Mbyte
Expansion: eight16-bit Micro Channel slots; seven normally free to user
Discs: one double-sided 3.5in. floppy drive plus one 44Mbyte hard disc standard; 70Mbyte and 115Mbyte hard disc also available, plus additional built-in 3.5in. floppy and external 360K 5.25in. floppy drive
Display: built-in VGA controller offers compatibility with MDA, CGA and EGA and maximum 640 by 480 resolution in 16 colours; monitors are sold separately
Interfaces: bi-directional parallel printer port, RS-232C serial port, mouse port
Dimensions: system box 597mm.(23.5in.) x 483mm.(19in.) x 165mm.(6.5in.)
Price: £4,075 for system box with 40Mbyte hard disc
Extras: keyboard £185, PC-DOS 3.3 and Basic £70, mouse £58
Monitors: 12in. monochrome £201; 14in. colour £505, 12in. high-definition colour £583, 16in. very high-definition colour £1,204
Manufacturer: Made in UK by IBM Corporation of Armonk, New Jersey
UK supplier: IBM UK, 414 Chiswick High Road, London W4 5TF. Telephone: 01-995 7700
Available: now

CONCLUSIONS

■The Model 60 is a well-made system broadly comparable in power to the existing IBM PC/AT. Its key distinguishing features are its use of the VGA graphics standard, the Micro Channel expansion system, and its floor-standing design.

■For graphics work there may be some point in standardising on the new VGA graphics standard — the colour in particular is very good — but for ordinary text work it offers little.

■The Model 60's main claim to fame is its seven free Micro Channel slots. But until more cards are available to put in them the Model 60 is at quite a severe disadvantage compared to a conventional AT or clone.

■The Model 60 is really a machine for the future. For the time being, anything that runs MS-DOS software and contains an 80286 chip can do most tasks equally well. PC

REVIEW

DELL & MISSION 386s
CLONES GO UP-MARKET

By David Barlow

Though 80386-based PCs have been around for less than a year, it is already low price rather than technical specification on which newcomers to the market stake their claim.

With the lower end of the PC market now going through a relatively calm period as far as both technology and pricing are concerned, the cut-throat battles have moved to the more lucrative arena of the power-user market. First to be hit were the conventional AT compatibles. Prices tumbled from an initial £5,000-plus to the current low of around £1,200 for a fully equipped unit. Now machines using the Intel 80386 processor have been drawn into the war zone, and the prices being asked by the big names like Compaq, IBM and Zenith are already beginning to look rather silly.

But before parting with any cash for a budget clone it is worth asking some searching questions. This is especially the case when the hardware involved is so advanced as to be years ahead of its applications and operating-systems software base. Hardware and software standards to support the powerful 32-bit processor are still emerging, and there are no guarantees that the smaller manufacture will still be around to maintain the development of their particular implementations of the standard.

The two machines reviewed here are just the first salvo from the price-cutters to be aimed at the big boys precisely where it hurts them most — at their corporate and power-user base. The Dell 386 is the brainchild of 22-year-old American entrepreneur Michael Dell. In just three years he has expanded his US mail-order PC business from $1,000 start-up capital to a turnover of almost $70 million. He now plans to tackle Europe with the same mail-order techniques and is starting with the UK from his Bracknell headquarters. The machines will not be available through dealers but must instead be ordered by phone, to be delivered by courier to your door in around a week. The Dell range also includes conventional 80286-based AT compatibles.

Mission is a company that made its name in esoteric hi-fi. In recent years it has diversified into PC networking, and now offers a range of PCs. The Mission 386, which is the subject of this review, is designed and manufactured by Advanced Data Logic, an American company, but it will be fully supported in the UK by Mission from its Huntingdon base. This powerful machine

SPECIFICATIONS

DELL 386

CPU: Intel 80386 running at 16MHz
RAM: 1Mbyte static RAM
Mass storage: 5.25in. 1.2Mbyte floppy; 40Mbyte, 70Mbyte or 150Mbyte hard disc
Display: Hercules mono or EGA colour
Keyboards: 84-key old-style AT layout
Software in price: MS-DOS
Price: monochrome system complete with 40Mbyte hard disc £3,264
Manufacturer: Dell Computer Corporation, Farley Hall, London Road, Binfield, Bracknell, Berkshire RG12 5EU. Telephone: (0344) 863420
Available: now

MISSION 386

CPU: Intel 80386 running at 16MHz
RAM: 2Mbyte
Mass storage: 5.25in. 1.2Mbyte floppy; 40Mbyte, 80Mbyte or 130Mbyte hard disc
Display: Hercules-compatible monochrome
Keyboard: 102-key new-style AT layout
Software: MS-DOS, Desqview 2
Price: monochrome system with 40Mbyte hard disc £3,290
Manufacturer: Advanced Data Logic
UK distributor: Mission Electronics, Stonehill, Huntingdon, Cambridgeshire PE18 6ED. Telephone: (0480) 57477
Available: now

took the recent PC User Show by storm as it sported a sub-£2,000 price tag. Quite who would be interested in such a high-performance machine without a hard disc is hard to imagine, but hats off to Mission for a great publicity stunt.

Both the Dell and the Mission machines follow the bulky three-box approach and are of a similar size and weight to IBM's PC/AT. There is no evidence of design elegance in either model, but the Mission does have a useful stand which will allow you to get the monster system box off the top of a crowded desk and on to the floor.

The Dell 386 has a 1.2Mbyte 5.25in. floppy drive mounted on its front panel above a blanking plate where a second floppy can be fitted. Alongside the conventional AT keylock is the most eye-catching feature of the Dell: a four-digit green LED indicator panel that the company has christened Smartvu. It bursts into life as soon as the machine is switched on, and can therefore be used to display messages before the screen has warmed up. In normal use it displays information about hard-disc activity or confirms the current processor operating speed, but its most useful role will be for diagnostics. In truth it is a gimmick, but one that has some beneficial spinoffs.

The Mission, on the other hand, has no flashing lights to alleviate the tedium of the standard AT design. Once again a 1.2Mbyte 5.25in. floppy is a standard fitment, but in this case there are apertures for a further two half-height drives.

As you would expect from machines aimed at the power user there is a wide variety of mass-storage options. The Dell is sold with either 40Mbyte 70Mbyte or 150Mbyte units. The first two have an excellent 28ms. average access time, and the last an even better 16ms. access time. The base-model Mission has no hard disc at all, but serious users will be relieved to hear that 40Mbyte, 80Mbyte and 130Mbyte units are available with access times of 28ms., 23ms., and 19ms. respectively.

With the covers taken off the boxes it is the Dell that once again attracts attention. The distinguishing feature this time is the small motherboard, a result mainly of the Dell's remarkably low chip count. The Mission machine uses a more conventional approach, but in terms of performance it loses nothing in the process.

Both machines run their Intel 80386 processors at 16MHz, a clock speed which has become the norm for 80386-based computers. The one notable exception is IBM's PS/2 Model 80, one version of which runs at 20MHz. To ensure compatibility with existing IBM packages the Dell's processor can be made to emulate the PC/AT running at 12MHz or the IBM PC running at 4.77MHz. Hardware compatibility with PC/AT expansion cards is assisted by the ability to switch the expansion bus, which normally runs at 12MHz, down to a more AT-like 8MHz.

The Dell 386 contains 1Mbyte of RAM on a special memory board that plugs into its 32-bit expansion bus. The bus runs at the full 16MHz, and to maximise its speed advantage over the competition Dell has fitted static RAM, which does not require a refresh cycle to maintain its contents. Since the Dell's static RAM chips are manufactured using CMOS technology they also use less power and as a result produce less heat than normal dynamic RAM (DRAM) chips. Static RAM is more expensive to fit in the first place, and is more expensive than DRAM to expand, but it does give an edge to the Dell's performance. The standard memory board just has 1Mbyte, but memory can be expanded to an impressive 6Mbyte by plugging in additional strips, each containing nine 256K CMOS chips.

Mission's approach is more conventional, utilising high-speed 80ns. 32-bit memory chips. All machines sold with hard discs are fitted with 2Mbyte of memory as standard. There are two full-speed 32-bit slots, so users can expand memory to 8Mbyte without occupying any PC or AT slots.

Both machines have the basic features of battery-backed clock/calendar as well as serial and parallel ports — two of each in the

(continued on page 43)

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(continued from page 41)

case of the Dell. Display-adaptor options confirm the feeling in the industry that the CGA standard is no longer acceptable. The Dell offers just two types: a Hercules-compatible monochrome system and an EGA system based on the Video 7 adaptor card. Mission has yet to finalise its display options, but the review machine was supplied with an ADC EGA card driving the superb but pricey Taxan 770 colour monitor. In a welcome move, Dell is making the system unit available without keyboard and monitor, so you can choose your own display system and keyboard if you wish.

When it comes to keyboard design the advantage goes to Mission. Although Dell offers the superior expanded AT layout in America, this unit has yet to find its way across the Atlantic. Users will have to make do with the adequate but dull 84-key old-style AT layout. Mission users on the other hand get a full 102-key ATE unit, which is both better made than the Dell keyboard and has a more satisfying key action.

It is not surprising that both these capacious machines perform well as card cages. In most cases memory will be placed in the 32-bit slots leaving the remaining eight-bit and 16-bit slots free. The Dell starts with one 32-bit, five 16-bit and two eight-bit slots; with all the necessary support boards in place three 16-bit and one-eight bit slot are left vacant. Mission's bare 386 board has two 32-bit slots, four 16-bit slots and two eight-bit slots, and ends up with one 32-bit, one-eight and two 16-bit slots available to the user.

Both machines also offer good mass-storage expansion potential. A further three half-height devices can be fitted to either machine. But while the Mission allows front access to two of them, the Dell gives you access to only one.

It has long been obvious that machines as powerful as these desperately need an alternative operating system to the MS-DOS that currently encumbers them. The memory-management capability of the 80386 chip is in excess of the 8Mbyte maximum that the machines currently offer. Yet there seems little point in going even this far when MS-DOS can only cope with a measly 640K. Dell and Mission both promise that their machines will come into their own when Microsoft's OS/2 becomes available, but only Mission has bundled in software that can exploit advanced memory-addressing capability.

It is when you come to processor-intensive tasks that the 80386-based machines really score over even the fastest 80286-based AT compatibles. In the Basic Benchmarks tests the Dell came in at 1.69 seconds and the Mission at 2.07 seconds. It seems that Dell's efforts in providing high-speed RAM have paid off, as it now ranks as the fastest machine we have tested. But even the Mission is well within the range that is normal for 80386-based AT clones. The Kaypro 386 manages 2.03 seconds in the same test, and the Zenith Z-386 1.86-seconds timing. The current record holder is the Apricot Xen-i 386, which turned in a timing of 1.75 seconds.

The speedy processor performance also comes through loud and clear when the machines are actually being used for day-to-day applications. Tasks that otherwise take a second or two, such as searching a spelling-checker dictionary, are completed more or less instantly, and complex spreadsheets no longer take an age to recalculate.

Running the Bagshaw Disc Benchmarks, the Dell's hard disc achieved a total timing of 27.2 seconds, marginally faster than the Mission's Priam unit which managed 28.8 seconds. The difference is so small as to be imperceptible in practice, and both are fast.

DELL 386

PC VERDICT

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

☐ Good-value high-performance machine available only through mail order but backed by a one-year on-site maintenance guarantee.

MISSION 386

PC VERDICT

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

☐ Good value and high performance; available through conventional dealer outlets.

The 40Mbyte hard disc on the Zenith Z-386 was timed at 32.4 seconds. It would be unwise to attach too much importance to these figures as hard discs fitted to production units may change from time to time. Users should, however, beware the Mission, as some unauthorised dealers may get hold of the basic unit and fit cheap — and much slower — hard discs. This would make a nonsense of buying an 80386-based machine, as for most applications the performance of the processor and support chips would be completely drowned out by the long access times of an inferior hard disc.

The Dell Computer Corporation has written its own BIOS for the 386, but it does not seem to pose any special problems. We found that most packages will run at 16MHz, though Lotus 1-2-3 and a limited number of other packages have to be originally loaded on to the hard disc at a slower speed, as on most 80386-based machines. Mission's 386 uses a 386 ROM BIOS from the established Phoenix Compatibility Corporation. Once again we encountered no problems running mainstream software, and as on the Dell there is always the option of slowing down to 12MHz from the keyboard if necessary.

Comparing the display qualities of the two EGA machines it was immediately apparent how much crisper the Mission's screen was. But this feature must be mainly attributable to the advanced monitor supplied as part of the review system. Both machines are noisy, so it is worth keeping them on the floor rather than in front of you on the desk — for the sake of your ears as well as to leave some desk space. A floor stand is supplied with hard-disc Missions, but as yet no such extra is available for the Dell.

If you are fussy about documentation you will usually find that it pays to buy a PC from an established manufacturer. These two machines underline the point: the Dell was supplied with a couple of brief hardware booklets, one covering the basic PC and the other covering the EGA display adaptor. If you purchase MS-DOS you will get the full Microsoft documentation, which must rate as some form of consolation. The Mission fared little better in the hardware area, and for the multi-tasking environment you have to make do with a small booklet.

If his business in going to succeed in the UK, Michael Dell is going to have to overcome the traditional British reluctance to spend large sums of money by mail. To order the machine you simply phone through your precise requirements, taken from the options listed on Dell's price list. Included in the system price is a one-year on-site warranty arranged through Honeywell Bull, with a promised response time of one business day. Operating problems short of a complete breakdown will be dealt with by an unlimited telephone hotline service available from Dell's Bracknell head office during normal office hours.

The Mission setup is altogether more conventional as the hardware is only being sold through authorised dealers. The Mission 386 has a two-year warranty on the basic system unit and one year on drives and other mechanicals. Maintenance agreements will be available from dealers as an extra-cost option.

CONCLUSIONS

■Both machines offer high performance levels. The Dell is marginally faster, but you will need a stopwatch to detect the difference.
■Hardware and software compatibility are excellent in both machines thanks to switchable processor and expansion-bus speeds.
■Dell and Mission are new names to the PC world and have yet to establish themselves. This may not be a crucial factor in 8088- or 80286-based machines where the design of the architecture is now fixed; but it should be given greater weight in 80386 designs as standards have yet to emerge in this area.
■Despite Mission's show-stopping £1,999 claim, it is the Dell that looks better value for money, thanks in the main to its one-year on-site warranty. PC

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- high resolution mono and parallel printer card

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TECHNOLOGY SO ADVANCED ...

MEMORY
* 512Kbytes RAM (520ST-M, FM)
* 1024Kbytes RAM (1040ST-F)
* 192Kbytes ROM
* 128Kbytes external plug-in ROM option

ARCHITECTURE
* Motorola 68000 Central Processing Unit (CPU) with a clock speed of 8MHz
* 16-bit external data bus
* 32-bit internal data bus
* 24-bit address bus
* 8×32-bit data & address registers
* 7 levels of interrupts
* 56 instructions
* 14 addressing modes
* 5 data types
* DMA (Direct Memory Access)
* real time clock as standard

GRAPHICS
* full bit-mapped display
* palette of 512 colours

Using Atari Monitors (on 520 & 1040):
* 640×400 high resolution - monochrome
* 640×200 medium resolution - 4 colours
* 320×200 low resolution - 16 colours
* 80 column text display (40 col low res)

Using Domestic TV (on 520):
* 640×200 medium resolution - 4 colours
* 320×200 low resolution - 16 colours
* 40 columns × 25 line text display

SOUND AND MUSIC
* 3 programmable sound channels
* frequency programmable 30Hz - 125KHz
* programmable volume
* wave & dynamic envelope shaping
* programmable attack, decay, sustain, release
* Musical Instrument Digital Interface (MIDI)
* MIDI allows connection of synthesisers etc.

MOUSE
* high precision
* 2 button control
* free with 520ST-FM/1040ST-F
* non slip ball motion sensor
* removable ball for easy cleaning

STANDARD SOFTWARE
* GEM desktop + TOS operating system
* ST BASIC interpreter/language system

INPUT/OUTPUT
* MIDI out ..... (5 pin DIN) 31.25K baud
* MIDI in ..... (5 pin DIN) 31.25K baud
* audio out ... 1.0V DC peak to peak, 10K ohm
* audio in ..... 1.0V DC peak to peak, 10K ohm
* RGB monitor ..... 1.0V DC, 75 ohm
* mono monitor ..... 1.0V DC, 75 ohm
* mono horizontal scan rate 35.7KHz
* mono vertical scan rate 71.2KHz
* sync ..... 5V DC (active low) 3.3K ohm
* modem/serial ..... RS232C, 50 to 19,200 baud
* floppy disk ..... 250 Kbits/s
* hard disk ..... 11.3 Mbits/s
* mouse ..... standard Atari connector
* joystick ..... standard Atari connector
* cartridge port ..... 128K capacity
* RF output (520ST-FM) ..... for TV use

OPERATING SYSTEM
* TOS with GEM environment in ROM
* hierarchical file structure with sub-directories and path names
* user interface via GEM, with self explanatory command functions
* multiple windows + icons
* window resizing, re-positioning and erasing
* drop down menus (selected by mouse)
* GEM virtual device interface

COMMUNICATIONS
* RS-232C serial modem port
* 8-bit parallel printer port
* MIDI port (also for networking use)
* VT52 terminal emulation

KEYBOARD
* standard QWERTY typewriter format
* 95 full stroke keys
* 10 function keys
* 18 key numeric keypad + cursor keys
* variable auto-repeat & key click response
* keyboard processor reduces CPU overhead

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At Silica Shop, we have a dedicated service department of five full time Atari trained technical staff. This team is totally dedicated to servicing Atari computer products. Their accumulated knowledge, skill and experience makes them second to none in their field. You can be sure that any work carried out by them is of the highest standard. A standard of servicing which we believe you will find **ONLY FROM SILICA**. In addition to providing full servicing facilities for Atari ST computers (both in and out of warranty), our team is also able to offer memory and modulator upgrades to ST computers.

1Mb RAM UPGRADE: Our upgrade on the standard Atari 520ST-M or 520ST-FM keyboard will increase the memory from 512K to a massive 1024K. It has a full 1 year warranty and is available from Silica at an additional retail price of only £86.96 (+VAT = £100).

TV MODULATOR UPGRADE: Silica can upgrade the 1040ST-F to include a TV modulator so that you can then use it with your TV set. This is an internal upgrade and does not involve any unlidy external boxes. A cable to connect your ST to any domestic TV is included in the price of the upgrade which is only £49 (inc VAT). The upgrade is also available for early 520ST computers at the same price.

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520ST-M

The affordability of Atari computers is reflected in the price of the 520ST-M keyboard, which is a mere £259 (inc VAT). This version of the ST comes with 512K RAM, as well as a modulator and lead for direct connection to any domestic TV. The price does not include a mouse. In addition, when you buy your 520ST-M from Silica, you will also receive the **FREE** Silica 'ST Starter Kit'. During 1987, many software houses will be producing games software on ROM cartridges, which will plug directly into the cartridge slot on the 520ST-M keyboard, giving instant loading without the expense of purchasing a disk drive. With the enormous power of the ST, you can expect some excellent titles to be produced, making this the ultimate games machine! If your requirement is for a terminal, then the 520ST-M can fulfill this role too. Leads are available to connect the ST to a variety of monitors, and with the imminent introduction of terminal software on ROM cartridge, the ST provides a low price terminal for business use. If you wish to take advantage of the massive range of disk software available for the ST range, you will need to purchase a disk drive. Atari have two floppy disk drives available, a ½ Mbyte model £149 and a 1Mbyte model £199. Full details of these drives, as well as the Atari 20Mbyte hard disk are available on request. If required at a later date, the mouse may be purchased separately.

£259

520ST-FM

The 520ST-FM with 512K RAM and free mouse, represents a further breakthrough by Atari Corporation in the world of high power, low cost personal computing. This model is the latest addition to the ST family, and is not only powerful, but compact. It is priced at only £399 (inc VAT) a level which brings it within the reach of a whole new generation of computer enthusiasts. When purchased from us, it comes with the **FREE** Silica 'ST Starter Kit' see paragraph on the left. To make the 520ST-FM ready for use straight away, Atari have built into the keyboard a ½ megabyte disk drive for information storage and retrieval, allowing you easy access to the massive range of disk based software which is available for the **ST**. This new computer comes with all the correct cables and connections you will need to plug it straight into any standard domestic television set. You do not therefore have to purchase an Atari monitor. If you do require a monitor however, these are available with the 520ST in the following money saving packages:

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520ST-FM Keyboard + Med res colour monitor - £699 (inc VAT)

Because the 520ST-FM has its own power transformer built into the keyboard, there are no messy external adaptors to clutter up your desk space. You are left with only one mains lead, serving both the disk drive and the computer. You couldn't ask for a more stylish and compact unit.

£399

1040ST-F

For the businessman and the more serious home user, Atari have their most powerful model, the 1040ST-F with 1028K RAM. This low cost powerhouse can be introduced into a business environment as a stand-alone system, or can support a mainframe computer as a terminal. The 1040ST-F not only features twice as much memory as the 520ST-FM, but also includes a more powerful built-in disk drive. The drive featured on the 1040ST-F is a one megabyte double sided model. The extra memory facility of the 1040ST-F makes it ideal for applications such as large databases or spreadsheets. Like the 520ST-FM, the 1040ST-F has a mains transformer built into the console to give a compact and stylish unit with only one mains lead. The 1040ST-F is also supplied from Silica Shop with a free software package and 'ST STARTER KIT'. In the USA, the 1040ST-F has been sold with a TV modulator like the 520ST-FM. However, for the UK market, Atari are manufacturing the 1040ST-F solely with business use in mind and it does not currently include an RF modulator, this means that you cannot use it with a domestic TV (Silica Shop do offer a modulator upgrade for only £49). The 1040ST-F keyboard costs only £599 (inc VAT) and, unless a modulator upgrade is fitted, will require an Atari or third party monitor. There are three Atari monitors available and the prices for the 1040 with these monitors are as follows:

1040ST-F Keyboard Without Monitor - £599 (inc VAT)
1040ST-F Keyboard + High res mono monitor - £699 (inc VAT)
1040ST-F Keyboard + Low res col monitor - £799 (inc VAT)
1040ST-F Keyboard + Med res col monitor - £899 (inc VAT)

The 1040ST-F comes with a mouse controller and includes 1Mbyte of RAM. It has a 1Mbyte double sided disk drive and mains transformer, both built into the keyboard to give a compact and stylish unit, with only one mains lead.

£599

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CAMBRIDGE Z-88
THE WRONG MIX?

By Carol Hammond

Compromises are inevitable when you set out to build a cheap battery-powered computer that is small and light enough to be used anywhere.

The Z-88 is Clive Sinclair's first offering under the name of Cambridge Computer. Any micro from the man whose previous company, Sinclair Research, spearheaded the home-computer boom with the ZX-80, ZX-81 and ZX-Spectrum would be interesting. What makes the Z-88 worthy of note is that it is a lap portable, complete with software, which costs about £250. If the machine fulfils Cambridge Computer's claim to have produced "the first portable with full personal-computer facilities" then it will certainly have proved to be a price breakthrough.

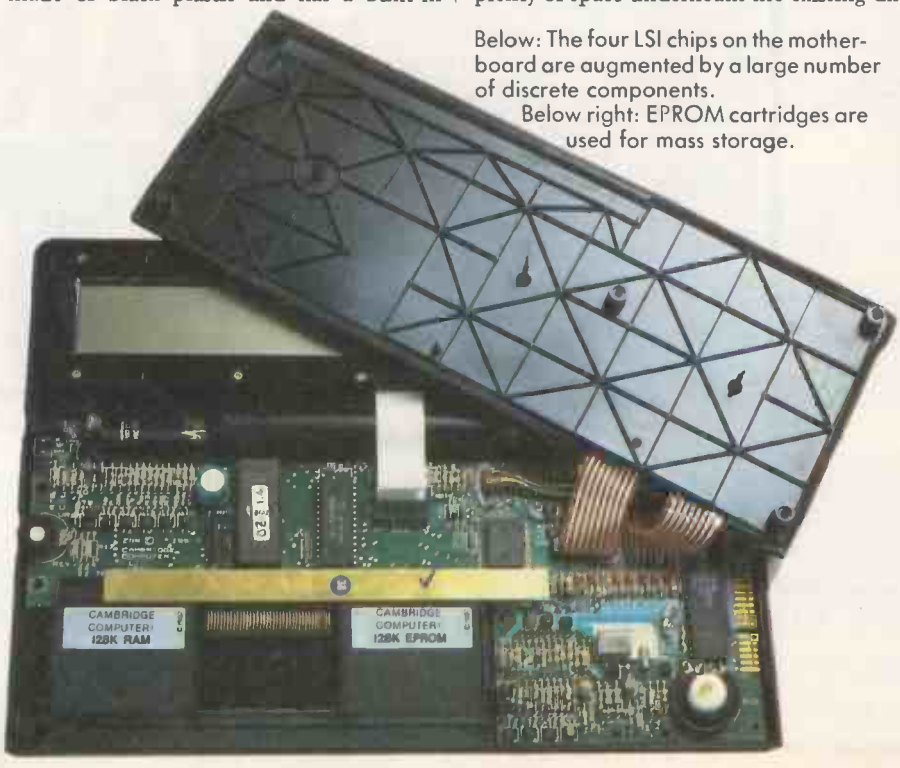
The Z-88 comes in a grey carrying case which looks as though it is made of plastic-coated cardboard and has a black plastic handle. Flimsy though it is, you could use the case to carry the Z-88 around in as the machine is very light. However, the case does not look as if it would last very long, nor does it fit in with an executive image. Most people will probably just pop the Z-88 into a briefcase.

One of the advantages of the Z-88 is that it is truly portable. It is light — weighing just under 2lb. — slim, and takes up about as much space as an A4 pad. The casing is made of black plastic and has a built-in screen in the top face. Below the screen lies a stick-on panel which lists the most commonly used key combinations, and below that is the keyboard.

On the right-hand side there is an RS-232 serial port and a plastic panel that pulls out to reveal the Z-80 expansion bus. On the left is a mains adaptor port, a dial to adjust brightness, and a small hole which houses the Reset button. To reset the machine you poke a piece of wire or a paper clip into the hole and jab twice.

On the front edge there is a clear plastic window covering a row of three cartridge slots. You flip out the window to insert RAM or EPROM cartridges. On the bottom face of the machine is another plastic panel which you can pull out, enabling you to rest the Z-88 at an angle of 12.5 degrees. Below this is a smaller panel that covers the battery compartment.

The Epson-built LCD screen is clearly legible. The background is a sage-green colour and text appears in purple. Unfortunately, you can only display eight lines of data at time. This is a common problem with lap portables, and one that Cambridge Computer has been unable to solve. There is plenty of space underneath the existing dis-



Below: The four LSI chips on the motherboard are augmented by a large number of discrete components.
Below right: EPROM cartridges are used for mass storage.

BUILT-IN SOFTWARE

To switch on the Z-88 you press the two Shift keys at the same time. The machine comes with applications and pop-downs built-in. The applications are Diary, Pipedream, Basic, Import/Export, Terminal and Printer Ed. What Cambridge Computer calls pop-downs are what most people call pop-ups: they can be called up within an application and perform simple tasks. They are Calculator, Calendar, Clock, Alarm, Filer and Panel.

When you first turn on the machine you are met by the main menu or Index. You can return to the Index screen at any time by pressing the Index key. The screen is divided into four parts. The application you are in is displayed on the left together with a list of the menus available within it. To the right is a box listing the applications and pop-downs that are available.

Another box, titled Suspended Activities, lists the activities being held within the machine. For example, it gives the name of the application, along with the date and time you last looked at it. You can re-enter a suspended activity by selecting it using the cursor and pressing Enter. Finally, there is an area which will give messages telling you if your batteries are low or if the alarm is set. You can select an application or pop-down using the cursor keys and Enter, or by hitting the Square key and the appropriate letter — say, P for Pipedream.

Pipedream provides the Z-88's word-processing and spreadsheet facilities. Here the screen is divided into three parts. To the left is the list of menus available, which you select using the Menu key. You carry on pressing the menu key, and the relevant menus appear as each menu is highlighted. In the middle is the text area, where up to six lines of text can be displayed. To the right is a page-display map which gives you an overall view of the current page of the document you are working at in Pipedream.

Each character in the document is represented by a dot on the map. I did not feel that this was really of much help: it is so small it can only give a vague impression of what the page layout looks like. It also squanders a substantial chunk on the display area. I would have preferred this space to have been given over to an enlarged text area or to displaying the menu options. As it is, calling a menu brings up a list that covers the screen, obscuring the document you are working on.

Menu options are selected either by using the cursor keys and Enter or by using the Diamond key followed by the appropriate letters. Unfortunately, some of the key sequences are three or four letters long, which is quite a lot to remember. At first I got into strange contortions trying to press five keys at the same time. When this proved unsuccessful I realised that a sequence was required. Sometimes you have to press the same key twice in succession, say,

Diamond, L,L,C,R

which still calls for some agile fingerwork. In some cases it took several fist-banging attempts to get what I wanted done because the keyboard did not seem to be responding.

There are over 70 such combinations you could try to remember. Some of them were fairly easy to remember, like

Diamond, E,J,L

to join lines in the Edit menu. But with so many options, the need to avoid repetition means that a lot of them do not have obvious key combinations:

Diamond, P,O

means Print, for example. The stick-on label lists most of the commonly used options and their key combinations.

The built-in software covers an ambitiously wide range. The word processor and spreadsheet provide a good selection of useful features and the pop-downs are a valuable bonus, though the conversion facility on the calculator did not seem to work on our machine. On a few occasions the Z-88 also put up error messages which we could not find listed in the manual.

play to house a larger one, should that become a possibility. Nevertheless, the Z-88 can display a full 80-character line, which is a lot for the price and its size. Though the characters are of necessity small, I had no problem reading them.

The keyboard is said to have been specially designed to be silent. In fact it is a membrane keyboard of the same ilk as that found on the ZX-Spectrum. The disadvantages of this is that its rubber surface feels something like a pair of well-used Wellingtons — some people call it "dead flesh". I did not find it difficult to use for short periods but I would not like to have to type a long article on it.

On the plus side, it does succeed in being quiet, and emits only a muffled thud when the keys are depressed. This could be an asset if you want to use the machine in lectures or meetings, or anywhere else where the clatter of a conventional keyboard might prove irritating to people around you. You can adjust the keyboard to make a clicking sound if you wish, using the Panel utility which is part of the built-in software.

The keyboard has 57 alphanumeric keys and a space bar, as well as Esc, Tab, Shift, Del, Enter and Caps Lock keys. It also has two Shift keys, four cursor keys, Index, Menu, Help, Square and Diamond keys. The keyboard on the machine supplied to us was different to that exhibited at the Which Computer? Show last February. The show machine had a Topic key instead of an Index key, and some of the keys have moved around. Cambridge Computer says the Diamond key has been moved to make it easier for touch-typists to reach, and that Topic was felt to describe that key's function more clearly than Index.

The stick-on label on the Z-88 we had was also different to the one that appeared on the original version, with different key combinations for commands. This is an indication that the software has changed since it was first shown. Cambridge Computer says that it is delays in developing the software that account for the late appearance of the

(continued on page 49)

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(continued from page 47)

Z-88. It was originally intended to be shipped in April, and at a lower price than that now being asked.

The ROM and EPROM cartridges that slot into the front of the machine are a similar size and shape to the Sinclair QL's Microdrives, measuring about two inches square and a quarter of an inch high. They slot into place easily. Any programs written for the Z-88 — apart from those already built-in — will be supplied in cartridge form.

The EPROM cartridges are the nearest the Z-88 gets to a conventional mass-storage device. EPROMs store text and other data semi-permanently. They are available in 32K and 128K cartridges — our machine had a 128K EPROM — up to three of which can be plugged in at once. Cambridge Computer says that 1Mbyte EPROM cartridges should be available in September. Also available is an ultraviolet EPROM eraser that wipes existing data, allowing a cartridge to be used again.

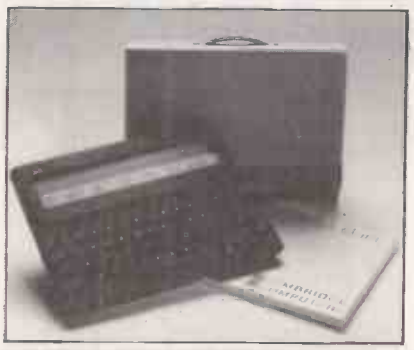
BATTERY-BACKED RAM

The Z-88 comes with 32K of RAM, of which 10K to 15K can be used for data. Additional RAM is available — our machine had 128K of extra RAM — and once again this comes in 32K and 128K cartridges with a 1Mbyte version due in September. Data is erased from the RAM cartridges when they are removed, or if the machine is deprived of power. Normally the machine goes into Sleep mode when you turn it off, and all the data in the resident RAM cartridges remains intact.

But problems arise when you change batteries. The Z-88 uses four AA batteries which are meant to be enough for approximately 20 hours normal use, or about a year when the micro is turned off. To conserve battery power the Z-88 will automatically turn itself off and go into Sleep mode if the keys have not been depressed for a given amount of time — you can choose how long. Turning the machine on again returns you to your application at exactly the point where you left it.

When you change batteries it is advisable to safeguard data in RAM by temporarily connecting the Z-88 to the mains; an adaptor is supplied at extra cost by Cambridge Computer. Otherwise you are going to have to be pretty nifty when changing batteries. The manual includes a table showing how much time you have, depending on the number of RAM cards fitted. With one 128K RAM card you have four minutes to change your batteries; with three fitted you have a mere 60 seconds.

Of course, it should not take that long to change a set of batteries, but you could be in trouble if your power ran out unexpectedly while you were stuck in the middle of nowhere with no spares to hand. The Z-88 gives a warning on-screen when the batteries are low, to help you avoid such accidents. On one occasion we could not get the Z-88 to switch off by the normal means of pressing both Shift keys simultaneously. Rather than waste a new set of batteries by leaving it on overnight we removed them and wiped out the data being held in RAM.



SPECIFICATION

CPU: CMOS Z-80 running at 3MHz
ROM: 128K containing C-DOS operating system and applications software together with BBC Basic
RAM: battery backed; 32K as standard, expandable using 32K, 128K and 1Mbyte cartridges to 3Mbyte
Display: Epson super-twist LCD screen; eight by 80 characters, 64 by 640 pixels
Keyboard: 64-key QWERTY-layout membrane keyboard
Dimensions: 293mm.(11.5in.) x 209mm.(8.25in.) x 23mm.(0.87in.)
Weight: 0.85kg. (1.87lb.)
Mass storage: up to 3Mbyte removable storage using 32K, 128K and 1Mbyte EPROM cartridges
Interfaces: three cartridge expansion slots, RS-232 serial port, mains adaptor port, Z-80 expansion bus
Software in price: spreadsheet, word processor, simple database selection, diary, calendar, calculator, clock and alarm
Optional extras: mains adaptor, £9.95; RS-232 cable, £9.95; I/O software cable for IBM data transfer, £14.95; 32K RAM cartridge, £19.95; 128K RAM cartridge, £49.95; 32K EPROM cartridge, £12.95; 128K EPROM cartridge, £49.95; ultraviolet eraser, £29.95
Price: £249.95
Manufacturer: Cambridge Computer, Sidney House, Sussex Street, Cambridge CB1 1PA. Telephone: (0223) 312216
Available: now

The Z-88 is not meant to be opened up by users, and there should not normally be any reason for doing so. We managed to get at the inside by undoing 11 screws. The display's innards lie at the top, directly connected to the one and only board. Below the display lies a plastic battery housing and L-shaped board. The board curves around the box for the cartridges, which is held in place by a long strip of brass.

Four large chips are mounted on the board. From left to right they are an NEC 1Mbit EPROM, a 256Kbit static RAM, a logic array, and the main processor — a Zilog CMOS Z-80. Below them and to the left is a small loudspeaker. The substantial logic array helps to keep the component count low, but there is still a surprisingly large number of discrete components in the form of transistors and resistors.

Cambridge Computer was unable to supply a printer cable in time for us to try out the Z-88's printing capability. The Z-88 uses an RS-232 serial port for printing, which is also slightly worrying. Cambridge Computer claims that it can be used with most popular printers, though the cheapest models usually have a parallel port as standard. To convert a printer to serial operation could cost you about £30, possibly adding a hidden cost to buying a Z-88.

The documentation was fairly helpful, though it is not without errors. One tutorial instructs you to press the Square and Down Arrow rather than the Diamond and Down Arrow when using the Calendar, which confused me for a while.

The Z-88 is said to be aimed at business, professional and educational users. Its closest rival is probably the Tandy 102, which costs £299. The Tandy machine displays fewer characters on-screen and has slightly less memory but it does have a full-travel keyboard, and parallel and serial printer ports. It also has a built-in modem — though it is not approved for use with the UK phone network — along with a separate modem port. Software in the form of a text processor, Basic, and address and scheduler programs is also standard. The Multiplan spreadsheet is available at extra cost. For business users it could well prove a more appealing option than the Z-88.

CAMBRIDGE Z-88

PC VERDICT

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

☐ The budget feel of the machine will probably prevent it from finding favour among business users.

CONCLUSIONS

■ On paper the Z-88 looks good value for money. Its spec is impressive, especially the built-in software; it is light and easy to carry around, and has a clear display. But it is let down by the membrane keyboard, the lack of a parallel port and the messy way in which you access menu options within the software.

■ When assessing the machine it is worth adding in the price of extras like a mains adaptor and printer cable, and possibly also the cost of adapting your printer to serial operation; its price may then be less appealing than it appears at first sight.

■ By spending a little more money on its machine, Cambridge could have removed its faults. Its cheapness will no doubt attract a lot of interest, but giving the machine such a budget feel could well prove its downfall.

■ For simple data capture the keyboard is probably bearable; for writing, the benefits of a full-travel keyboard are likely to be missed.

■ The Z-88 may prove suitable for educational use, especially by students, but business users will probably prefer something more refined like the Tandy 102. PC

PRINTER STANDS
HIGH-TECH ORANGE BOXES

By Carol Hammond

Continuous stationery is cheap and convenient but for one problem — what to do with the stream of printout spewing forth from your machine. Printer stands are designed to keep the problem under control with printer, paperstack and printout supported on one neat unit.

Laser printers solve one of the awkward problems of using a printer: where to put the paper. They store the paper to be used and come with a tray to catch the printed output. However, for those using more humble printers, paper handling still presents a problem that many people look to printer stands to solve.

If you use continuous stationery you need to position your printer so that there is a clear path for feeding paper into it, and somewhere for the resulting output to go, where it can be neatly folded. Otherwise you may find that the printout gets crumpled, or that it starts feeding itself back into the printer mechanism. To avoid this you may have to rig up your printer in a way that takes up quite a lot of room. Even then you may feel that it is necessary to stand over it while it is in action, in case any paper gets caught.

People buy printer stands to overcome these annoyances. Stands cost anything from £10 to £300, so it seems there must be many different ways of solving the problem. We looked at a variety of stands, from the cheap to the expensive, which adopt different ways of housing printers and paper.

The first one we looked at was the Universal PC Printer Stand; at £12.75 it was also the cheapest. The Universal consists of five pieces of smoked plastic, complete with slots, which you put together yourself. It is quite easy to assemble. A diagram is provided, and each section of the stand has letters embossed on it so you know to connect each piece to another with the matching letter.

One piece sits horizontally, and two other pieces are placed vertically at either end of it. The horizontal piece has four slots; the two outer ones are for housing a 132-column printer, and the two inner ones for an 80-column printer. You rest your printer on this horizontal base. There is another piece which acts as a lip to prevent your printer from sliding off, since it will be lying at an angle, sloping towards the front. The remaining piece is the paper guide, which slots in at the back. It has two cut-out shapes at either side of it to feed printer cables through. The Universal is meant to have stick-on rubber feet but ours arrived without them.

Although the Universal stand looks flimsy, it proved to be quite sturdy. Unfortunately, it did not seem to be of much use. You can put your paper underneath the stand in order to save space, and you can feed it through the paper guide to the printer and then out quite easily so that it does not get creased. But the stand has no mechanism to fold the paper or catch it, so it is still free to go awry.

The Amaray stand consists of one piece of smoked plastic suitable for an 80-column printer. The stand has three sides to it, the largest having a hole in it to feed paper through for bottom-feed printers. The stand we used had a crack in the front, so it obviously did not travel well through the postal system and must have been quite brittle. With the Amaray stand, again, you just put your printer on top and your paper beneath, so you save some space and make a clear path to feed paper into the printer.

The Datasafe Printer Carrier comes in 80-column or 132-column models. Both are made up of two pieces of plastic: the main stand and a catcher tray. The 132-column model can be used with bottom-feed printers. One piece is box shaped but with two side pieces missing. One of the remaining side pieces has a hole in it from which a panel pokes out to form a paper guide. The top edge of this side of the stand does not join to the piece of plastic above it, but has a rubber edge. Paper is stored inside the stand and feeds through this open edge to the printer, which rests on top of the stand. The output falls into a catcher tray which fits on to the back of the stand below the paper guide.

CURLED PAPER

Although the Datasafe stand makes some attempt at catching the paper and keeping it in one place, when we used it the paper started to curl around itself and did not fold up neatly. A carefully positioned cardboard box with a hole in one side would have been just as efficient. There is the advantage, however, that as you move the stand you can move the paper stored inside it.

At this point we began to feel that printer stands were largely a waste of time and money. Unless the printer stand actually folds the paper coming out of it, there seems little point in having one. On all the models we tested up to this point the paper could still get creased, and we would not have been happy to leave the printer to its own devices during a long printing session.

The Misco Micro Fold stand, however, has a paper-folding compartment which worked successfully when we tried it. The Micro Fold stand costs almost £60, but it works so efficiently it is probably worth the expense if you do a lot of printing. It is certainly one we would use in our office.

The Micro Fold is supplied in eight separate pieces plus a bag of screws. It looked as though assembly might be a complex and frustrating task, but in fact very clear instructions are provided and we were able to put the Micro Fold together in about 15 minutes. The small piece of plastic that was left over when we had finished proved to be a clip to hold the printer cable in place.

RECUMBENT V

Once assembled, the Micro Fold looks like a V lying on its side. Your printer rests at an angle on the raised part of the V shape. Underneath the printer lies a wire tray where your printout is refolded. Beneath this tray there is room for an input stack about 1.5in. thick. If you want to do a print run that requires more paper you can feed it in from a bigger stack at the front of the Micro Fold.

A metal plate at the back of the stand separates the incoming paper from the printout. It can be adjusted according to the type of paper or printer used to ensure the paper feeds through at the right tension. A helpful diagram of how to feed in paper is stuck on to the stand. The Micro Fold can be used with bottom-feed printers too.

Encouraged by this, we moved on to use the Inmac Desksaver, which employs a similar vertical arrangement to store and fold paper. It is supplied as three separate pieces of plastic which, once assembled, are claimed to form a printer stand with a smaller footprint than the printer itself.

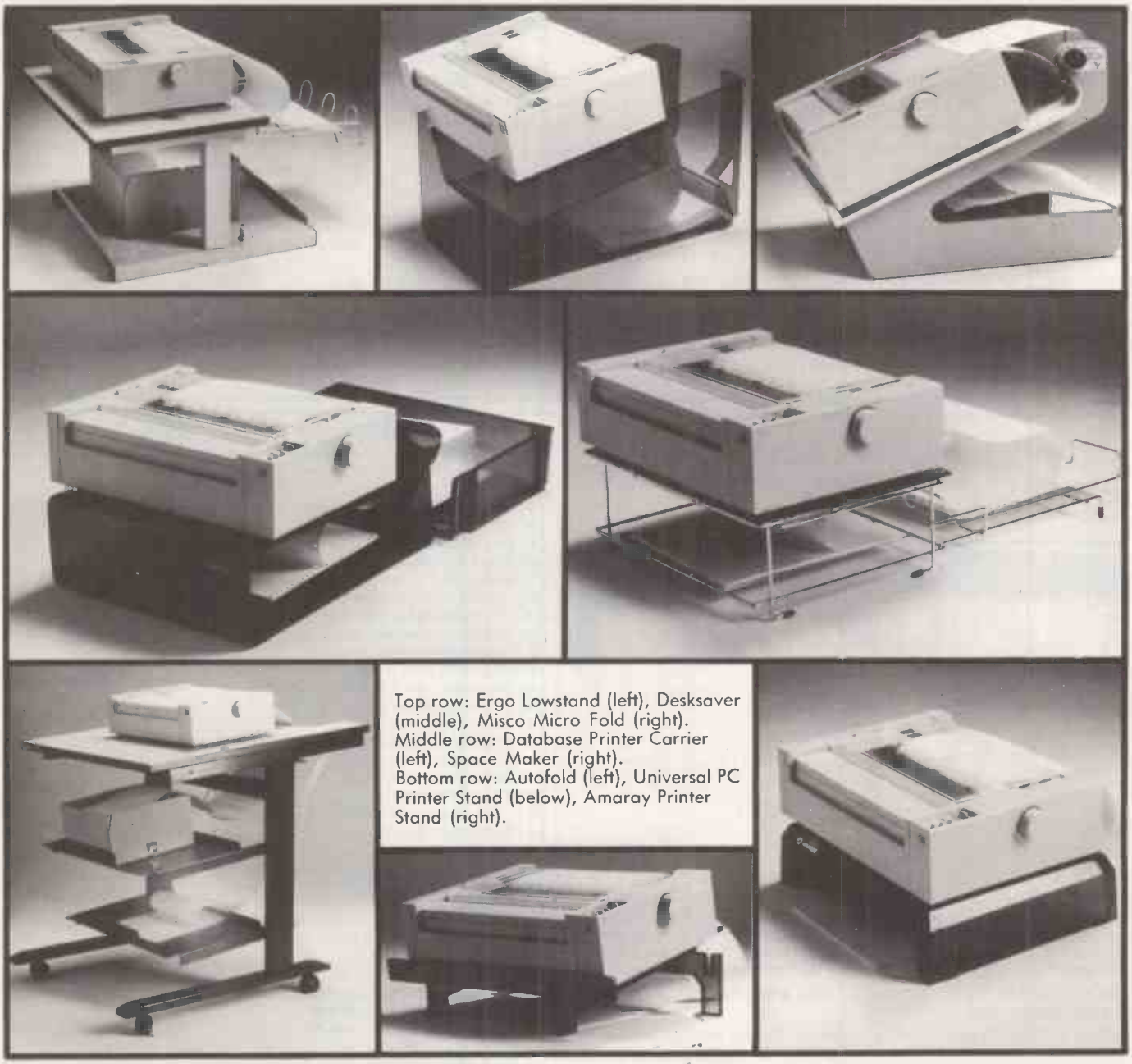
The largest piece resembles a four-sided box. You place one piece at the bottom of the box to form a tray for the stack of new paper, while the last piece hooks over the edges of the large box to form a deep tray to

(continued on page 52)

PRINTER STANDS

	PRINTER WIDTH	DIMENSIONS (mm.)	MATERIAL	SUPPLIER	PRICE	
Universal PC Printer Stand	132 col	450×475×110	plastic	PAS	£12.75	
Amaray Printer Stand	80 col	400×349×108	plastic	PAS	£15.65	bottom-feed
Space Maker	80 col	400×300×115	metal	Inmac	£29	paper stored beneath stand and folded beside it; suitable for top-feed printers
Datasafe Printer Carrier	80 col	381×450×140	plastic	PAS	£46.80	paper stored beneath stand; printout feeds into tray behind
Misco Micro Fold	80 col	415×460×380	metal	Misco	£59	paper stored and folded beneath stand; suitable for top and bottom-feed printers
Datasafe Printer Carrier	132 col	597×450×140	plastic	PAS	£61.80	suitable for top- and bottom-feed printers
Desksaver	80 col	280×571×365	plastic	Inmac	£65	paper stored and folded beneath stand; suitable for top- and bottom-feed printers
Ergo Lowstand	132 col	600×800×410	metal	Inmac	£139	paper stored and folded beneath stand; suitable for top-and bottom-feed printers; optional castors
Autofold	132 col	680×800×720	metal	Inmac	£269	castors cost £7 extra

DIMENSIONS are quoted as width × depth × height



Top row: Ergo Lowstand (left), Desksaver (middle), Misco Micro Fold (right).
Middle row: Database Printer Carrier (left), Space Maker (right).
Bottom row: Autofold (left), Universal PC Printer Stand (below), Amaray Printer Stand (right).

SUPPLIERS

Inmac 16 Silver Road, London W12 7SG. Telephone: 01-740 9540
Misco Computer Supplies 4 The Western Centre, Western Road, Bracknell, Berkshire RG12 1RW. Telephone: (0344) 482121
PAS Computer Products Datasafe House, Unit 4, Central Trading Estate, Staines, Middlesex TW18 4UP. Telephone: (0784) 62781

(continued from page 50)

take the printout. The printer rests on the top of the box, poking out from either side of the stand. We found that paper fed into the printer without any problem, but it did not fold up easily and had a tendency to curl up. Moving the bottom tray to the front, back and middle of the stand seemed to make no difference. There were no instructions to tell you where to position it, and the Inmac catalogue shows the tray in three different positions. We felt that users would not be getting much for the £65 that they would have to pay for a Desksaver.

Disillusioned, we moved on to the Space Maker stand, which comes with a foldaway basket to save space. The Space Maker is supplied fully assembled, looking rather like a wire cage shopping trolley.

The main unit has two levels. The top part is a square piece of plastic on which you sit your printer; underneath it there is a wire tray where you store the paper stack. A second wire tray, connected to the first, normally dangles down vertically — say, beside your desk — but it can be pulled up and slotted into position to accept printout. We found that the Spacemaker performed satisfactorily — both as regards feeding paper in and in folding the output. It also had the virtue of not taking up much room. However, the movable basket should be positioned where passers-by cannot bump into it, since it might rip clothing. Unless you want to move the printer and stand every time you use it, you would also have to leave room to swing the basket up into place, so perhaps you would not save much space after all.

At £269, the Autofold stand was the most expensive we tried out. As you would expect for that sort of price, the Autofold was big and heavy. Opening up the box it came in revealed something that looked like a cross between a desk, a cooker and an exercise bicycle. Assembling it was straightforward, but it took two people because many of the parts were heavy and awkward to position. The sheet of instructions supplied was reasonably helpful, but did not show clearly how to position the wire divider tray. Once screwed together, using the tools provided, it certainly looked built to last. We fitted castors because it would otherwise have been far too difficult to move around.

The Autofold has three levels. The top is a flat, plastic-covered surface on which the printer rests. Underneath it lie two metal trays for the paper stack and the printout. The trays can be positioned at six different heights according to the amount of paper you need to accommodate.

In use, the Autofold did not quite live up to its impressive appearance. We found our printout did not fold very easily, and there seems to be little reason to pay so much money for a stand unless you do a great deal of long-run printing. It might also be appropriate if you use a very large or heavy printer and want to be able to wheel it round the office.

The Ergo Lowstand, the second most expensive stand we tried, looked like a cut-down version of the Autofold. Like the Autofold it is robustly built, but it has only two levels: the upper houses the printer and the lower the paper. A wire tray protruding from underneath the top level can be extended to take printout. The stand worked well when we put it to the test, folding up paper without any difficulty. It is more expensive than the Misco stand, but has the advantage that it can be wheeled around on castors and is very well built.

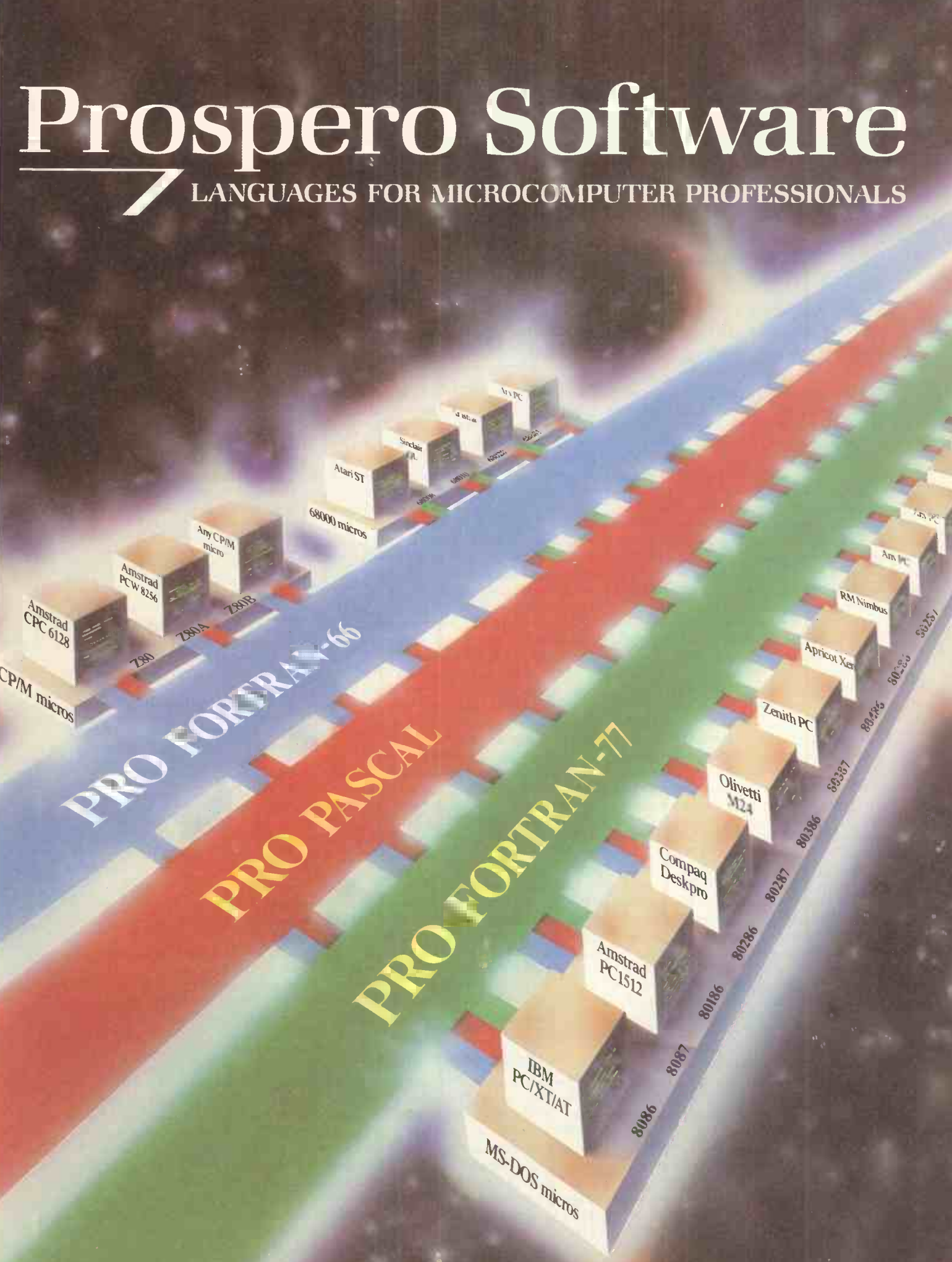
If you have decided on a particular printer stand, try to see it in use before you buy it — photographs may paint a flattering image of a particular model's capabilities. If you buy from a catalogue, check that you can get a full refund if you are not satisfied. Finally, keep an eye open for empty crates or cardboard boxes. With a little bit of time and ingenuity you might even be able to set up a suitable arrangement of your own.

CONCLUSIONS

- Overall we were disappointed by the printer stands we tried.
- Price seems to bear little relationship to the functionality of the product; if anything it depends on the material from which the stand is constructed.
- If you are buying a stand, go for a model that will fold up your printout.
- Avoid the temptation to overspecify: some of the more expensive models are so soundly built that they will still be as good as new long after your last continuous-stationery printer has been replaced by a laser. PC

Prospero Software

LANGUAGES FOR MICROCOMPUTER PROFESSIONALS



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GEM APPLICATIONS
LOW-END DTP AND WP

By Susan Curran

Digital Research's mouse-driven front end has so far not found much favour with the writers of applications software, but some home-grown programs have now arrived to fill the gap.

If Digital Research's Gem front end is ever to play a major role in the PC market it will have to be well supported with application packages. Of course, any run-of-the-mill PC applications can be called up from the Gem front end, but what are needed are proper Gem-style applications with mouse support, windows, slide bars, pull-down menus and the rest. Not many independent software suppliers have produced the goods, and it seems that Digital Research has cottoned on to the fact that it will have to produce some of these packages itself, if only to get things started.

The results of this thinking are Gem Desktop Publisher and Gem 1st Word Plus, a word processor. Desktop Publisher is a low-end product as desk-top publishing (DTP) packages go and was developed by Digital Research itself. The word processor was bought in and adapted. Both have the Gem format. They interrelate with Gem graphics packages and are very competitively priced. It is essential to have graphics capability in order to use these programs, and colour is desirable. It is also more or less essential to have a mouse: though keyboard alternatives to the mouse commands are provided, they are fail-safes and do not add up to a true alternative interface.

Gem 1st Word Plus has been packaged by Digital Research with the Gem Desktop itself, including the usual range of output drivers. You also get Gem Paint, a pleasant little painting program. Amstrad owners are presumed already to have Desktop and Paint, and can buy 1st Word Plus alone at a lower price. Separate discs and manuals for all three come together in a hard slip case.

The standard Gem manual style is soft-covered and spiral bound. The cover graphics are pretty and the reference material is reasonable, though the writing style is rather leaden. More seriously, the authors seem to have no idea of what constitutes a proper tutorial.

1st Word Plus comes on two unprotected floppy discs. One holds the main program and the spelling checker, while the other is for the mail-merge package. Using the usual Gem procedures it is easily installed on a hard-disc machine; it would be very hard work to use Gem applications with floppies alone.

The program opens with a document-selector screen, which then leads to an editing screen. Gem applications can never be clean-screen programs as all the usual mouse-and-windows clutter has to be displayed. In 1st Word Plus there is also a note of function-key assignments at the bottom of the screen, totally hemming in a little text window, though you can pull down the text window to hide it if you wish. The key-assignment strip indicates whether boldface, underline and the like are toggled on or off, but it is less useful than it might be because it displays only unshifted key assignments. The program uses shifted function keys as well, but no Alt or Control combinations. Most function-key assignments are in any case duplicates of the menu functions.

There is no automatic context-sensitive help, but among the pull-down menus there is a help menu which provides a list of topics. On the start-up screen there is a fount table which provides very easy access to non-keyboard characters; it is also accessible from the main screen if you shift the text windows. There is also a key box which allows you to click with the mouse instead of pressing Space, Return, Delete and various other keys. To keep it on-screen while typing, though, would mean losing a hefty chunk of text space.

1st Word Plus works by default in an insert mode, without automatic reformatting. It displays italics, boldface and the like, and justifies your text on-screen. Although the program handles a small range of fount sizes, this is not reflected in the display. It is painfully slow in responding to key presses: it is not difficult for a moderately fast typist to race several words ahead of the display.

JERKY SCROLLING

The usual mouse-type cursor arrangement is provided to get you around the text screen. You move a pointer with the mouse or the cursor keys and then click on its position to move the text cursor. This works well, and text highlighting that is necessary to define blocks or change type styles is also smooth. Horizontal scrolling is rather jerky and vertical scrolling is even worse, as the whole screen is continually rewritten.

1st Word Plus does not handle files that are too long to fit into memory, but it will handle multiple documents up to the full extent of memory capability, and you can move text around from one document to another.

The menus are sensibly arranged and provide most of the usual commands, including block move, copy and delete, and delete line; there is no delete word command. Automatic footnoting, left, centre and right headers and footers, and search and replace are available, along with the usual options. There is a background print facility. Variable rulers are held within the file and saved with it, and you can set up format files with starting rulers or text to be associated with files that have different suffixes.

The spelling checker has an in-built 40,000-word dictionary — that puts it on the smallish side — and you can set up various supplementary dictionaries. An unusual feature is the possibility of amending the main dictionary. Words are checked in context, after a lengthy wait while the dictionary is loaded, but the checker is oddly uninformative. It simply

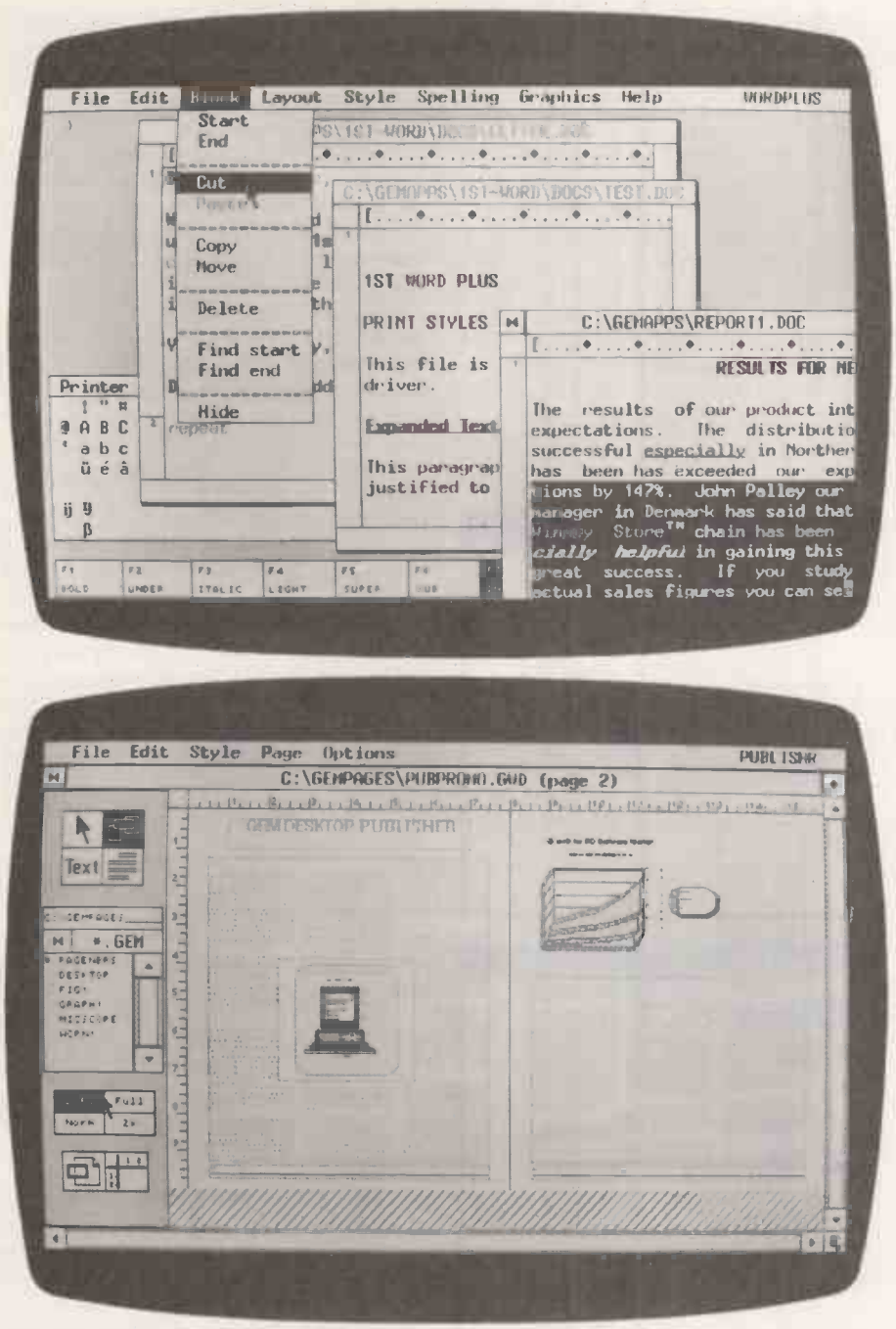
SPECIFICATIONS

GEM 1st WORD PLUS

Description: mouse-orientated word processor with spelling checker and mail-merging
Hardware required: IBM PC, PC/AT, PS/2 or compatible with at least 512K RAM; Hercules or compatible graphics card; suitable mouse or pointing device
Copy protection: none
Price: £149.94, including Gem Paint and Gem Desktop; Amstrad version without extra Gem programs £69.50
Publisher: Digital Research, Oxford House, Oxford Street, Newbury, Berkshire RG13 1JB. Telephone: (0635) 35304
Available: now

GEM DESKTOP PUBLISHER

Description: page makeup program with limited editing facilities; requires separate word processor and graphics package
Hardware required: IBM PC, PC/AT, PS/2 or compatible with at least 512K RAM; IBM, Hercules or compatible graphics card; suitable mouse or pointing device
Copy protection: none
Price: £295
Publisher: Digital Research, Oxford House, Oxford Street, Newbury, Berkshire RG13 1JB (0635) 35304
Available: now



Top: 1st Word Plus can handle as many documents as there is room for in the memory. Above: Desktop Publisher's double-page display shows how graphics and text will fall.

stops the cursor next to the questionable word, leaving you to correct it by hand.

Though 1st Word Plus does not offer much in the general direction of DTP, it does allow you to combine pictures with your text. The graphics must be available as Img files on disc — that covers Gem Paint files, but not images from Gem Draw — or have been copied to disc with Gem Desktop's Snapshot feature. Pictures can be moved, but you cannot crop or scale them. You can also superimpose text or other pictures over a picture. The program has a graphics mode that shows the full pictures, and a non-graphics mode in which a box defines the space the picture fills.

The mailing-list organiser, called 1st Mail, will merge letter outlines with data files created either in 1st Word Plus itself or with most databases. 1st Mail is a free-format program, with no fixed address template. It works on a command basis, which makes it reasonably flexible, but possibly a little confusing for novices. It will automatically reformat text around variable data, and data from the same record can be used several times. Form letters and command files can be nested or chained. The only thing it lacks is a selection facility.

All in all, 1st Word Plus is a neat little package. It lacks the in-depth capabilities of the top word processors, but it does have a good basic range of capabilities, and it could appeal to many people who like mouse-based word processing. It is a pity about the slow responses, though.

The version of Gem Desktop Publisher we saw was a beta-test release with a draft manual. All the indications are that the final documentation will be just as pretty as the 1st Word Plus manual, and equally heavy going for the reader. This program itself did not have an output module, though there is no reason to suppose that there will be any problems here. But I did encounter a few reliability problems, and in one morning session I crashed the program nearly 20 times. Its idiot-proofing will, I hope, be improved by the time it is released to the public.

By DTP standards, Gem Desktop Publisher is a compact program. It uses just two floppies, though of course it also relies on the printer drivers and the like that are included in Gem Desktop. Gem Desktop Publisher has no graphics or word-processing facilities of its own, so you have to use it in conjunction with a separate word processor and graphics package.

Gem Desktop Publisher supports word-processed files from WordStar, Word Perfect, Multimate and Displaywrite, as well as from the Gem word-processing packages 1st Word Plus and Write. Documents from these sources can be imported in their normal formats, though they are stripped of their bold, underline and other display codes. You can also import ASCII documents from any other program capable of producing them.

COLOUR CAPABILITY

The only graphics programs that are supported are the Gem packages Paint, Draw Plus and Graph. Gem Desktop Publisher will handle colour, but it does not translate colour into shades of grey on monochrome machines.

The program comes up with a standard Gem-type screen, with menus along the top and a toolkit along the left-hand side; the toolkit can be suppressed to give more screen space. Apart from the clock and other little Gem goodies it is a one-window program, but it does allow you to switch between a number of views of the document. For example, you can view two adjoining pages or one full page with normal-size text rendered illegible, or you can select any part of the page to be displayed at either actual size or twice actual size.

For laying out pages, Gem Desktop Publisher works with the basic concept of a rectangle; the same thing is known as a frame in the parlance of some other packages. Before doing anything else, you must define and place a rectangle on the blank page. All text and graphics — even the page numbers — are enclosed within rectangles. You can locate as many rectangles as you need on a page, overlapping them as necessary. Once your rectangle is in place, you grab the contents from a suitable file to be read into it.

Rectangles are defined in the usual Gem way: you set the mouse pointer at one corner, and then stretch the box out. It is possible to display grid co-ordinates on-screen to ensure accurate positioning, a feature which is more or less essential, since Gem Desktop Publisher cannot define page

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margins in any other way. Rectangles and text will normally be positioned precisely as defined, but you can also arrange for them to snap to the nearest grid section. The size of the grid is adaptable.

Each rectangle has to be either a graphics rectangle or a text rectangle: which type it is, is determined by the nature of the file you read into it. A rectangle cannot be filled with matter from more than one file, but the contents of a single file can spill across several rectangles if necessary. This is not quite as restrictive as it sounds, since graphics rectangles can include text that has been generated as part of an illustration, and rectangles can be superimposed to combine text and graphics.

The real problem is that it is only possible to designate a rectangle for graphics or text by reading in a file. If you leave a rectangle as an empty phantom you cannot locate the cursor in it to type in any fresh text. Nor is it possible to paste text cut from a text rectangle into an empty rectangle; there has to be some text there first, even if it is subsequently deleted.

Of course, most of the time you will be importing chunks of text that have been prepared using a word processor. But most DTP users still need to add an occasional headline to an existing piece of text, and will not take kindly to having to call up their word processor in order to do so. Gem Desktop Publisher makes this simple operation — and several others — seem like hard work.

Rectangle attributes are defined from a pull-down menu of options, one of which is column layout. Rectangles can have from one to four columns of text, and the space between them can be selected. Each column has to be of the same width, and you have to define a separate rectangle for a heading that is intended to spread across the head of two or more columns of text. This causes some problems if you want to include text from several different files on a single page. Each slab of text has to be fed into a separate rectangle, so you have to do all the columnar calculations by hand.

NO GRAPHICS

The background inside a rectangle can be set to appear in any one of eight colours and nine patterns, including plain; it can be either opaque or transparent to underlying rectangles. There is no built-in facility for setting borders around rectangles. If you want a border you have to import one from a graphics program or superimpose rectangles of slightly different sizes. There is a command for setting vertical lines between columns, but otherwise there are absolutely no built-in graphics capabilities.

Only as much text is read into the rectangle as will fit; the overflow is ignored. If the rectangle or the text in it is resized, the contents are adjusted automatically and the flow to subsequent rectangles is automatically corrected.

Text is invariably chained from one rectangle to the next in a straight sequential way, depending upon its position on the page; you cannot override this ordering. To some extent this is handy, but I did find it difficult to adjust my rectangles to the right size so that only the headings of a file appeared in a heading rectangle. Gem Desktop Publisher did not seem particularly helpful here: time and again I got a "word too long for rectangle" error message when I did not want the word in question to appear in the rectangle anyway. And when I picked too large a fount size for my heading, the program seemed very reluctant to give me a chance to choose again. I would also have liked a clearer way of indicating whether — and when — there was overflow from a rectangle. It has no automatic method for pointing from one section of a file to the next.

GEM 1st WORD PLUS

PC VERDICT

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

☐ A decent mouse-based word processor with good extras.

GEM DESKTOP PUBLISHER

PC VERDICT

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

☐ A reasonable DTP program that strikes a fair balance between power and ease of use.

A good feature of Gem Desktop Publisher is its handling of illustrations. You do not have to define spaces for illustrations before reading in text: you can do this at any point. If you define a graphics rectangle in the midst of a spread of text, the space for it will be cleared automatically and the text flowed around it. Flowing takes place automatically in a simple newspaper-column format so that text will not read right across the illustration even if it is placed in mid-column or within single-column text.

As well as defining rectangle attributes, you can define attributes for sections of text within a rectangle. These blocks can be existing paragraphs or a section of text that you have defined with the cursor. Paragraph attributes include the Swiss and Dutch fount styles and sizes from 7 point to 72 point. You can also specify various indents and spaces along with ink colour and text alignment; range-left, range-right and centred styles are all available. You give each set of paragraph attributes a name of your choice, and save the set of names used within a document as a style sheet.

Individual character attributes are applied to defined blocks of text, and are limited to the basic set of bold, underline, italic and normal styles. You can enter both paragraph and character attributes into your original text files. The command

@subheading=

for example, will set the rest of the paragraph into sub-heading style, assuming one exists in the style sheet being used. This is a very handy feature which greatly simplifies and speeds the design of long documents.

Gem Desktop Publisher's general facilities for handling multi-page documents are at least adequate. Some attempt is made to carry forward the initial layout to subsequent pages, and it is possible to insert and delete pages at any point.

Though text cannot be entered from scratch, it can be edited within the program, and there is a facility for assigning the editing keys so as to mimic those of your originating word processor. I found the text-editing cursor to be a clumsy beast, which rarely located itself exactly where I expected.

Gem Desktop Publisher lacks automatic hyphenation facilities, so if you want to insert soft hyphens you have to do so manually. It also lacks any kerning facility, so you cannot adjust the spacing of characters to improve the look of the type. I also found that supposedly justified text sometimes falls short.

Headers, footers and even simple page numbering are handled as graphics files. The advantage of this approach is that it allows you to incorporate a logo, but it does make adding simple headers an unnecessarily complex business. A basic selection is provided, to simplify the task.

Gem Desktop Publisher's file handling is complex since the program cannot save all your text and images in a single file. In order to produce or reproduce a document you need a bewildering variety of files on disc, including various versions of the text files, graphics files, style sheets and the special files that the program itself generates. All of them must be present on the same disc. Though this arrangement is economical on disc space, it does make it a major chore to do simple tasks like copying a document to a floppy in order to carry it to a remote printer. The program does make a small attempt to simplify this procedure.

CONCLUSIONS

■ Gem 1st Word Plus and Gem Desktop Publisher are decent attempts to exploit Gem's very pretty front-end. Both programs implement the Gem features well.

■ Both programs are mid-range to low-end programs with a relatively limited range of features, and both are very competitively priced.

■ Though both programs are perfectly competent, neither is so exceptional as to provide an overwhelming reason for choosing Gem as a front end. PC

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ADOBE ILLUSTRATOR
TRACING WITH POSTSCRIPT

By Carol Hammond

While most drawing programs force you to start with a blank screen, this Macintosh package is designed specifically for those who want to adapt existing images.

As its name suggests, Adobe Illustrator is a drawing package. Like others of its kind it can be used to create images, but it really comes into its own as a tracing tool to modify existing artwork. It is intended primarily as a tool for graphic artists, technical illustrators and suchlike. Its tracing facility also allows the less artistic to produce reasonable looking artwork.

Adobe Illustrator comes from Adobe System, the company which originated the Postscript page-description language. As you would expect from a program with such a lineage, Illustrator takes advantage of Postscript. Rumour has it that Illustrator is a development of an in-house tool originally used by Adobe to create Postscript founts.

Unlike painting programs such as Macpaint, Adobe Illustrator is object orientated. When you use Macpaint to create an image, the image is specified as the dots or pixels that appear on the screen. But artwork created with Illustrator is automatically specified as a collection of lines and curves, each of which has its own mathematical definition. The definitions that make up a piece of Illustrator artwork comprise a Postscript program, which is executed every time you print the artwork. It is this that makes it possible for Illustrator to create high-quality artwork.

You can use Illustrator to generate images or to alter existing images created with Macpaint, Macdraw or any other software that creates Macdraw Pict or Macpaint documents. You can also modify scanned images stored in Macpaint or Macdraw Pict format. They could be existing images like a photograph, map, cartoon or technical drawing, or a drawing you have done yourself on paper and scanned in.

Where you want to use an existing image as artwork, Illustrator imports it as a template and displays it on-screen as a bit map. What you see is a copy of the scanned image. You then trace around whatever area of the image you like to form a new Illustrator document. For example, you could scan in a photograph of a man beside a tree in a field and just trace around the silhouette of the tree. You could then outline the tree, fill it with a tint, add some text and use it as a company logo.

On-screen Illustrator initially appears like other Mac drawing packages. There is a window complete with a drawing area, scroll bars and a tool box down the left-hand side. Some of the 13 tools are familiar ones: an arrow is used to select objects, a hand tool moves objects, and a magnifying glass zooms in on objects.

But the spray can, paint pot, eraser and pencil icons found in Macpaint are missing from Illustrator. Instead there is a pen tool which you use to draw and trace around artwork, plus several others which allow you to add type, draw rectangles and squares, draw circles and ovals, split paths, transform objects by scaling, rotating, reflecting and shearing them, and finally subdivide the drawing area into pages for printing. These tools show where the strength of Illustrator lies: in manipulating images.

ADOBE ILLUSTRATOR

VERDICT

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

A useful tool for modifying existing images, but too complicated to contemplate for drawing alone.

To trace round an object you select the pen tool and place it at the point where you want to start. You then negotiate your way round it by building up a series of lines or curves, as appropriate. You do not use a mouse to draw lines; instead you set up a sequence of curves and lines by specifying points which Illustrator then connects. It is rather like the drawings children construct by joining numbered dots. For the novice, the process of tracing is rather fiddly, but with practise you can build up a very precise copy of the object you are tracing.

To draw straight lines you click on the pen tool to bring a pointer up on the screen. You move the pointer to one end of the line and click again. A solid black square called an anchor point appears. You then move to the other end of the line and click again to draw the line and set another anchor point, from which you can carry on to draw another line. Squares, rectangles, circles or ellipses can be drawn from scratch by selecting the square and circle tools from the toolbox.

To trace a curved line round an object you first establish an anchor point as before. Using the mouse to drag the pointer causes the anchor point to become a small hollow square with two lines sprouting from it in opposite directions. As you drag, the lines change orientation to indicate what the tangent to the curve will be if you stop dragging and release the mouse button to establish the second anchor point.

With the second point fixed you can start dragging again. This time the directions of the pointer lines at the two fixed points change, while the curve adjusts itself to remain tangential to them. In this way you can make sure that any curved line will fit snugly to its template. The whole process is like using an infinitely variable French curve, and is correspondingly hard for the beginner to learn.

The difficulty of drawing curved lines is my main grouse against Illustrator. Nifty

(continued on next page)

SPECIFICATION

Description: drawing package which allows you to generate and modify artwork
Hardware required: Mac Plus with 800K floppy-disc drive, hard disc recommended; scanner and Postscript-compatible printer
Software required: software to store scanned images in Macpaint or Macdraw Pict format
Copy protection: master disc required to use backups
Price: £450
Publisher: Adobe Systems of Palo Alto, California
UK distributor: McQueen, Buckholm, Galashiels, Selkirkshire TK1 3NL. Telephone: (0896) 4866
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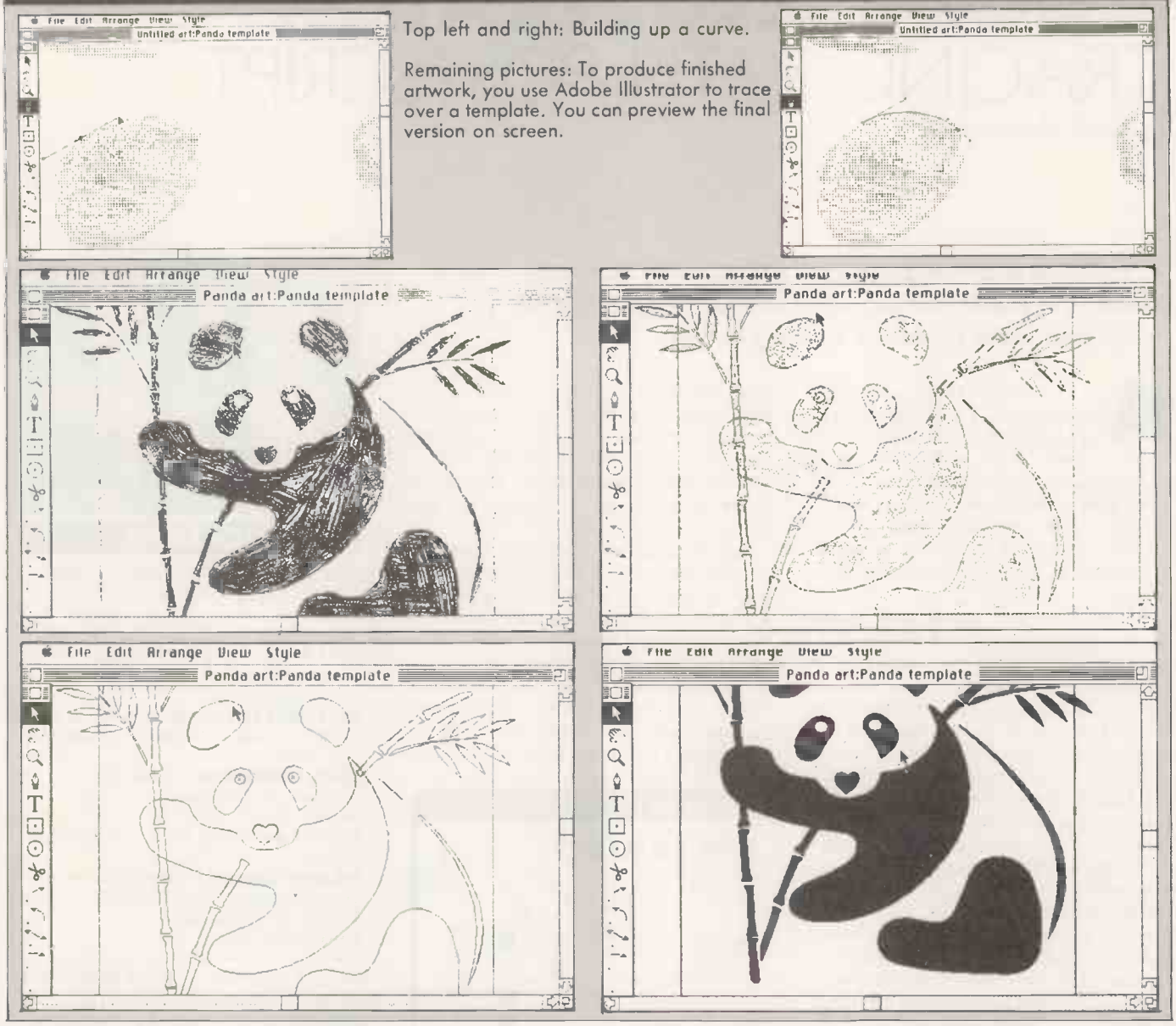
BUILDING AN IMAGE WITH ILLUSTRATOR



Top left and right: Building up a curve.

Remaining pictures: To produce finished artwork, you use Adobe Illustrator to trace over a template. You can preview the final version on screen.

(continued from previous page)

fingerwork is also required to use the Shift, Option and Command keys and the space bar in combination with the various drawing tools to vary their effect. This gives you a lot of options, but the assignments are hard to remember. Somehow Illustrator does not have the intuitive feel that makes many other Mac packages so pleasant to use.

Once you have traced round or drawn an object you can zoom in on it to make any fine adjustments, or add type to it. You can also transform objects by rescaling, rotating, duplicating, reflecting or shearing. You can also paint objects with tints, and apply continuous or dashed outlines of varying weights. If you are running Illustrator on a Mac II you can allot colour as well.

To look at what you have created you select Preview from the View menu. You can preview what you are doing as you go along by dividing your screen into two windows, and set one aside as a Preview window and one as an Artwork and Template window. This is still not entirely satisfactory, as you lose half your drawing area. You can, of course, print out as you go along to an Imagewriter to get an idea of what your finished artwork will look like.

You can save Illustrator documents in three formats: Postscript Only, Encapsulated Postscript (Macintosh) or Encapsulated Postscript (IBM PC). While the code of a Postscript Only document is accessible to the user and can be edited, this cannot be done with the others. They are designed to be used with page-composition systems that support the Aldus/Altsys/Adobe Encapsulated Postscript file format for IBM and Mac products. Systems that support this format display the previewed image on-screen for positioning, scaling and cropping, and send the transformed Postscript to the printer. A PC version of Illustrator is expected next year.

Illustrator's documentation includes a video tape in addition to the conventional manual. The tape takes the form of a tutorial led by the president of Adobe Systems, Charles Geschke. It is rather like a sales demonstration, in that it fills the viewer with enthusiasm about the capabilites of the package. Alas, as in a demonstration, users are left to find out that using Illustrator is not as easy as it looks. But the video does serve the purpose of giving you a comprehensive grounding in what the package can do and how to use it.

The manual tries very hard to explain how to use what is a fiddly package, and comes complete with copious diagrams. I found I had to reread passages over and over again before I understood them. But this is probably an inevitable result of the complexity of the package.

CONCLUSIONS

- Adobe Illustrator will be useful to graphic artists who routinely tinker with existing images.
- The facility for tracing over artwork will endear it to those who are less artistic.
- Illustrator is fiddly to use. It is not something for the casual user: even tracing over existing artwork is not easy.
- You will need to contemplate heavy use of the package to justify the cost of such a specialised graphics tool — and the time and effort to become adept at using it. PC

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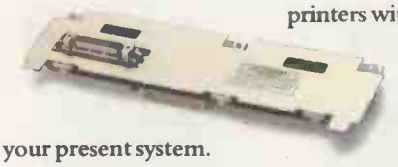

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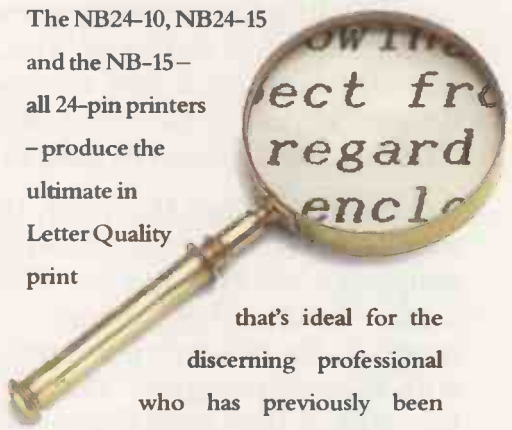

that's ideal for the discerning professional who has previously been limited to a daisywheel printer.

6 **Paper Width.** The suffix 10 or 15 in each printer's name indicates its carriage size. So the NL-10 and the NB24-10 can accept paper widths of up to 10 inches wide (80 col), while the ND-15 and NB-15 for example can accept paper up to 15 inches wide (136 col).

7 **Performance.** The 9-pin models are all ideal for printing draft text at superb speeds. The NR-10 and NR-15 can reach 240 cps with an exceptionally crisp Near Letter Quality at 60 cps. The NB24-10 and NB24-15 are ideal for important business documents. Both can clock up 216 cps in draft mode and 72 cps in letter quality. The top of the range NB-15 can produce Letter Quality print at a very impressive 100 cps while maintaining its excellent drafting capability of 300 cps for more informal documents.

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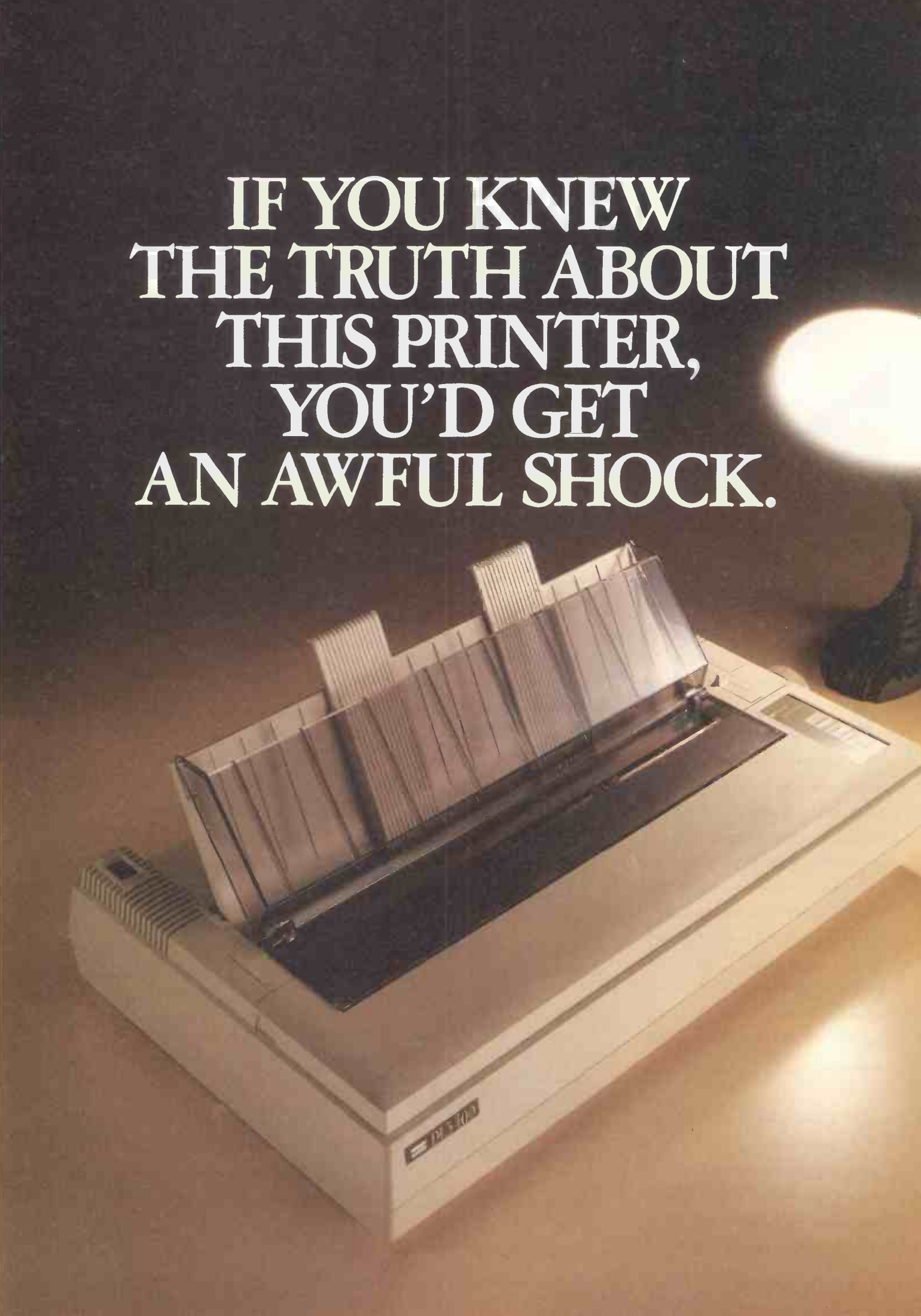

Don't get us wrong; it's a very fine printer, one of the finest you can buy, in fact. It's called the *Fujitsu DL3400.*

It's made by the number one computer maker in Japan, and so, as you might expect, it comes with a range of excellent features.

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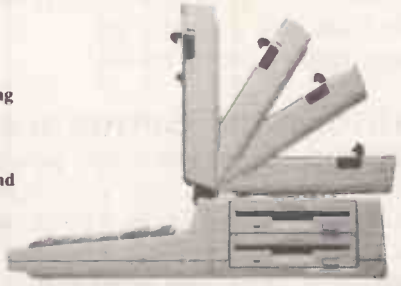

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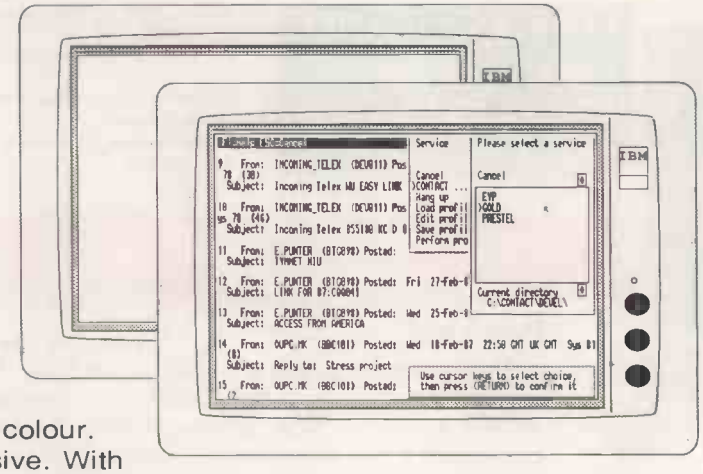

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DOS HELPERS
FRIEND OR FOE?

By Carol Hammond

The forbidding facade that MS-DOS presents to the world discourages most users from using many of its functions. These programs set out to make them more accessible.

The DOS operating system does not provide the easiest of interfaces, particularly for first-time users. With this in mind, a number of software houses have started producing DOS helpers — programs which set out to help you use MS-DOS and PC-DOS. They adopt a variety of approaches. Some simply provide a disc-based tutorial, while others augment the standard operating system to make it easier or quicker to use.

A program called Using the IBM Personal Computer Disk System is in the first category. It comes from Science Research Associates (SRA), the educational subsidiary of IBM, which has a long history of publishing educational materials. This pedigree shows in the product, which is both useful and easy to use.

The package is made up of two 5.25in. discs, one 3.5in. disc and a leaflet telling you how to insert the discs and what kit you need to run the program. It is no more than a gesture towards documentation, but you do not need any more than this because the program is designed to be completely self documenting.

To run the SRA program you switch on or reboot the machine with the disc in place. From then on you simply read the text which it displays and answer the multiple-choice questions that it poses at appropriate points. I found it simplicity itself to use, and comprehensive paper documentation would have been superfluous.

The program covers the most basic concepts of computing, from what hardware and software is, to what an operating system is and what different DOS commands do. It also covers topics like what a virtual disc does and why you might want to use it. Beginners will find it extremely helpful as an introduction to DOS.

Experienced users may well benefit from it too as it allows you to learn about the operating system's many powerful commands in an interesting and structured way. For many people, their introduction to DOS comes from reading the manual, which can be boring and time consuming. There must be plenty who have given up not much after Dir in the alphabetical command list. Others just learn how to cope with DOS as they go along.

Anyone who has never sat down and learned how to use DOS in a systematic way is likely to remain unaware of handy commands like

TREE /F

which lists the directory paths of all the directories on the current drive, together with the names of the files they contain. Obviously the program does not totally replace a DOS manual, but it is certainly a valuable supplement to it.

The program is divided into chapters, each of which covers a distinct area. The treatment of separate topics within each area concludes with a set of exercises. For example, the section explaining PC hardware is followed by an interactive question and answer session in which you are told whether your answers are right or wrong. I found completing the exercises helped me remember what different commands did and what syntax to use. It is more effective then just reading about them in a manual.

The sessions are never dull, since the form they take varies. Sometimes they are multiple-choice exercises in which you fill in the right word in a sentence, for example. In others your answers are used to build up a comparison between two items: the session on the advantages and disadvantages of hard and floppy discs is one example. At the end of each exercise you are given a tally of how many questions you have answered successfully, with or without help.

The screen is divided into three areas. The chapter and exercise number are flagged at the top while text and diagrams appear in the middle, which is also where you put your answers. The area at the bottom is used to display help information and the response to your answers. If you get an answer wrong you are told why it is wrong and the program makes suggestions to put you on the right track. You use the function keys to get help, display the solution, skip a question, redisplay a question, return to the index, end a session or access a glossary of terms.

The only serious problem with the program is that it is copy protected, so you

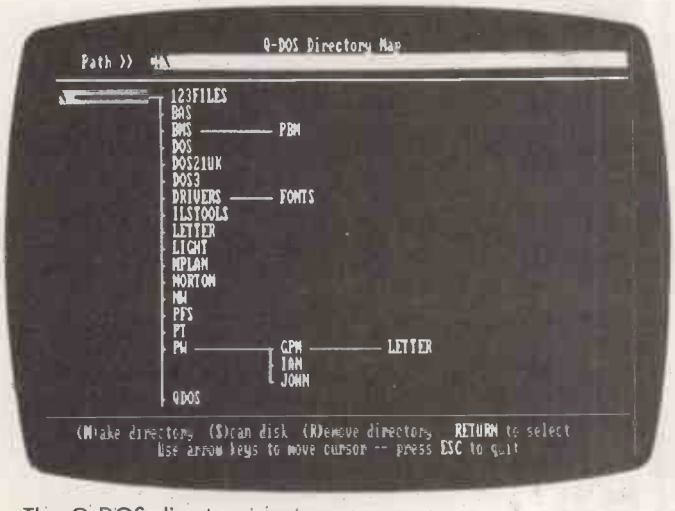
(continued on next page)

USING THE IBM PC DOS

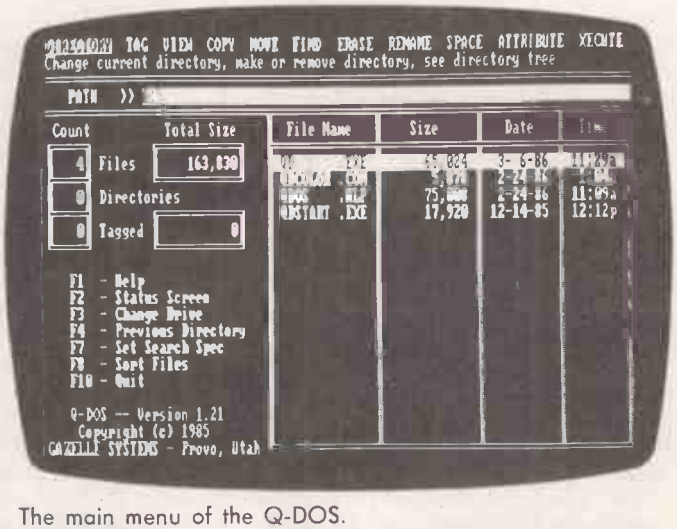
PC VERDICT

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

☐ An excellent introduction to DOS, which old hands may also find instructive.



The Q-DOS directory map.



The main menu of the Q-DOS.

(continued from previous page)

cannot make backups or install it on the hard disc of more than one machine. It is also not cheap, and some people may be unwilling to pay £80 for a glorified manual-cum-tutorial, however useful it may be.

The Q-DOS program, also known as Quick DOS, is a file manager for DOS users. It aims to help novices by enabling them to understand disc organisation, and experienced users by performing DOS functions more quickly than can be done by addressing DOS directly. It does this by cutting down on the typing you need to carry out different functions, and presenting a less inscrutable face to the world than does DOS itself.

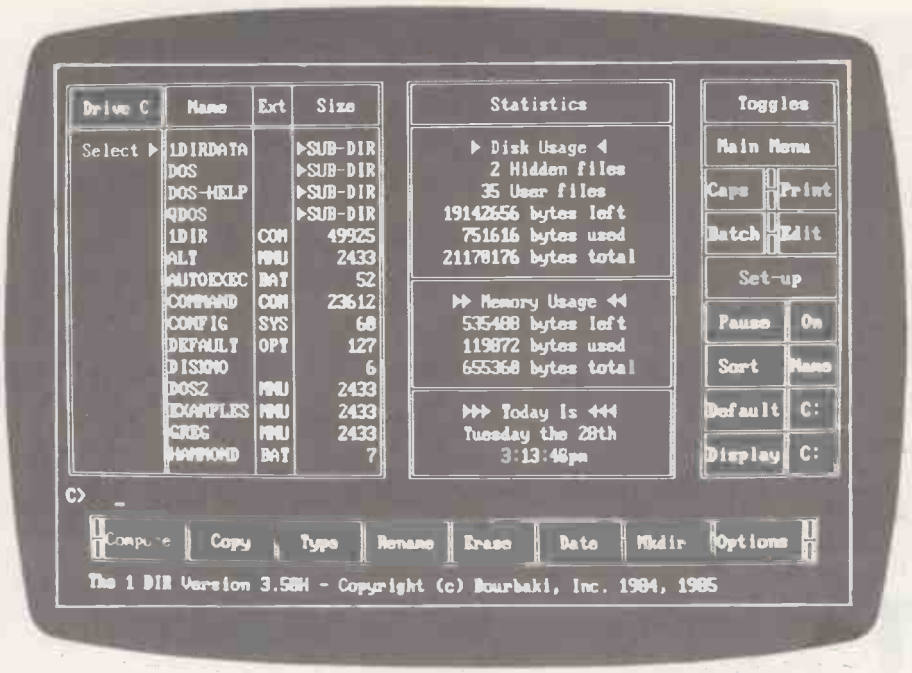
Q-DOS comes on a single unprotected floppy disc with an installation program that copies all the relevant files to a separate directory on your hard disc. You then run the program in the conventional way. You can also run Q-DOS direct from the floppy drive, but if you want access to its help information you have to keep the Q-DOS disc present in the drive.

Q-DOS

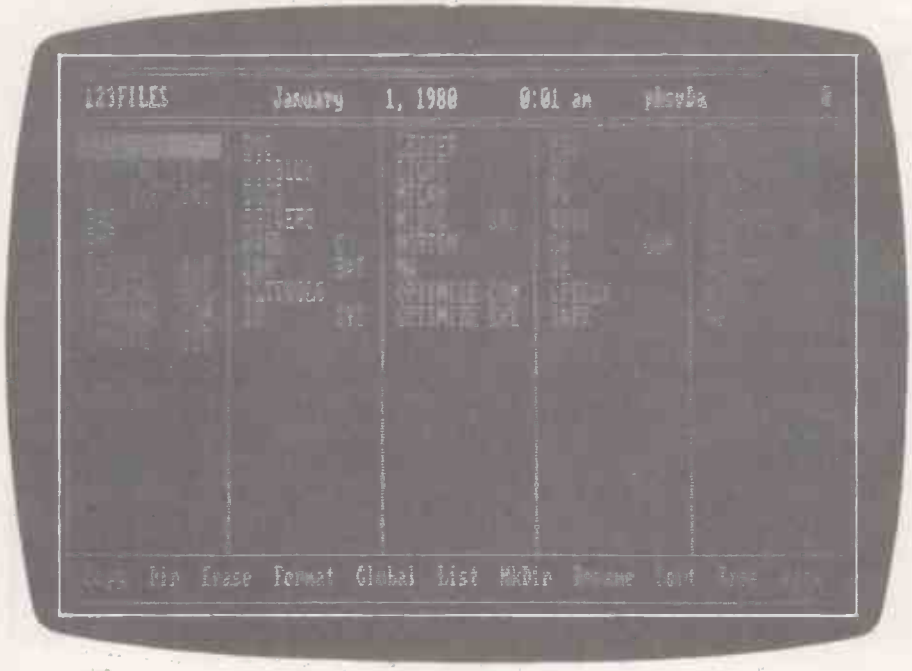
PC VERDICT

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

☐ Will help veterans and novices to use DOS wisely. Its directory map is a boon.



Above: 1-DIR shows how much memory is available.
Below: Window DOS shows path name of directory viewed.



Operations are carried out from Q-DOS main menu. Listed at the top are the main commands: Directory, Tag, View, Copy, Move, Find, Erase, Rename, Space, Attribute and Xecute. Commands can be selected by pressing the first letter of the command or by highlighting it with the command cursor — which you move by using the left and right arrow keys — and pressing Return. Beneath the command list lies the path name from the root directory. Many of the commands perform functions broadly similar to their like-sounding DOS equivalents.

The body of the main menu screen lists files and directories vertically, giving file name and file size, plus the date and time it was created. To copy, erase, rename or move a file you have to tag it first. This is done by selecting a file, using the cursor keys, and then pressing the space bar. If you tag more than one file the operation can be performed on the whole group.

To the left of the screen are five boxes which show the number of files in the directory, the total size of those files, the number of sub-directories, the number of tagged files in the directory and the total size of the tagged files in the directory and the total size of the tagged files. Function keys and their assignments are shown below the boxes. If you run a program which takes over the function keys for some other purpose you should still be able to execute the Q-DOS functions by holding down the Alt, Shift or Ctrl key and pressing the desired function key.

The on-screen help that forms part of the program is a useful addition that will be helpful to DOS novices. Having the commands listed on-screen also means there is less to remember in the way of what commands there are and what syntax to use, so you do not have to type so much.

Q-DOS's Directory command is particularly useful. When you select Directory the program asks you to specify a drive. Pressing Return then displays a directory map of the disc in the specified drive. This consists of directories sorted alphabetically and connected by lines showing their hierarchical relationship, and immediately makes clear the tree-like structure of DOS. You can move around the directory map using the cursor keys. This feature will help novices understand the concept of a hierarchical file structure, and perhaps encourage experienced users to organise their files more efficiently than they otherwise might.

You can also perform various functions on the directory map. For example, using the Make command you can make a new directory just by highlighting the directory you have chosen as its parent and keying M. An input box appears, you enter a DOS filename, press Return and Q-DOS will update and display the directory map. You can also copy files to other directories, copy directories to other drives, and move files around

SPECIFICATIONS

USING THE IBM PC DISK OPERATING SYSTEM

Description: introductory screen tutorial for the IBM PC disc operating system for PC and PS/2 users
Hardware required: IBM PC, PC/AT or compatible with 256K of memory and one double-sided disc drive
Copy protection: one installation on hard disc; program disc cannot be copied
Price: £80
Publisher: Science Research Associates, Newtown Road, Henley-on-Thames, Oxfordshire RG9 1EW. Telephone: (0491) 575959
Available: now

Q-DOS

Description: file manager and DOS enhancer
Hardware required: IBM PC, PC/AT or compatible with 256K of memory and two drives

Software required: DOS 2.0 or higher
Copy protection: none
Price: £39.95
Publisher: Gazelle Systems of Provo, Utah
UK supplier: Ideal Software, Tolworth Tower, Surbiton, Surrey KT6 7EL. Telephone: 01-399 2206
Available: now

1-DIR

Description: memory-resident file manager and menu system
Hardware required: IBM PC, PC/AT or compatible with 192K of memory and two floppy-disc drives
Software required: DOS 2 or higher
Copy protection: none
Price: £59
Publisher: Bourbaki Inc. of Boise, Idaho
UK supplier: Qubie, 7 Ferrier Street, London SW18 1SN. Telephone: 01-871 2855
Available: now

WINDOW DOS 2.0

Description: memory-resident file manager
Hardware required: IBM PC, PC/AT or compatible with 256k of memory and one floppy-disc drive
Software required: DOS 2 or higher
Copy protection: none
Price: £49.95
Publisher: Window DOS Associates of Arlington, Texas
UK supplier: In Touch Computer Solutions, Fairfield House, Brynhyfryd, Caerphilly, Mid-Glamorgan CF8 2QQ. Telephone: (0222) 882334
Available: now

from one directory to another on the same disc with the help of the directory map.

It does not take long to get familiar with Q-DOS and the documentation is helpful in explaining how the program is used. Its descriptions are clear for beginners, while managing to be pithy enough not to be boring for experienced users. However, the manual would benefit from a few screen dumps to illustrate what is going on.

The other two programs we reviewed, 1-Dir and Window DOS 2.0, are both variations on the same theme as Q-DOS. They both include a file manager and try to give DOS a friendlier face by dispensing with the need to type file names and commands. I did not find them to be quite as easy to use as Q-DOS, and I particularly missed the Q-DOS directory map. But they both have useful features, and it is worth considering what facilities you would like out of a DOS helper before deciding which one to choose.

For example, with 1-Dir you have a choice of modes: Basic and Expert. If you choose Basic mode the program asks you to verify any command you enter before it executes it, which is handy for new users to the program and for DOS novices generally. It also has a screen saver facility which sets the length of time the screen is displayed after your last keystroke. You can even use it to re-program existing menus or create new ones to meet your requirements.

Features like the menu builder reveal the true colours of this program: it is not really intended for novice users. The real targets for 1-Dir are confident users who would like to customise DOS to suit their special needs, and at the same time maybe make it easier and quicker to use.

The price you pay for the wealth of features provided by 1-Dir is that it is not particularly easy to get used to. It comes with an extensive A5 manual, and there are a large number of key combinations that you need to remember to use it effectively. If you want to add hub caps and go-faster wheels to your operating system, 1-Dir will probably repay the effort you have to expend to get to know it. The danger with any program of this type is that you could end up replacing one difficult environment with another that is equally complex.

I did not find Window DOS 2.0 quite as easy to use as Q-DOS, and it has a profusion of key combinations that you have to know before you can make use of its functions. It has a number of endearing features, particularly its screen-saver facility, password protection and Tree window. Its documentation is brief and comes complete with diagrams.

The Tree window is like Q-DOS's directory map, though not quite as graphic or as versatile. It lists the sub-directories of a drive, with the root first at the left edge of the window and each following letter of subordination indented two spaces to the right. When the cursor is over a sub-directory the number of files and bytes of storage space occupied by the files in that sub-directory are displayed on the second line of the Tree window.

1-DIR

PC VERDICT

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

☐ Designed for experienced users who want to customise DOS.

WINDOW DOS

PC VERDICT

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

☐ A handy addition to DOS.

CONCLUSIONS

■ As an aid to getting to know how to use DOS for the beginner, or as a refresher in how to use DOS more efficiently, SRA's Using the IBM Personal Computer Disk Operating System is certainly worth a look. I wish I had seen it long ago. Shame about the copy protection.

■ Q-DOS is easy to use, making DOS more approachable for the novice and helping veterans use DOS more quickly and wisely. Its directory map is a particularly helpful feature.

■ For more experienced users who want to customise DOS, 1-Dir could be a real asset. Less confident users may find getting to grips with all its features as much of a burden as acquiring a thorough knowledge of DOS itself.

■ Window DOS does not have the plethora of sophisticated features provided by 1-Dir, nor is it as easy to use as Q-DOS, but may provide the right mix for some users.

■ How you make your micro easier to use is a very personal matter, analagous to deciding what maps, diary or paraphernalia to put in your Filofax. It is worth looking around at DOS helpers before you buy one: different levels of expertise and requirements will influence your choice substantially. PC

ALVEY'S ACHIEVEMENTS

With the Alvey programme due to come to an end next year, the direction of IT research in Britain is once again coming under scrutiny. **Mary Fagan** looks at what has been accomplished by the existing programme, and what is likely to replace it.

Since it began in 1984, the Alvey programme has been at the centre of Britain's research effort in information technology (IT). Collaboration between industry and academic workers has been one of the key features of the programme. Joint project teams are drawn from industry and from academic institutions.

The academics receive full government funding, while industry pays for half its involvement. The programme has cost £350 million, £200 million of which has come from various government departments. The remaining £150 million has been provided by the IT industry. Most of the money has been allocated to some 200 collaborative projects.

The idea was that all the projects should be based on pre-competitive research. The difficulties of getting companies to co-operate with each other and with academics were considered too great for more market-orientated projects to be considered. In spite of this, many of the individual companies involved have already exploited work carried out under the Alvey scheme as marketable products and service.

The programme has been divided into several smaller units, each dealing with a different kind of enabling technology. The aim is that work from one project should be able to feed into others. The individual areas include very large-scale integrated circuits (VLSI), software engineering, intelligent knowledge-based systems (IKBS), architectures and the so-called man-machine interface (MMI). To focus the work and integrate the results, a series of large-scale demonstrator projects has been set up to bring together research from all the areas.

One of the most important demonstrator projects is an effort led by ICL to develop a decision-support system for the Department of Health and Social Security (DHSS). The task of encapsulating in software the legislation, case histories and procedures that rule how the DHSS works is immense. The aim is to help decision making by DHSS staff, freeing them for more direct contact with clients.

An equally important goal is a very easy-to-use computer to help clients fill in the department's daunting claim forms. It is hoped that clients will eventually be able to use a machine rather like an arcade game to find out what their entitlements are. The first version, called the Forms Helper, has already been demonstrated. A more advanced product will guide people through an electronic form on the screen. Trials will begin next year to see how DHSS clients react to using a machine instead of wrestling with paper.

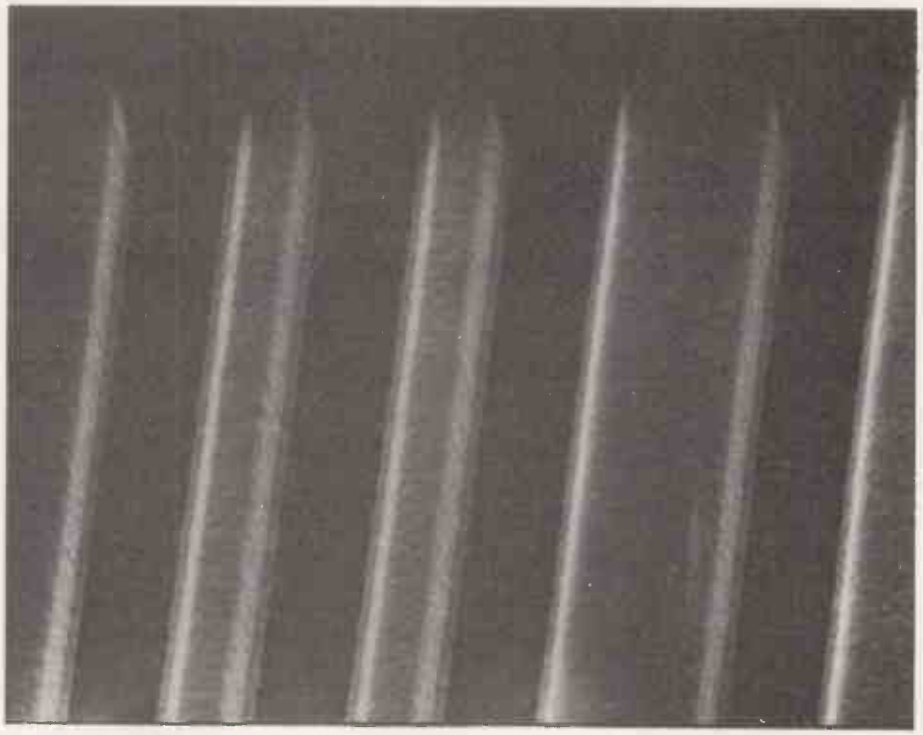
Further up the ladder, systems are being developed to provide clerks with a database of the legislation and case histories they need. For policy makers, the aim is to help them to keep abreast of the continually shifting legal framework, identify problems with existing rules, and evaluate hypothetical alternatives.

All these schemes will need to draw on the IKBS and software-engineering research going on in individual Alvey projects. But even more important will be the MMI issues. A sophisticated support system will be useless unless the decision makers take it on board.

Equally ambitious, and infinitely more glamorous, are the efforts at Edinburgh University to build a speech-driven word processor. It has as its objective the development of a word processor that recognises connected speech in real time, and with a reasonable error rate. Imperial College and the Husat centre at Loughborough University are also involved in the work but the original industrial partner, Plessey, has dropped out.

The first prototype was built last year. It consisted of a series of software modules running on Masscomp and Xerox computers. Phoneme recognition rates reached 92 percent on a limited test set, and rose from 46 percent to 76 percent on a larger set. A 46 percent recognition on phonemes corresponds to only 10 percent on words, but the team's goal is to understand 20,000 words of continuous speech. The system should also be speaker adaptive so that it can be used by more than one person.

The eventual aim is to get things right first time 50 percent of the time, and a further 30 to 35 percent right after some interaction with the user. Unrestricted automatic speech recognition would mean that the machine would have to understand rather than just recognise the speech. This is out of reach for the moment so something has to



The VLSI project has brought feature sizes below one micron, as in this mask.

go. It is full automation that has been sacrificed, but with an interactive system it is possible to get away with less than perfect performance.

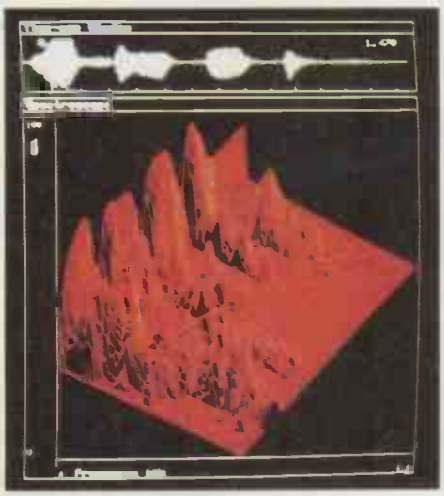
The project on mobile information systems demonstrates how work begun under Alvey can be converted into something of practical use. The overall objective is to bring the benefits of IT to the mobile user. In practice this means the development of a cellular phone that can go anywhere in Europe to transmit and receive both speech and data.

Chips for the high frequencies used by cellular phones are being made by Ferranti. They are the result of the one micron CDI process which Ferranti developed as part of a separate Alvey project. Other sub-projects feeding into the mobile-systems work include a traffic-information collator, a fault diagnosis IKBS and a secure electronic mail network for mobile phones, known as Locator.

At present it is easy for anyone to listen in to cellular radio, and the problem will be exacerbated when data is added to voice transmissions. The Locator represents an attempt to devise the architecture and encryption techniques for secure X-400 electronic mail. Racal's partners in the project are Hewlett-Packard, Ferranti, Cambridge and Sussex Universities, and Thames Polytechnic. In a parallel project, Husat in Loughborough is trying to assess the needs of users of this type of system.

The demonstrators also include a hybrid, called Ansa, which in some ways could be the most far-reaching of all; the name stands for advanced network systems architecture. Ansa is unusual in two respects: it has a large foreign input and, instead of being spread around, all the work takes place in Cambridge, at a single site. Ansa's project manager, Andrew Herbert, believes it is the first attempt to develop a generic standard for open distributed processing (ODP) in which applications can talk to each other without intervention from the user.

The distributed system can be different computers in different locations, different chips in a single box, or different functions on a single chip, all working towards completing a common job. The Ansa project takes a global approach, and is even being taken as the basis of a working group on ODP systems within the International Standards Organisation (ISO). Herbert is confident that Ansa will become the basis of an ISO standard.



A 3D representation of speech patterns, part of the project to develop voice-activated word processing.

The final Alvey demonstrator applies artificial-intelligence techniques to designing, manufacturing and selling products. The project, called Design to Product, addresses an entire product life-cycle from design through process control to after-sales service. It will assess how design changes can affect manufacturing, assembly or sales, for example. The project will culminate in a computer-integrated manufacturing (CIM) demonstration at a factory owned by Lucas that makes parts for diesel fuel pumps. But it should be possible to exploit the results in any short-run manufacturing that relies for its success on a fast response to changing customer needs.

The large demonstrators give a global view of the aims of the Alvey project, but there have also been many smaller successes along the way. Much work has been done to develop whole processes for manufacturing VLSI components with sub-micron feature sizes. STC is producing very high-speed random-access memories with 1.25 micron geometries, the result of a process developed with British Aerospace, Racal and the University of Leuven in Belgium. Ferranti is well advanced with work on one-micron reticules for producing very fast gate arrays, and Plessey is in pilot production with a 1.5 micron CMOS line at its new Roborough plant.

One major success story is Ella, a computer-aided hardware-design language which originated at the Royal Signals Research Establishment. A firm called Praxis took up the development and is now taking it to European and American markets. Less well known are products such as the generic associative memory (GAM) chip for knowledge processing, developed at Strathclyde The chip is now to be commercialised by Deductive Systems, a small Glasgow firm.

A common thread running through the schemes is the application of expert systems. One of the great achievements of Alvey is that it has increased the pool of skills in artificial intelligence (AI) in the UK and has done a lot to bring AI out of the academic world and into industry and commerce. According to Brain Oakley, who heads the Alvey Directorate, "The academic teams have been overwhelmed by demand from industry, and it is most encouraging to see that this co-operation has led to the widespread establishment of teams in the major firms." PC

Mary Fagan is Technology News Editor on New Scientist.

AFTER ALVEY

Alvey's greatest feat has been in persuading companies to collaborate with each other and with universities. The companies involved say that even where they would have carried out a certain line of research themselves, Alvey has accelerated the process. And where there are several possible research paths to follow, working with others spreads the risk of choosing the wrong one. On the academic side Bill Mitchell, director of the Science and Engineering Research Council, maintains that Alvey has given researchers more belief in themselves and the contribution they can make in IT.

But there have been problems too. There are still those in industry with suspicions about the value of academic work, and there are academics who prefer to remain aloof from industry. More serious is the problem of contractual arrangements that have to be worked out between the partners. Reaching agreement on precisely who has the right to exploit particular fruits of a joint project has caused many delays, and much anguish for small companies and universities who lack access to the necessary legal know-how. The Alvey directorate's Brian Oakley concludes that there is no simple formula, but the directorate will nevertheless be publishing a guide to contracts and intellectual-property rights that should help in any future programmes.

There lies the basis of a complicated argument. What should be the form of future collaboration in IT? A report written last year by the IT 86 committee headed by Sir Austin Bide recommended that basic research and development should continue to be funded in a £300m follow-on programme, and that it should have a scheme of applications alongside to pull the fruits of Alvey work through to the market. The idea is that under the scheme of applications, funding should go to companies that use IT in products and services, rather than to those that supply the technology.

This has caused concern in some quarters. No one disputes that R&D should be turned to economic benefit, but some workers are worried that fundamental research may be neglected if the government opts for a more market-orientated approach. The Trade and Industry Minister, Kenneth Clarke, has said that the nearer work gets to the market, the more industry should pick up the tab. Even Brian Oakley himself acknowledges that public money for one successful programme does not automatically imply more for the next. It is also likely that some of the work from Alvey will be carried forward on a European scale under the banner of Esprit or Eureka.

Mike Watson of ICL voiced the feelings of many when he said: "Alvey isn't a subsidy. It's very smart government investment in getting an important industry up and running. We cannot afford to give up what we've done. It would be delinquent to give it all up now — the next phase is to take it all out into the marketplace."

THE CRAY 2

The Cray 2 has become a byword for computing power. **Carol Hammond** reports on her tour of inspection of the machine.

To look at the Cray 2 is like being beamed up to the bridge of the *Starship Enterprise*. The horseshoe-shaped main unit stands nearly four feet high and is more than four feet in diameter. At its outer edge can be seen row upon row of silver- and gold-coloured circuit boards stacked several layers high. Viewed from its inner edge it appears to be crammed full of blue and white wiring. Closer inspection reveals that the whole unit is full of a gently bubbling clear liquid, giving the impression of a high-tech cauldron.

The Cray 2 is a product of Cray Research Inc. The company was founded in 1972 by Seymour Cray, and by 1986 it had gained a 64 percent share of the supercomputer market. Over 10 percent of all Cray machines are installed in the UK — nearly twice as many as in any other country apart from the US.

The machine we saw was installed in March of this year at the Harwell Laboratory of the UK Atomic Energy Authority. It is valued at £13 million. Crays are not new to Harwell. It bought a Cray 1 in 1981, and upgraded it to a Cray 1S in 1982. This was followed by a Cray X-MP in 1986 and finally the Cray 2 in 1987.

The Cray 2's main unit is accompanied by two free-standing support cabinets for the power-supply control unit and a cooling unit, along with a number of Perspex standpipe towers down which liquid coolant cascades. The towers of the Harwell machine are bathed in blue light, further enhancing the futuristic look.

If you want to run a Cray 2 you do not simply plug it into the mains. The machine consumes several hundred kilowatts of electrical power, and motor generators are needed to provide it with the 400Hz supply that it requires. Apparently the higher frequency is necesary to give sufficiently smooth d.c. supply.

The Cray 2 at Harwell has 12 DD-49 disc drives. Each one provides 1,200Mbyte of storage, giving a total of 14.4Gbyte. It is possible to have up to 36 disc drives on a Cray 2 though as yet no one does — even Nasa restricts itself to 34. The drives run at a sustained rate of 9.6Mbyte per second. A modified AT&T PC serves as an elaborate on/off switch, acting as a system-control console to stop and start the main machine.

The main unit of the Cray 2 is built up from 14 columns like slices of a pie. The upper part of each column contains a stack of circuit-board modules, while the lower part contains power supplies for each column. Up to 320 circuit-board modules can be accommodated. Each one contains about 750 integrated circuits to give the Cray 2 a total of around 240,000 components, of which 75,000 are memory chips. Each module is made up of eight circuit boards. The chips on the modules we saw were Japanese, but Cray Research now has its own chip-making facility at Chippewa Falls, Wisconsin, where all the hardware is assembled.

Circuit interconnections are made in all three dimensions within the module. In a supercomputer, component packing is important because one of the main constraints on speed is the time required for signals to pass from point to point within the machine. It takes about a nanosecond for electrical pulses to travel 10cm. through ordinary wiring. The distance that electrical signals have to travel along the data path is therefore crucial to the performance of the machine. The longest wire in a Cray 2 is 25in., with 10in. being the average length. About 36,000 pairs of wires are hand wired into the machine.

The problem with such a compact design is that the power consumption of the machine is huge in relation to its size. The Cray 2 is rated at 195kW, which is of the order of 1,000 times the power consumption of a PC. Nearly all of this energy ends up as heat, which is carried away by the 200 gallons of coolant that bathes the machine's components.

The coolant used is a colourless, non-toxic, non-flammable fluorocarbon liquid

The Cray is capable of modelling the dynamics of a crystal lattice.

called Fluorinert, made by 3M. It is a good electrical insulator, has high thermal stability and good heat-transfer properties. It circulates up one column of the main unit and then down the next in direct contact with the integrated-circuit boards and power-supply components.

Placing the coolant in direct contact with the components to be cooled helps to stabilise the operating temperature, and improves the reliability of the system by preventing chips getting hot. The liquid enters the main unit at a temperature of around 70F and leaves at about 80F.

If a module fails, diagnostic software isolates the problem to the failing module or, in the worst case, to two or three modules. Indicator panels on the top of the machine display information about the status of key components. Before defective modules are removed the coolant must be pumped up into the standpipe towers, and then pumped back into the machine after a replacement module has been fitted. Cray claims that the operation only takes a few minutes.

Faulty modules are diagnosed and repaired by on-site maintenance staff. Where a fault can be pinned down to a particular chip it is removed from the board, repaired or replaced and then soldered back on. In its preventive-maintenance scheme Cray Research stresses the machine outside its normal operating limits to expose any incipient faults.

Above: The Cray 2's main unit, with the standpipes for the coolant visible in the background.
Below: Each module contains eight circuit boards and around 750 ICs.

To achieve its high processing rates the Cray 2 uses scalar and vector processing and a large common memory in a multiprocessing environment. The scalar processing used by conventional computers handles information sequentially. Supercomputers attain their increased speeds by handling data which has been assembled in vectors or arrays. Vectors are expressed in a computer as a string of 64-bit numbers that can be processed in parallel as a single entity. A special set of instructions is used to process vectors, and only one instruction need be issued to carry out the processing of the entire vector.

Each Cray 2 has four identical CPUs which run at 1,700 million floating-point operations (1.7Gflops) per second. The common memory holds 256 million 64-bit words and there is an integral I/O controller and a maintenance control console. Each of the four CPUs contains registers and functional units to perform vector and scalar operations. The I/O controller controls I/O devices like disc drives and the front-end interfaces. The large size of the common memory allows users to run programs that would be too large to run on other systems, and it allows several jobs to reside concurrently in memory.

The Cray 2 comes with an operating system called Unicos, based on AT&T Unix System V. Fortran is the main language used, though Cray also offers an automatic vectorising Fortran compiler and a C compiler. A large number of applications packages are available from third-party suppliers.

The Cray 2 at Harwell is connected to IBM and DEC machines as well as various work stations, including Sun and Apollo units. The IBMs are linked via a front-end interface which acts as a channel-to-channel connector and sorts out the differences between Cray and IBM channels. The Vaxes are linked via a Network Systems Corporation Hyperchannel, which also links to one of the work stations and an IBM. The work stations also use one of the Vaxes as an Ethernet gateway.

The high cost and small market for supercomputers has meant they have hitherto been the domain of government, research and military establishments. But their number-crunching prowess and real-time computing ability has taken them into other fields. Harwell's Cray 2 is used for applications in aerospace, computational physics and structural analysis.

Harwell hires out time on the Cray 2 at around £1,000 per hour. If this seems expensive it is worth bearing in mind that a problem which could be solved in an hour on the Cray 2 would take something like a month on a DEC Vax 11/780. Put another way, 10 days' worth of calculation on an IBM PC would be completed in just one minute on the Cray. PC

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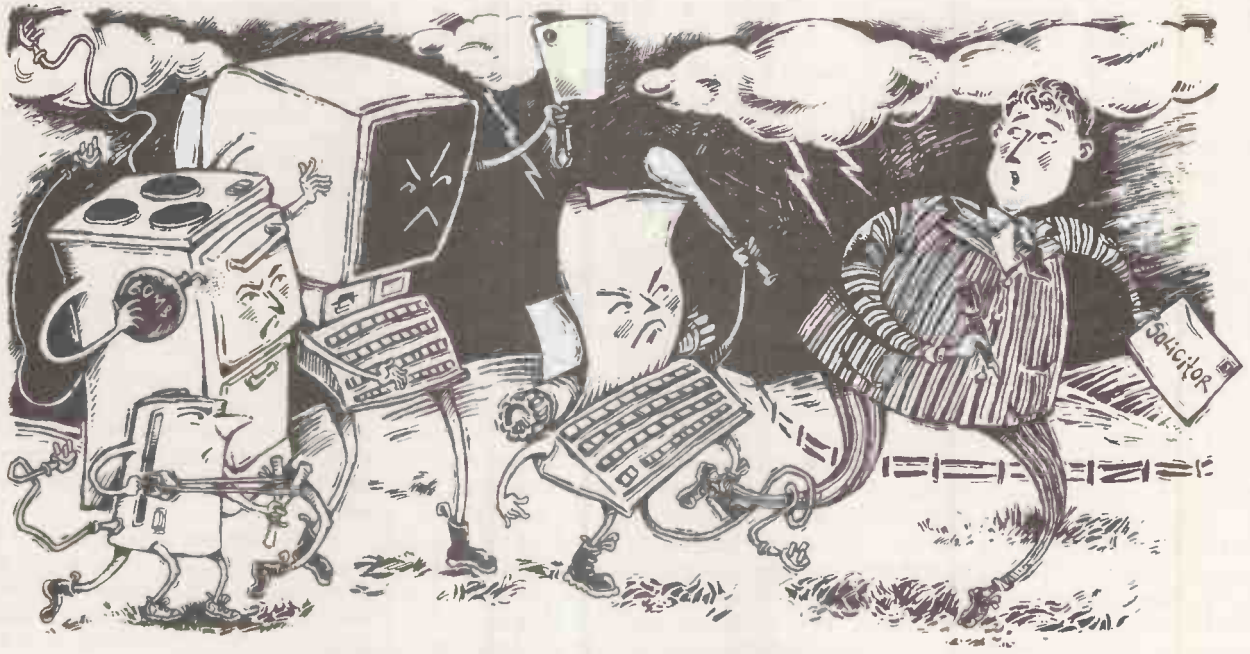
PC/9/87

It seems likely that anyone sold defective software will now have a stronger case for claiming damages, but it still all depends on whether software is properly classified as goods or services. **Anne Staines** explains how the law relating to this area is still in a muddle.



MIKE GORNALL

CONFUSED? YOU WILL BE

Somewhere in the gathering dusk, a voice is heard to whimper: "Well how should I know why all the missiles suddenly launched like that? There must be a fault in the system." This is hardly an original scenario; in fact it is one so hackneyed it could even lie at the root of an act of Parliament, as indeed it does. It is an extreme but feasible example of the risks inherent in modern technological production.

The EEC Council addressed its directive on product liability in 1985 to these risks. The directive ordered all EEC member states to implement national laws giving effect to the principle that, irrespective of fault, producers shall be liable for damage caused by a defect in their products. The deadline for such laws to come into effect was July 1988.

In the UK, the directive was implemented on 15 May 1987 by means of the Consumer Protection Act 1987, which turns the former product liability law on its head. Before, a person claiming damages in respect of injuries caused by a defective product had to prove that it was more likely than not that the defect resulted from negligent manufacture. Since 15 May a litigant need only prove that he or she has suffered damage for which the courts would award more than £275 in compensation; that the product is defective in that its safety is not such as persons generally are entitled to expect; and that the defect was the cause of the damage. If a court can be satisfied on these points, the producer will be held liable for the damage unless it can successfully raise one of the statutory defences.

Such defences appear numerous, but they are limited in effect. The most important defence is likely to be that of state of the art. A producer will not be liable under the act if, in the words of the act, it can be shown "that the state of scientific and technical knowledge at the relevant time [usually this will be the time at which the producer supplied the product] was not such that a producer of products of the same description as the product in question might have been expected to have discovered the defect if it had existed in his products while they were under his control." This tortuous use of language is typical of the whole act.

The state of the art defence is the closest approximation in the Consumer Protection Act to the theory of negligence, which it replaces in the case of defective products. A negligent producer is one who takes less care in its production process than the mythical so-called "reasonable man" would take in the same circumstances. That objective standard does not take into account the producer's actual degree of technical knowledge, but the degree that the reasonable producer would have. So it assumes that producers keep reasonably abreast of the times.

The new act uses the same test in its state of the art defence, but reverses the burden of proof. Now the producer must demonstrate that reasonable care was taken, rather than the consumer proving that it was not. Product liability is only one aspect of consumer protection with which the act deals. Elsewhere in the same legislation are provisions consolidating the Consumer Safety Act 1978 with the Consumer Safety (Amendment) Act 1986. The new act also regulates the giving of price indications, by amending Part I of the Health and Safety At Work Act 1974 and sections 31 and 80 of the Explosives Act 1875; it also repeals the Trade Descriptions Act 1972 and the Fabrics Misdescriptions Act 1913.

The provisions relating to product liability appear in Part I of this hotch-potch. The opening words make it clear that Part I is intended to comply with the EEC product liability directive. The directive, referring specifically to the problem of increasing technicality in industrial production, clearly covers computer software, either as a product itself or as a component part. Whether or not the UK law does is less clear.

The problem lies in the definition of

(continued on next page)

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the word "product". According to the directive, product means all moveables, including electricity but excluding primary agricultural products and game. Moveable property is anything other than land. The Consumer Protection Act, on the other hand, defines a product as being any goods or electricity.

For several years lawyers have debated whether or not computer software can be said to be goods. Interest in this question has so far centred on the applicability or otherwise of various statutory warranties. If software is goods, it must comply with the requirements of fitness for purpose and merchantable quality laid down in the Sale of Goods Act.

There is a widely held view, however, that the supplier of software is providing services not goods, since it is the information contained in the program that the user wants rather than the medium on which it is fixed. Information, it is argued, cannot be classified as goods, and sufficient legal precedents can be called in support of this argument to make it very persuasive. It may be that some programs are easier to define as goods than others, the most obvious distinction lying between off-the-peg packages and specially commissioned, bespoke software.

But arguments of this kind only serve to confuse the already complex area of liability for defective software, which this legislation was supposed to clarify. There is really no excuse for the government's failure in this act to grasp the nettle and finally declare on which side of the fence computer software falls.

For the most part, it is safe to assume that software falls within the ambit of the Consumer Protection Act. Predictably, consumers will be the main beneficiaries.

Despite the strength of argument that software is services, it is likely that it would be defined as goods within the meaning of the Consumer Protection Act, should the point arise in a UK court. The New York Bar Association recently deliberated on the matter, and in the resulting report concluded that software should be deemed goods. The legal arguments in favour of its conclusions are not wholly convincing; at times they are contradictory and confused. But what swayed the writers of the report and may be expected to sway its readers were policy considerations. Both producers and users, the report concluded, have an interest in uniformity and certainty of legal treatment. In an area of the law where everything is often uncertain, that is a hard argument to refute.

For the most part, it should be safe to assume that software falls within the ambit of the Consumer Protection Act, although there will be some exceptions. Software supplied as part of a telecommunications or cable program service is undoubtedly part of a service. In addition, there will be some contracts in which the emphasis on continuing support, revisions and updating make the agreement more clearly one for the supply of services than goods.

As might be predicted from its title, the main beneficiaries of the act will be consumers — that is, private as opposed to business users of defective products. Where a business causes damage to a consumer as a result of using defective software in its manufacturing process, both the business and the software supplier will be liable as producers. Of course, the consumer will invariably sue the manufacturer, who must then seek a contribution from the software producer. It is advisable for all manufacturers in this position to ensure that their contracts with software suppliers contain a provision indemnifying them against loss or damage in the event of a defect in the software.

The act does not improve the lot of businesses that suffer loss themselves as a result of using defective software. Producers are not liable under the act for loss of or damage to the product itself, or for loss of or damage to property that is neither of a type ordinarily intended for private use, nor intended by the injured party mainly for private use. Injured businesses must continue to prove negligent manufacture.

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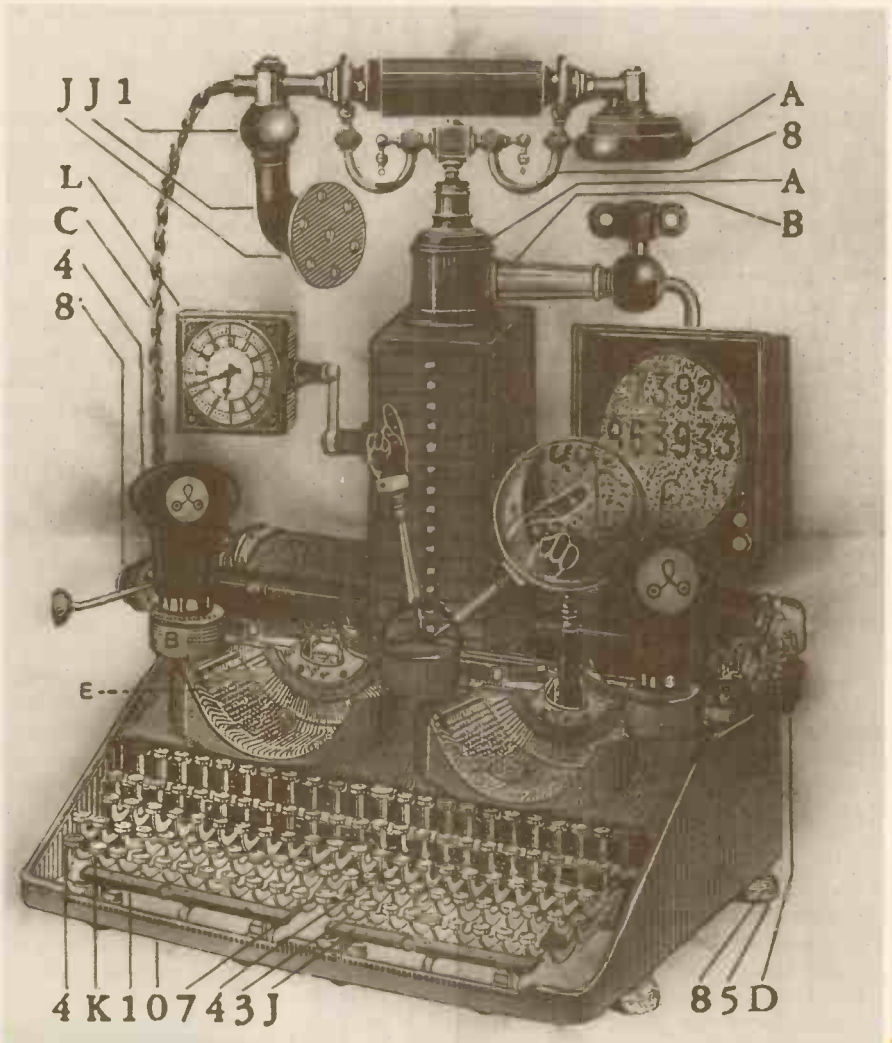


GETTING IT TOGETHER

IS THE INTEGRATED OFFICE WITHIN REACH AT LAST? **GLYN MOODY** EXPLAINS WHAT STILL NEEDS TO BE DONE TO ACHIEVE THIS ELUSIVE GOAL.

Once upon a time, when the computer revolution was still young and people were uncorrupted by practical experience of its impact, some bright spark came up with the phrase "the paperless office". It seemed obvious: as computer technology moved out of the air-conditioned rooms where it was tended by dedicated DP professionals, and into the office, so the medium of information transmission would pass from paper to electricity.

As we now know, it did not quite work out that way. To be sure, the migration of technology from DP department to desk top proceeded even more rapidly than the most sanguine of predictions. But in the process, the amount of paper generated has increased enormously. The micro has become a tool for doing what was done before, only more so; and that includes aiding and abetting global de-afforestation.

A paperless office may be utopia — at least until a paper-like and paper-thin display is devised — but the truly electronic office remains an achievable goal. Recent developments suggest that it is at least getting nearer. Perhaps the most crucial progress in the enabling technology has been the continuing increase in processor power. With 80386-based machines available for under £2,000, almost any office worker can have what is to all intents and purposes a minicomputer on their desk. Given that the pattern of working with the personal computer remains essentially single-user, this leaves a grossly underutilised computational capacity. That capacity might easily and usefully find itself channelled into handling other office equipment in an integrated environment.

To use that surplus power, networking will need to be routine. The full benefit of an integrated office — where all the functions can work together in a very natural way — will only occur if there is ready communication between the component parts. Networking of micros is still in its infancy, though there are some signs that IBM's Token Ring system is on the way to turning into another de facto standard. The sooner that becomes so — and the teething troubles of what are complex and fiddly systems are sorted out — the sooner progress can be made in wiring up the office.

(continued on next page)

Allied to straight computer networking, the ordinary telephone network will play a key role in any future office environment. Again, changes which have occurred over the last few years make the necessary convergence of technologies look much more likely. This is partly a reflection of the modernisation of exchanges, which itself is a harbinger of the switch to a fully digital telephone network. Although digital networks can be set up locally within a company to integrate computers and communications, the full benefits only come once that network can be extended through to the outside world. In particular, the adoption of the Integrated Services Digital Network (ISDN) standard will accelerate changes in this area enormously. As the discussion on page 92 shows, progress is already being made, with the UK apparently well ahead.

The convergence of micros and telephones is likely to lead to a new breed of integrated work stations, of which ICL's One Per Desk and BT's Qwertyphone were less than successful early implementations. Indeed, the coming together of the various component parts of the fully electronic office will only succeed if this kind of synthesis takes place. After all, even a micro takes up a substantial area of valuable desk space.

As Ian Stobie reports in the article opposite, there is already some movement towards combining some of the key elements in one box. Putting together a fax machine with a scanner is an obvious step. Incorporating an intelligent optical character recognition device would be another. And given the fact that a laser printer and a photocopier are very similar in mechancial design, it surely cannot be long before there are combined photocopiers and printers, which then add intelligence to become scanners and fax boxes too. Add a telephone handset and a screen and you have the beginnings of the ultimate office work station.

The earlier vision of the new office foundered on the failure to cope with raw data. The integrated workstation solves the problems of communication, but leaves that of storage untouched. But once again, recent developments, this time in the field of optical discs, may come to the rescue.

The write once read many times (Worm) technology has come a long way in recent years. The fact that IBM is now offering its own variant can be seen as the final seal of approval on the whole approach. Potentially it could allow rows of filing cabinets not only to be replaced but, more importantly, to be integrated fully into the office environment. The data stored in them would become live rather than dead reference material. The technology for doing this is discussed in greater detail by Carol Hammond on page 94.

Clearly much new technology is around which could help turn the dream of the integrated office into a reality. But perhaps even more important, there is a world of difference in office workers' attitudes to that new technology. The paperless office pipe dream of a couple of decades back was conceived as some grand scheme which would be imposed on workers with little reference to them or their readiness for it. Today's moves towards an integrated office environment are taking place against a background of increasing acceptance of micros, advanced PABXs, fax and networks as a matter of course.

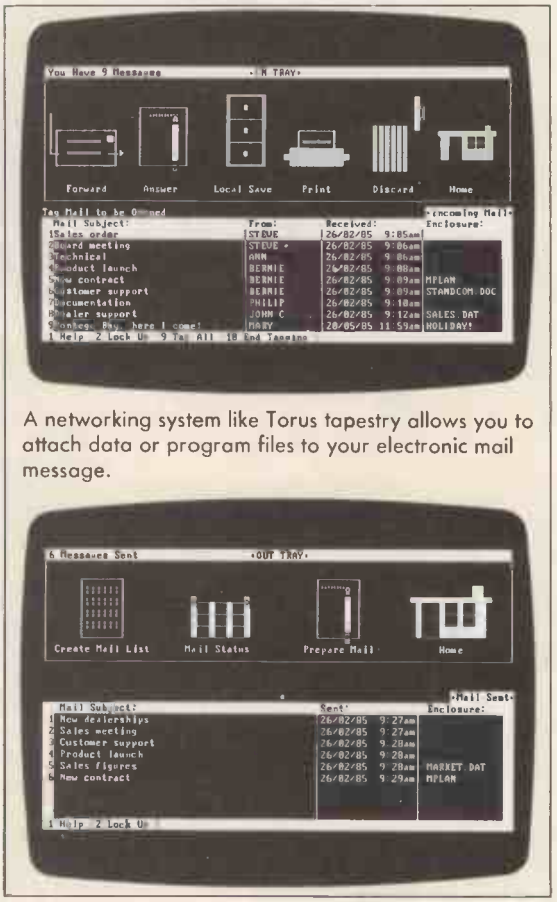
As a result of the accumulated experience of the last decade, manufacturers too are far better prepared; in particular, they have a clearer idea of what will work in practical everyday situations. Ultimately it is this spirit of realism on both sides, rather than any fancy new technology, which will determine whether we will move closer to the truly integrated office — with or without paper.

The integrated office is a metaphor as yet only inadequately supported by real products. But the concept is gaining greater currency at the moment because of two developments. One is the growing number of local area networks: companies are finally getting beyond the planning stage and are actually installing the things. The other is a growing convergence in the technology of computing itself, particularly as it affects peripherals.

The integrated office is really what networks are all about once you shift your focus from the details of the technology to the wider view. For a long time user acceptance of networks was held up by technical issues, lack of standardisation being the main one. But ever since proper network support was added to MS-DOS in version 3.1 the basis of the future standard has become clear. Further recent clarification by Microsoft and IBM of their plans, along with a shakeout among the hardware suppliers, has removed most of the uncertainty from the technology itself. The emphasis has therefore moved from the technology to the things you can do with it.

The central idea of the integrated office comes from recognising a key feature of ordinary offices. Here one task leads naturally into another, whether or not it is performed by the same person. This means that for a computer to be truly helpful in a typical white-collar environment you need to be able to do many more things with it than you can today.

Integrated computer systems are already well established in some specialised vertical-market applications, especially those involving an accounting function. But the integrated office is really about generic tasks — the kinds of things a high proportion of office workers would wish to do. At present most of the major generic tasks, such as word processing or using a



A networking system like Torus tapestry allows you to attach data or program files to your electronic mail message.

WHEN TECHNOLOGIES CONVERGE

LINKING PCs TOGETHER AND TO OTHER ELECTRONIC DEVICES GIVES YOU SOMETHING THAT IS QUITE DISTINCT FROM THE OLD BIG-COMPUTING DP, AS **IAN STOBIE** EXPLAINS.

spreadsheet, are still implemented on an individually orientated basis. There is also still a wide range of human tasks that the computer cannot help with.

While personal computing was about enhancing the productivity of an individual, the integrated office is about enhancing the productivity of the group. But supporting a group is different to supporting an individual. The two approaches are not in competition — the integrated office is an extension of the philosophy of the PC. Both are interactive forms of computing, unlike traditional data processing, and both should fit into an existing division of labour without disrupting it too much.

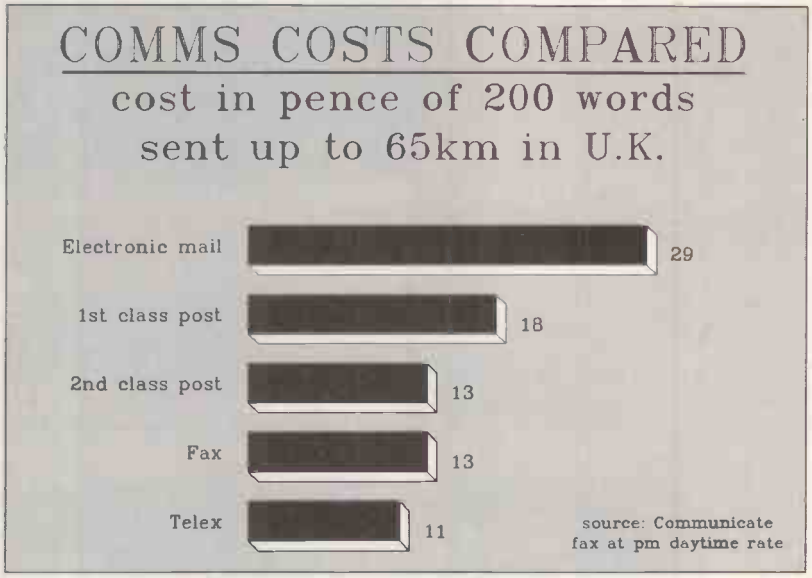
People are still feeling their way into this particular future. Part of the excitement of the integrated office is that it is not yet clear precisely which technologies and functions will end up working together in a sensible way. But already many of the possibilities are clear: networks, mail, communications, document production and possibly expert systems will all be involved.

One virtue of the integrated office concept is that it forces you to lift your eyes from the technology and concentrate instead what it is all for in terms of goals at the organisational level. A key idea is that it functions with a work group by helping the group members interact with each other more productively. This makes network mail a central feature of the integrated office.

Network mail complements the ordinary voice telephone, as you can use mail when people are not sitting by their phone. Other advantages are that it gives you a permanent record if you wish; it is quicker than ordinary paper mail; and you can be more confident that your message gets through. Reading network mail is also generally quicker than getting the same message by phone as you can scan through it and pick out topics and headlines.

A typical modern integrated mail system is the one provided with the Torus Tapestry networking software for IBM local area networks. It provides a similar interface for all your text-editing jobs, including routine word processing, creating network mail, or sending telexes to the outside world. For detailed editing you can use a normal word-processing package such as WordStar. Once you have sent a message across the Tapestry network you can check if it has been read. You can also copy mail to other network members very easily.

With Tapestry and other network mail systems such as Top Mail on the Macintosh you can attach any kind of file — a spreadsheet, a chart or even a program — to your mail message. This is already a very powerful feature, but in future facilities of this kind are likely to go much further. For example, you could add comments inside an attached file. You could flag proposed changes in a document or spreadsheet in some way, and send them to your colleagues for comment. Perhaps you could superimpose pop-up notes on it, in a kind of network version of Note-It. Or, as on the Discus



TELEX — STILL GOING STRONG

TELEX has a long history. The first telex machine was installed in 1933, and the system was already established in pretty much its present form by the start of the Second World War. Telex now has about two million users worldwide in over 200 countries.

Because of its relative antiquity as a business communications medium, telex has several limitations. It is fairly slow, with messages transmitting at 50 baud. This translates into a top speed of about 60 words a minute. Telexes use the old five-bit Baudot encoding scheme rather than ASCII, so you can only send messages consisting of upper-case letters and numbers. Graphic images, programs or bulk data are out of the question.

On the plus side, telex lines are separated from the normal voice telephone system, which gives you some protection against casual hacking. But the main reason for using telex is that it is the most established real-time business hard-copy medium. True, it is something of lowest common denominator, but there is no problem finding people with compatible kit to talk to.

The BABT-approved Procom PC telex board.

(continued on page 90)

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system described on page 94, you could attach voice notes which are played back to your recipients when they open the document.

Ideally you would be able to also do this noting and commenting in real time. This means that once your recipient has read your message and its attached documents you could open up a simultaneous channel for a chat, perhaps in the form of a pop-up text window. The technology also exists to allow you to point with your mouse at documents displayed on the other system's screen, or to open up a simultaneous voice channel.

This gives you a powerful kind of electronic conferencing, with the relevant documents readily to hand. And there is no reason why such conferring has to be restricted to two participants. The number is limited only by the resources of the system and the space available on your screen for windows for all the participants.

Powerful as these mail and conferencing systems are, they still only mark the beginning of what linked computers could achieve in assisting routine office transactions. One problem when dealing with someone outside your immediate work group is that you do not know what they require. Systems based on simple applications of artificial intelligence, should hold out great advantages in such circumstances.

FAX — THE UPSTART

FAX is growing much faster than telex. At the moment there are about the same number of fax and telex machines installed in the U.K. — around 100,000 each, according to market research company International Resource Development — but fax sales are outstripping telex by a factor of at least 10 to one.

Fax a visual medium. A document is transmitted line by line, as an image rather than as a series of characters. This means it can handle handwriting, graphic images and the character set of any nation, all with equal facility. On the other hand it cannot transmit programs or bulk data; they require a completely error-free transmission method such as X-25. Fax is fast compared to telex: an A4 page typically takes under a minute to send.

In the past fax has suffered from compatibility problems, and this has led some people to think of it as a workable medium only within an organisation, where purchasing policy can be standarised. According to this view telex still reigns supreme for general business use, despite its technical inferiority. But things are changing fast, as new fax machines upgrade the quality of the installed base. All modern group 3 machines can talk to each other, and also to most of the earlier group 2 machines.

A dedicated stand-alone fax machine consists basically of a scanner, modem and printer mounted in the same box. Current fax machines typically work at a resolution of 200 by 200 or 200 by 100 dots to the inch. This is rather lower than the 300 dots per inch achieved by PC laser printers and the image scanners used in desk-top publishing.

Group 4 fax machines will have higher resolution. This standard is still emerging, but as well as offering compatibility with earlier group 2 and 3 machines it is likely to use a resolution-independent coding scheme, so manufacturers can go to 300 and 400 dots to the inch as soon as it becomes economic to do so.

The earliest facsimile machine was rather surprisingly developed back in the 1840s, by a Scotsman called Alexander Bain. This makes it almost as old as the penny black stamp and the Royal Mail. The current fax boom started in 1980, when group 3 fax came in. What is really pushing fax forward is its runaway success in Japan. There, because of the complex nature of the Kanji written character set, instant hard-copy business comms has had to wait for the arrival of fax. The release of this massive pent-up demand has driven the cost of fax down fast, and is incidentally fuelling the development of related scanner technology.

Unlike telex, fax machines use the ordinary voice telephone line. Sending short messages can be very cheap, especially at night-time rates. This is one way a PC-based fax system scores over the dimmer dedicated machines, as it can store non-urgent fax messages on disc and transmit them at cheap times.

In fact you do not even need to go this far. At its simplest level, each network user could simply establish a help file which says things like when they can be contacted, on what issues and in what sort of way. It would be available to anyone interested through a network help function.

Many people have core functions which involve some formalised procedure, and in many organisations dealing with them involves using appropriate memos and forms. This again is very amenable to some sort of computerised help function. A simple system could be built up from a personalised series of help screens which tell you what to say in the memo, or which forms to use.

The obvious next step is to have the mail user fill the memo or form on-screen, there and then. An interactive form-filling system could give help simply by checking on the arithmetic and fetching values from a reference database. But logically it should go further, and provide the sort of help the originator of the form or procedure would be able to provide if they were actually present at the form filler's side.

This is where expert systems come in as they are ideal for giving help, especially when the problem is governed by well-known rules or procedures. The logic involved is well within the capacity of present-day expert-system shells. You could ask things like, "Should I claim now under section 6B, or would I do better under 7D, and am I eligible?"

The advantage of an expert system over more traditional help screens is not just in the complexity of the problems that can be tackled. Its real asset is that the system itself can ask the questions: it can scan the form-filler's input and start asking for clarification if it spots a problem. Otherwise it can keep out of the way. Ideally expert-systems shells will become sufficiently easy to use to be programmed in a personalised way by the responsible individual, rather than at a departmental level. This will make the computer-assisted form much more human than its paper equivalent.

THE OUTSIDE WORLD

Most organisations have facsimile (fax) machines and telex, but the procedures involved in using them are often so cumbersome that they are used far less than they should be. Because the fax machine resides in another room or on another floor people do not bother to use it; instead they end up making unnecessary journeys across town. Similarly, people waste time making fruitless phone calls to people who always seem to be out, whereas a short telex would probably get through.

Once you have a network of PCs set up the cost of adding telex and fax is very small — a matter two or three thousand pounds at the most to provide a facility that can be used by everyone on the network. Obviously running costs have to be controlled, but they are easily monitored on a computerised system and are often exaggerated anyway. The cost of not using fax or telex when it is appropriate is often far higher.

The point is that in the integrated office, telex and fax become far more convenient to use. People can do it for themselves, without involving secretaries or telex operators who have to type everything out laboriously a second time. Ideally you should be able to use your existing word processor to prepare the message. Then you just tell the system that you want it sent as telex or fax, giving the recipient's fax or telex number — or perhaps just their name if it has been previously entered in the system's directory.

To operate a telex system of your own you need to rent a telex line from British Telecom, which costs about £90 a quarter. A PC telex card incorporating the necessary telex modem can be obtained for under £1,000, with multi-user network versions costing a little more. You then pay British Telecom charges based on use, but they are comparable with other forms of electronic mail.

The cheapest way of getting computerised telex is to use the services of a bureau. You can do this through an electronic-mail system such as Telecom Gold. But if the volume of your telex business is likely to go beyond a dozen telexes per week it is probably worth investigating leasing your own telex line and getting an add-on telex board for your PC. As well as reduced costs you get other advantages: you will know instantly whether your telex has been received, something that a bureau takes time to tell; and you will have your own unique telex number for incoming messages, which you will receive with no delay.

As with telex, the initial crop of computerised fax products was really aimed at large existing users who wanted extra features. A computerised fax lets you do things like store messages and send them at cheap times of the day. It also makes it easy to send out batches of personalised messages — junk fax, in other words. British Telecom's Merlinfax PC-100 at nearly £7,000 is an example of such a system.

However, the same technology makes fax very attractive to PC users. The cost is much lower, as they already have the PC and a suitable printer. Both Comwave and Communicate do single-user fax boards with built-in high-speed modems for under £1,000. For just under £2,000 Communicate will sell you a multi-user fax board capable of supporting eight users. To this you need to add the cost of a scanner if you wish to fax existing paper documents. All scanners aimed at the computer market are very high quality by fax standards so a £1,000 machine would easily do the job.

Even if you do not have a scanner you can still send off messages from a computer-based fax unit. You can convert both text and graphics files into fax format without having to print them out first. Your fax board will come with software to handle the conversion, which it does using a bit-mapped character set. This produces a much higher-quality fax compared to a conventional fax machine as there are no scan errors. The main point of sending an ordinary text file by fax is that, like telex, it is a priority medium. It is also quite cheap.

Incoming faxes can be stored on disc, then printed out. If you wish, it is possible to go a stage further, using optical character recognition (OCR) software to convert the incoming message to ASCII. In the truly integrated office this step would be very desirable, allowing you to make use of the message immediately with word processing or other standard software. Communicate says that it intends to offer OCR as an option with its fax system.

But there is a problem. At the moment most conventional fax machines scan at rather too low a resolution. The OCR software needs as much information as possible to work on. It is also likely to be thrown by any transmission errors. A few blobs or lost scan lines do not make much difference if you are reading a printed fax image by eye, but they make OCR very difficult. This means that OCR is unlikely to be used much in conjunction with fax until group 4 takes off, though the technology does work if you use good-quality fax equipment and transmit at 300 by 300 resolution. It is already a viable option for communications within an organisation, where you can make sure all the kit is up to the job. Despite its advantages in other respects, fax is not the ideal medium for text messages that are destined for further processing within your computer system: an ordinary electronic mail service like Telecom Gold, the X-25 data network and even telex are all much more suitable.

The Sharp MZ-IV01 combines the functions of a fax machine, an image scanner, a printer and a photocopier.

Another obvious application for high-grade, high-resolution fax is in desk-top publishing. Artwork or complete made-up pages can be sent far more quickly than by post or courier. Again, at least 300 by 300 resolution is required, along with a low error rate, so good-quality kit is essential.

Sometime towards the end of this year or the beginning of 1988 Sharp will introduce the MZ-IV01. This device joins together the functions of a fax machine, an A4 image scanner, a thermal printer and a photocopier; it will probably cost around £2,000. The scanner and facsimile transmission can both operate at 300 dots per inch, and though the printer works at lower resolution, images can be transferred to disc and printed out on a laser printer if desired.

This sort of technological convergence is likely to be very important to the future of the integrated office. Facsimile requires both an image scanner and a reasonable quality printer; the same elements are also required in photocopiers and for many desk-top publishing tasks. An image scanner simply converts a document into a bit pattern. In a fax machine the pattern is transmitted down a phone line and printed out at the other end. A digitial photocopier holds the image in memory, cleans it up a little with its built-in software, and prints it out on the spot. A scanner in desk-top publishing use transfers the image across to a PC, where it may end up incorporated into a document as an illustration. As the Sharp machine quite clearly shows, one machine could do all these jobs.

SUPPLIERS

Communicate London Road, Sunninghill, Berkshire SL5 0PH. Telephone: (0990) 281294
Comwave UK 46-47 Pall Mall, London SW1Y 5JG. Telephone; 01-839 3613
Sharp Electronics (UK) Sharp House, Thorp Road, Manchester M10 9BE. Tel: 061-205 2333
Top Mail Human Computer Interface, 11 Brunswick Walk, Cambridge CB5 8DH. Tel: (0223) 314934
Torus Science Park, Milton Road, Cambridge CB4 4GZ. Telephone: (0223) 862131

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ISDN

AS THE CURRENT ANALOGUE PHONE NETWORK IS REPLACED BY A FULLY DIGITAL SYSTEM A VAST NEW RANGE OF COMMS OPTIONS IS OPENING UP. GLYN MOODY LOOKS AT THEIR IMPLICATIONS FOR INTEGRATED OFFICE SYSTEMS.

The integration of computers and communications is already commonplace at one level. Electronic mail is growing fast, and more and more people are sending data down their phones. But at the moment the transmission process is slow and clumsy. At one end the digital data is converted to audio signals which can be transmitted over ordinary twisted-pair cabling, through the telephone network, and on to the other end, where it is laboriously converted back into digital form. In an ideal world you would be able to plug your micro straight into the telephone network and send digital data directly.

The Integrated Services Digital Network (ISDN) allows you to do just that. Moreover, it permits far higher data-transmission speeds than at present. Once a standard digital pathway has been defined over the telephone network — which itself must be upgraded to handle the digital data — it is not just micros which will plug in. The quality of voice transmission will be improved, fax will be faster and slow-scan CCTV will become increasingly common. And once intelligence is married to the digital standard, a whole new world of facilities becomes available — see box below.

The ISDN standard has been defined by the international CCITT body as the X-21 protocol. In its basic form, it specifies that the user transmits data in a digital form at 144Kbit/s. — way above the 300bit/s. or 1,200bit/s. currently offered by standard modems. But even more important than the gain in speed is the structure embedded in the system.

There are in fact three channels: two of 64Kbit/s. and one of 16Kbit/s. The latter is used purely for signalling information, and is invisible to the user. The other two can be used for either voice or data transmission; since both channels operate simultaneously, this opens up possibilities for sending data between computers and offering a voice commentary at the same time. This twin data plus signalling arrangement is known as 2B + D. There is also a higher level of access, known as primary access — as against the basic access just described — which provides for a 30B + 2D arrangement.

Clearly there are enormous potential benefits for the computer user, and for the concept of the integrated office. Under the ISDN approach, ordinary voice communications become just another data signal, and computers are seamlessly linked in with the external telephone network. As well as having access to the ordinary public switched telephone network, ISDN links up with Kilostream and the Packet Switched Stream (PSS) service.

Unfortunately, between this dream and reality there stands a great deal of work to be done. At the user's end this involves replacing the office PABX with a digital version which can cope with ISDN and provide the full range of facilities under that system. An even bigger task is the countrywide replacement of old analogue telephone exchanges by digital systems.

As the table opposite shows, work is already under way in many nations, at least at the pilot stage. The UK is currently well advanced along this road, and offers ISDN as a commercial service while most other countries are still conducting non-commercial trials

There is a price to pay for being ahead of the field. When BT started up its digital service there were no agreed international standards, and it was necessary for one to be devised. Instead of the standard 2B + D, BT opted for a single 64Kbit/s. voice or data channel. This service was introduced in June 1985 as the Integrated Digital Access (IDA). As far as the user is concerned there is little practical difference from the full ISDN standard. In addition to this basic access to IDA there is also a version called Multi-line IDA, which allows 30 simultaneous 64Kbit/s. voice or data channels, plus two for signalling. Now that the CCITT has defined a standard, BT has said that it plans to offer the full 2B + D service from next year, while maintaining the older system for current users.

Currently there are about 50 business centres based in the major cities which offer IDA, and a total of 1,000 lines using IDA. The present total of 500 local digital

FUTURE PHONES

The introduction of the ISDN standard will not only allow computers and communications to work together more closely, it will also transform the humble telephone. With the network fully digital, a wide range of new services and facilities will be available.

Some of the most advanced resarch in this area is being carried out at Bellcore, an independent consortium funded by the seven regional telephone companies which were split off from AT&T. The advanced telephone services which they are developing are not dependent on ISDN, and would work with any digital environment. However, ISDN does provide a very natural setting for them, and their development is likely to go hand in hand with its progress.

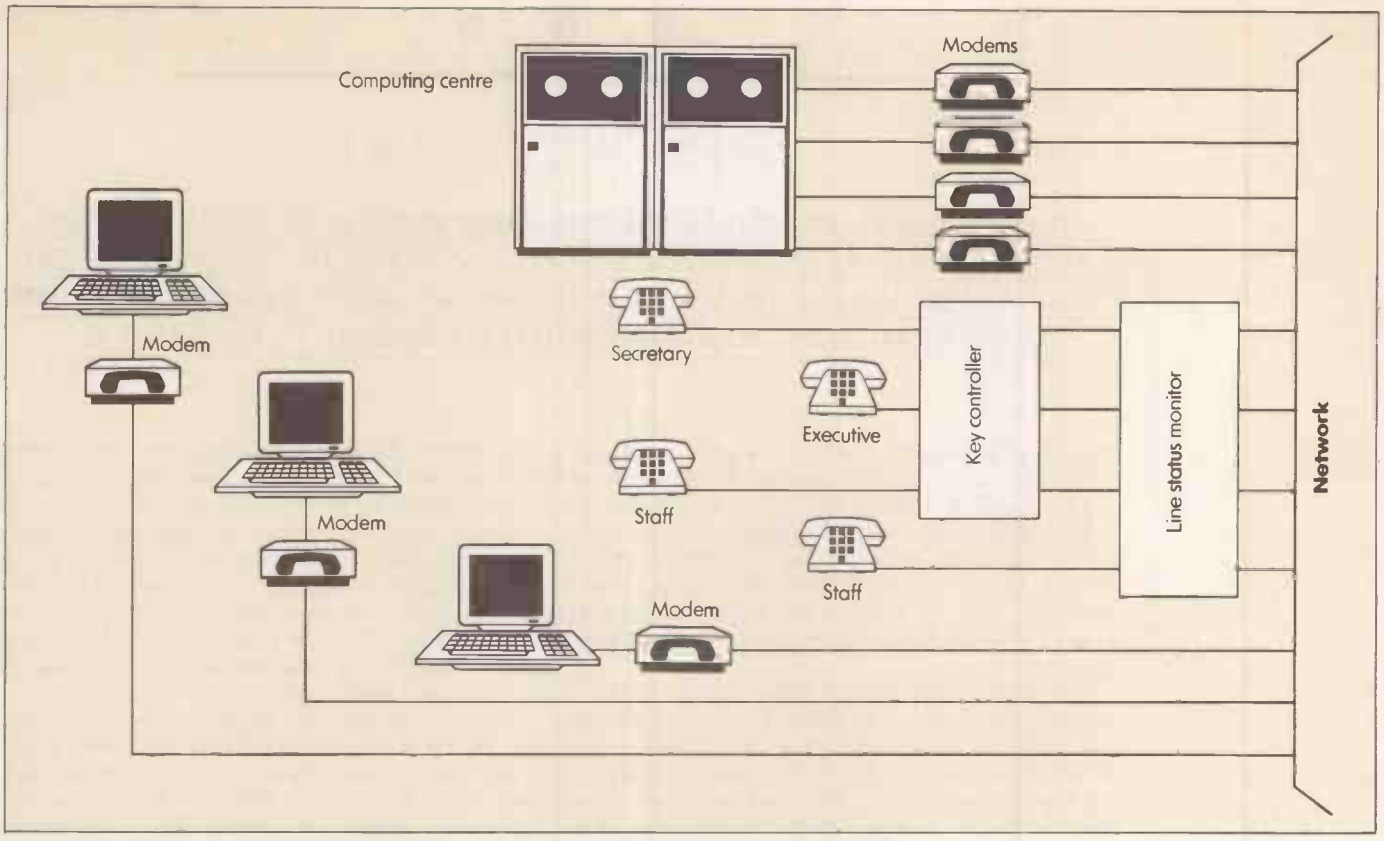
The system beng developed at Bellcore is the Modular Integrated Communications Environment (Mice). It exists in a prototype form in the laboratories at Morristown, New Jersey. One of the features offered by such intelligent networks is voice dialling. You can either speak the number you wish dialled, or alternatively give a command such as "ring John"; the system will recognise the name John, and retrieve the previously stored number. Voice recognition can also be used for security purposes to ensure that only authorised personnel use certain phones.

Advanced message handling is also a feature. The network will respond intelligently to callers, and allow you to pre-program its behaviour. For example, you can specify that certain numbers — say your boss and your spouse — get put through straight away, while others are diverted to a secretary or dumped to an answering machine. Message retrieval will allow you to listen to messages left in voice banks, and it will be possible to retrieve text messages too, using a voice synthesis program.

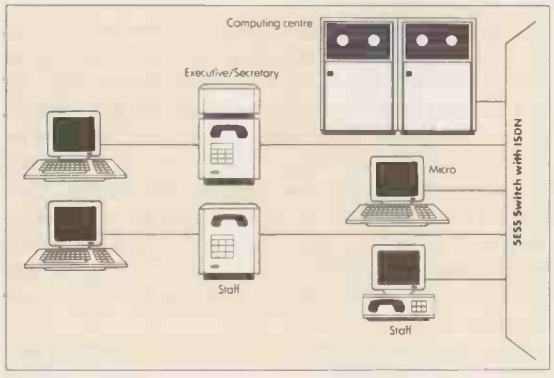
One important feature of these intelligent telephones is that the number will be line independent. You will be able to pick up a call from any telephone, or arrange for calls to be routed through to any handset. In the future, the number will refer to the user, not to the piece of equipment and the line to which it is attached.

And of course such telephones will routinely send data as well as voice. For the full benefits of this capability a screen will become a normal part of the telephone. It might be used in addition to set up call forwarding in a graphical way, drawing lines between incoming calls and their eventual destinations. A screen would also allow on-line databases, telecommuting and teleshopping to grow substantially.

It also opens up the possibility of videophones once the rate of transmission down the line increases sufficiently to cope with the enormous data throughput required — something like 150Mbit/s. That in turn will probably require a second-generation refurbishment of the telephone system, including the use of fibre optics at all stages. The combination of later developments of ISDN with the kind of data capacity such a network would provide opens up the possibility for unimaginable changes in the office environment, not to mention the office telephone itself.



Complex interfacing (above) needed to connect digital devices the analogue network. With ISDN (below) things are simpler.



exchanges will go up to about 750 next year, of which around 200 will offer IDA. By the end of 1990 it is expected that half the lines in use will be digital, with IDA available on a high proportion of them.

BT makes two types of charge for the service. There is an initial payment of £500 for pure data use, or £560 for mixed data and voice, plus an annual rental of £516 for data and £526 for mixed data and voice. The usage charge is unchanged.

A number of other countries are involved with trials, though they are not as far advanced as the BT pilot. The table opposite shows the state of play for the European PTTs. In the US, after some initial reluctance to follow what was perceived as a purely European standard, ISDN received a big boost when the 20 Bell operating companies, which run the local telephone networks, decided to back the system. Nearly all of them have or are planning trials of ISDN.

Much work has gone into experimenting with ISDN at Bellcore, the central research facility of the Bell companies. Areas studied go way beyond simple implementation of ISDN, and touch on all aspects of the telephone in the future, particularly with regard to its integration with the micro and the use of computer intelligence within a telephone network.

Inevitably, Japan too has advanced pilot projects. For some time Nippon Telegraph & Telephone (NTT) has been working on its Information Network System (INS). It started back in 1982, well before the ISDN standard was established, and hence used its own particular variety, which was similar to the British IDA. Since then it has affirmed its support for the international standard. ISDN is now available in four cities, including Tokyo and Osaka, and will be available across the whole of Japan in the next 10 years.

Pilots are all very well, but until they are turned into full-scale commercial versions, users are likely to remain sceptical and aloof. The market research company IDC has done some work in this area as far as Europe is concerned, and it predicts that full services will appear in Britain and France in 1991-92, in Switzerland and Italy a year later, followed by West Germany in 1995.

As an international standard ISDN must be almost unique in that it appears to have gained worldwide acceptance with little opposition. This is partly a reflection on the strategic importance of the whole concept. Communications and computer equipment manufacturers both recognise that this is an area where agreement is vital. The fact that there is this unanimity suggests that manufacturers at least believe in ISDN as the glue which will bind together tomorrow's integrated office. Now that the first services are beginning to come through, it remains to be seen whether the users will share that vision and commitment.

EUROPEAN DIGITAL NETWORKS

	DATE	CONNECTIONS	LOCATIONS
UK	1985-87	demand dependent	
West Germany	1986-88	800	Stuttgart, Mannheim
France	1986-87	1,300	Brittany, Ile-de-France
Italy	1987-88	2,000	
Switzerland	1987-89	300	
Sweden	1987-88	500	
Belgium	1988-89	800	
Netherlands	1988		

NOTE: The UK service is offered on a commercial basis; the others are non-commercial. SOURCE: International Data Corporation

(continued on next page)

DISCUS 1000

THE DATA-MANAGEMENT TECHNIQUES THAT WORK WITH TODAY'S STAND-ALONE PCs WILL BE OVERWHELMED BY THE VAST AMOUNTS OF INFORMATION THAT WILL BE GENERATED IN A FULLY ELECTRONIC OFFICE. **CAROL HAMMOND** LOOKS AT AN INTEGRATED SYSTEM THAT IS DESIGNED TO HANDLE IT ALL.

In the integrated office — when it eventually arrives — micros will no longer work in isolation. Instead they will be linked to other devices like scanners, printers and modems, harnessing their facilities to transfer, store and manipulate information. Video Media's Discus 1000 neatly fits this scenario, as it provides a facility to create a multi-media database of text, data, images and sound.

The Discus 1000 system links together a PC, a scanner, a laser printer, a CD-ROM player and a Worm optical drive. In addition it allows you to develop and use applications in MS-DOS which take advantage of the large amounts of data which can be stored on optical disc, free of the normal 32Mbyte restriction on disc-volume size. You could use it to scan printed documents or drawings, store them on an optical disc and retrieve them under the control of a database.

The system that Video Media supplies is based round a PC adaptor card and driver software that allow one or more micros to communicate with a number of peripherals. An image-compression/expansion card and software compresses images at an average ratio of one to 30 to save disc space. The card complies with CCITT standards for fax groups 3 and 4, so it may eventually allow you to use your micro as a fax terminal. You can also buy a board plus software package which digitises telephone-quality voice signals and stores them in MS-DOS format.

WORM JUKEBOX

OPTICAL discs can be linked together within an optical library or jukebox-like player to provide even greater mass storage than is available from a single drive. The Kodak 6800 optical-disc library is a Worm system which can store over a terabyte — that is 1,024 Gbyte — of information. By way of illustrating what this means in practice, Kodak claims that a terabyte is sufficient to store over 12 years' worth of x-rays, CAT scans and ultrasound examinations for a 250-bed hospital.

The Kodak system is made up of a drive, controller and interface housed in a single unit that can accommodate up to 150 14in. optical discs. Conventional double-sided 12in. Worm discs can hold 2Gbyte, but each Kodak disc provides 6.8Gbyte of randomly accessible on-line storage. The complete set of 150 of these discs adds up to a capacity of around a terabyte. The Kodak discs hold more information than conventional 12in. discs thanks mainly to the use of a variable speed recording technique which writes data at a constant density and so maximises the utilisation of disc space.

The Kodak 6800 is available in four configurations, allowing combinations of up to three optical-disc drives containing from 50 to 150 optical discs. The base unit comes with a caddy loader which accepts discs inserted from the outside and then loads them into the 50-disc library. A robotic elevator mechanism retrieves and replaces discs in the library and conveys them to and from the drive. Kodak says it takes 12 seconds or less to access any piece of information held within the jukebox. Discs with a capacity of up to 340Gbyte can be housed in the base-unit cabinet, which measures 58in. wide by 34in. deep by 71.5in. high. The unit is sealed against dust, so caddies are not needed within the libraries to protect the discs.

The Kodak 6800 system is supplied by Kodak Ltd, PO Box 60, Hemel Hempstead, Hertfordshire HP1 1JU. Telephone: (0442) 61122.

At present the Discus 1000 requires the following hardware: an IBM PC/AT or compatible, a Dest or Canon scanner, an MDS Genius monitor, a Canon or Hewlett-Packard laser printer, an Optimem or Alcatel-Thomson 1Gbyte Worm drive, and a Philips CM-110 CD-ROM player or equivalent. You also need an MS-DOS database or indexing package such as dBase III Plus, Foxbase, Status or Clipper. Video Media will provide a tailor-made database or indexing software to suit individual applications.

Users who already own the appropriate kit can just buy the necessary cards and software. If you need to add to your existing setup you can either buy the necessary components from Video Media or go direct to the appropriate manufacturers. Video Media estimates that the complete setup will cost around £45,000, but one of the advantages of the system is that it may well be able to make use of equipment that you have already installed.

The Discus 1000 system can also be incorporated into an Ungermann-Bass token-ring network, allowing the Worm disc and CD-ROM to provide mass storage for several users in the network under the MS-Net network operating system. These optical-disc drives can also be linked together or configured within an optical library or jukebox to provide even greater mass storage. Data can be downloaded from a mainframe via a communications link to a PC that forms part of a Discus 1000 system, and then stored on a Worm disc. The system can also be configured with a nine-track, 0.5in. tape handler.

You can choose to have a number of different peripherals and applications in your setup, and to support them you create your own main menu to the system. A library of symbols is supplied by Video Media to represent functions or applications such as word search, word processing, database, print and others.

Once you have chosen the appropriate symbols you position them on a sheet of paper and use the image scanner to feed them into the Image Icon Designator program supplied as part of Discus 1000. From then on you can select programs or applications just by pointing to the appropriate symbol using a mouse.

A typical use for the Discus 1000 would be to scan in an image, display it on-screen and then manipulate it in some way — say by using a drawing package to edit it or magnify it. You could then compress and store it or print it out. With a voice digitiser you could record and store a voice message which could be linked to the scanned image under the control of a database. This opens up a multitude of new ways of working. For instance, you could alter a technical drawing and attach a voice message to explain why.

Discus 1000 also allows you to send two images to your laser printer at the same time and print them on a single sheet of paper. For example, you could scan in a business form and overlay it with information from your micro or mainframe database, then print the combined image. In this way it would be possible to dispense with pre-printed forms.

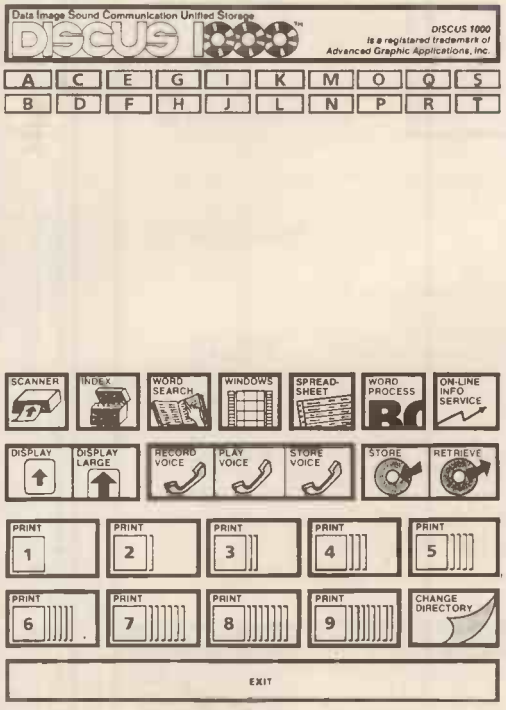
Above: The full Discus 1000 setup includes a CD-ROM player, a laser printer and a Worm drive.
Left: You set up your own menu screen using icons supplied with the system.

Any compressed image and its related data can be stored on a hard disc, 12in. Worm or CD-ROM. A single-sided 1Gbyte Worm disc can contain up to 50,000 A4 scanned images, 500,000 pages of text data, 72 hours of recorded speech or any combination of these. A 500Mbyte CD-ROM disc will store half the quantity.

Users with a Worm and CD-ROM connected to their PC via an SCSI interface simply treat the Worm as drives E and F and the CD-ROM as drive G. Normally MS-DOS has a disc-volume size limit of 32Mbyte but the manufacturer of Discus 100, Advanced Graphic Applications, has got round this by manipulating the sector sizes so that the disc volume size is increased to 500Mbyte.

Increasing the sector and disc-volume sizes usually brings in a time penalty, making access slower. This does not matter when you are trying to access graphics as the data itself is usually voluminous and thus takes a long time to transfer. With text files the difference may be noticeable since the files themselves are relatively small. A large number of text files can therefore be crammed into the same space, making the time overhead in the searching process more significant.

Video Media claims that by dividing up your optical media into more directories and sub-directories than is usual on a hard disc you can achieve acceptable access times. It quotes times of seven seconds to scan or print a



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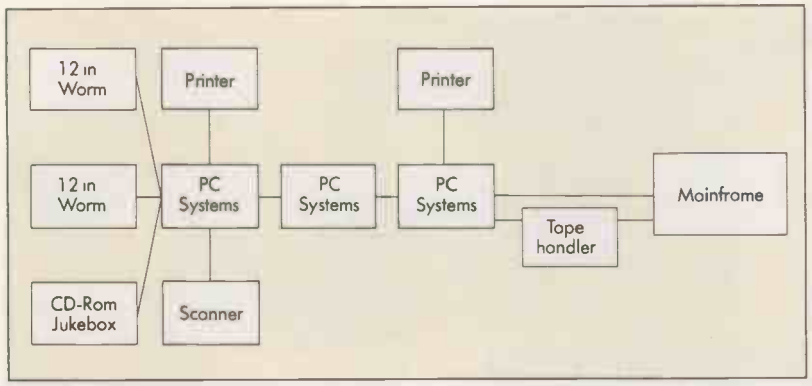


A typical setup for the Discus 1000 system.

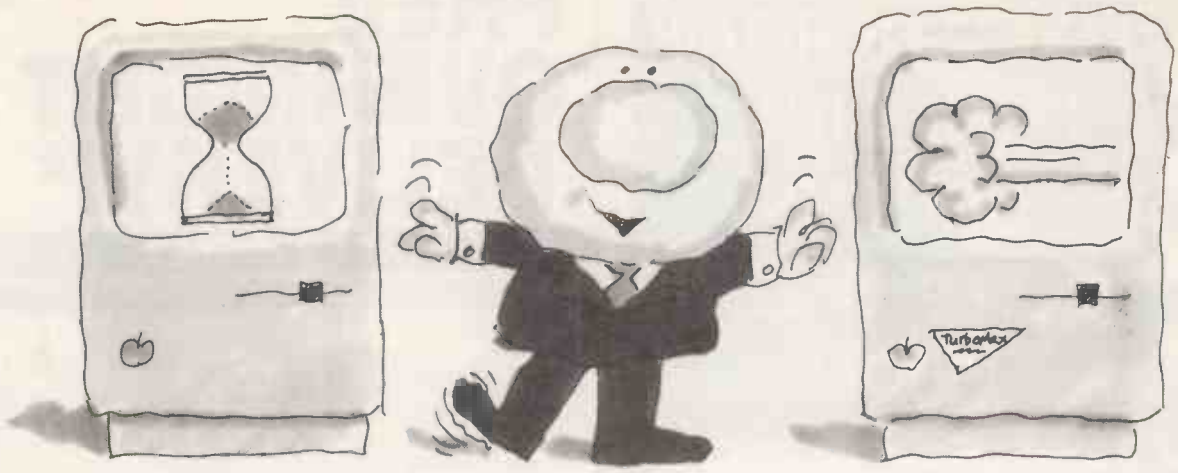
document, retrieve a file or store a document on a Worm disc.

Because Discus 1000 is run straight from MS-DOS you can use standard software to access data on CD-ROM. Video Media says it will have no difficulty incorporating OS/2 within Discus 1000 when it arrives because it complements the concept of a system which integrates data between different machines.

Advanced Graphics Associates has come to an agreement with the 3M Corporation to enable Discus 1000 users to use the Worm drive as a pre-mastering mechanism for CD-ROMs. This would allow CD-ROM data to be prepared totally in-house and would give the user complete control over what goes on to a CD-ROM, saving time as well as money. The mastering cost of around £2,000 per disc would remain, but pre-mastering on Worm might prove particularly attractive to large corporations who need to distribute the same data to a limited number of key staff dispersed over several locations. PC

SPECIFICATION

Description: storage management system
Hardware required: IBM PC/AT or compatible with 512K RAM and 30Mbyte hard disc; Microsoft mouse, Dest or Canon scanner, MDS Genius monitor, Canon or HP laser printer, Optimem or Alcatel-Thomson 1Gbyte Worm drive, and Philips CM-110 CD-ROM player or equivalent
Software required: MS-DOS 3.1 with micro or mainframe database/indexing package
Prices: driver card and software £4,345; image-compression and expansion card and software £7,425; voice card £1,485; voice software £660
Manufacturer: Advanced Graphic Applications of New York, NY
UK distributor: Video Media Operations Development, Kingsgate House, 115 High Holborn, London WC1V 6JJ. Telephone: 01-405 3257
Available: now



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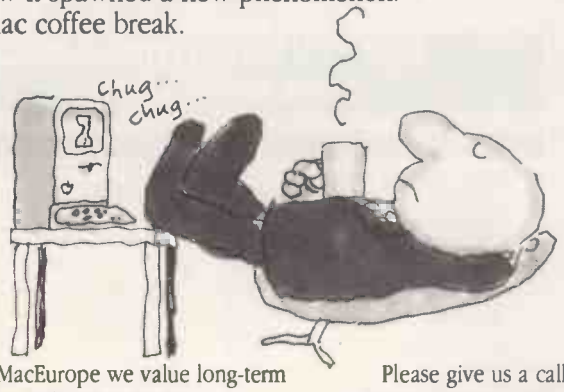
But then you realized how slow Mac can be. Slow to boot, slow to recover from crashes, slow to transfer data, slow to redraw graphics, slow to scroll, slow to access and move between applications, slow to process spreadsheets, slow to do almost everything you bought the Mac for.

So slow it spawned a new phenomenon.

The Mac coffee break.



Then come and do it on this.

Now imagine *your* Mac running up to 3 times faster than a Mac SE.

Doing calculations up to 100 times faster. Re-booting from system crashes in 5 seconds. Transferring a 400K file in 7 seconds. Opening MacPaint in 2 seconds, Cricket Draw in 3.

Imagine working with up to 4 times the memory. Imagine a RAMdisk whose contents are preserved even through system crashes. And imagine all this from a product which fits in minutes, without modifying your Mac in any way, and is completely compatible with all Mac software.

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TOP 10

As more and more languages suitable for micros are appearing, so it is becoming increasingly difficult to choose which one is right for a given application. **Jim Bates** explains how they work and what tasks each is best at doing.

The number of languages suitable for use with micros has grown considerably over the last few years. Paradoxically, this is making life increasingly difficult, both for existing users and for newcomers to computing.

Deciding which language to learn or which to use for specific applications is difficult without detailed knowledge of the strengths and weaknesses of each one. It is not even very helpful to talk to experts on particular languages since most people are, understandably enough, prone to consider their own favourite to be the best thing since the abacus.

All digital microprocessors are controlled by streams of instructions representing machine code stored in the machine's memory. Higher-level languages differ only in the methods which they adopt to generate this stream of numeric instructions. Each one represents a different strategy for enabling programmers to communicate their ideas and requirements most effectively to the hardware.

Above machine code, the lowest programming level uses assembly language which puts the programmer more or less in direct touch with the microprocessor chip. It does so using simple mnemonic commands to generate the stream of machine code that the hardware needs. The problem with assembler is that while the language is quite straightforward, program construction can be complex because of the need to maintain control of all the machine's lower-level functions.

INTERMEDIATE PROGRAMS

Higher-level languages seek to make the construction of programs more easily understandable by human operators, and leave the generation of machine code to intermediate programs. This can be done by introducing a series of commands that approximate to normal language and then adding a number of rules on how they may be used. It is the intermediate programs that have the capacity to understand these new commands, and this is where the real power lies. Their effectiveness controls the presentation, accuracy, capacity and speed of the final program.

There are two main ways of implementing a higher-level language. In the first, you load into memory a list of all the available commands, together with code to check that the rules are observed. You then provide and maintain an area of memory for the commands to be entered into. You also need to make provision for saving and loading this list of program commands to and from disc. As commands are entered in this system they are stored in memory. Upon request from the operator, each command in turn is interpreted and executed.

This is called an interpretive system. Its big advantage is that it can be directly interactive during program development without needing special provision from the programmer. If the program contains an error, either in syntax or data, program execution will stop and the interpreter will indicate the type of error and where it occurred. The programmer can examine the program for the error condition and make whatever corrections may be necessary. It is even possible to display the values of program variables, since they still exist in memory at the time that execution ceased. Unfortunately, interpretation of commands on an individual basis takes up a lot of processor time so interpretive versions of languages are usually quite slow.

The second approach completes the translation from high-level commands to machine code by using a compiler. In this method, the high-level program is written using a word processor or text editor and is saved to disc. The compiler is then loaded into memory and instructed to process the text file. Compilation consists of reading the text file and writing a new file which contains the series of high-level commands translated into machine code. In practice, compilation may be a little more involved than this, but the principle remains the same.

Once compilation is complete, the new file can be loaded and executed to perform the functions specified in the original text file. An advantage of this method is that since each translation of a high-level command only occurs once, compiled programs tend to run much faster than interpreted ones.

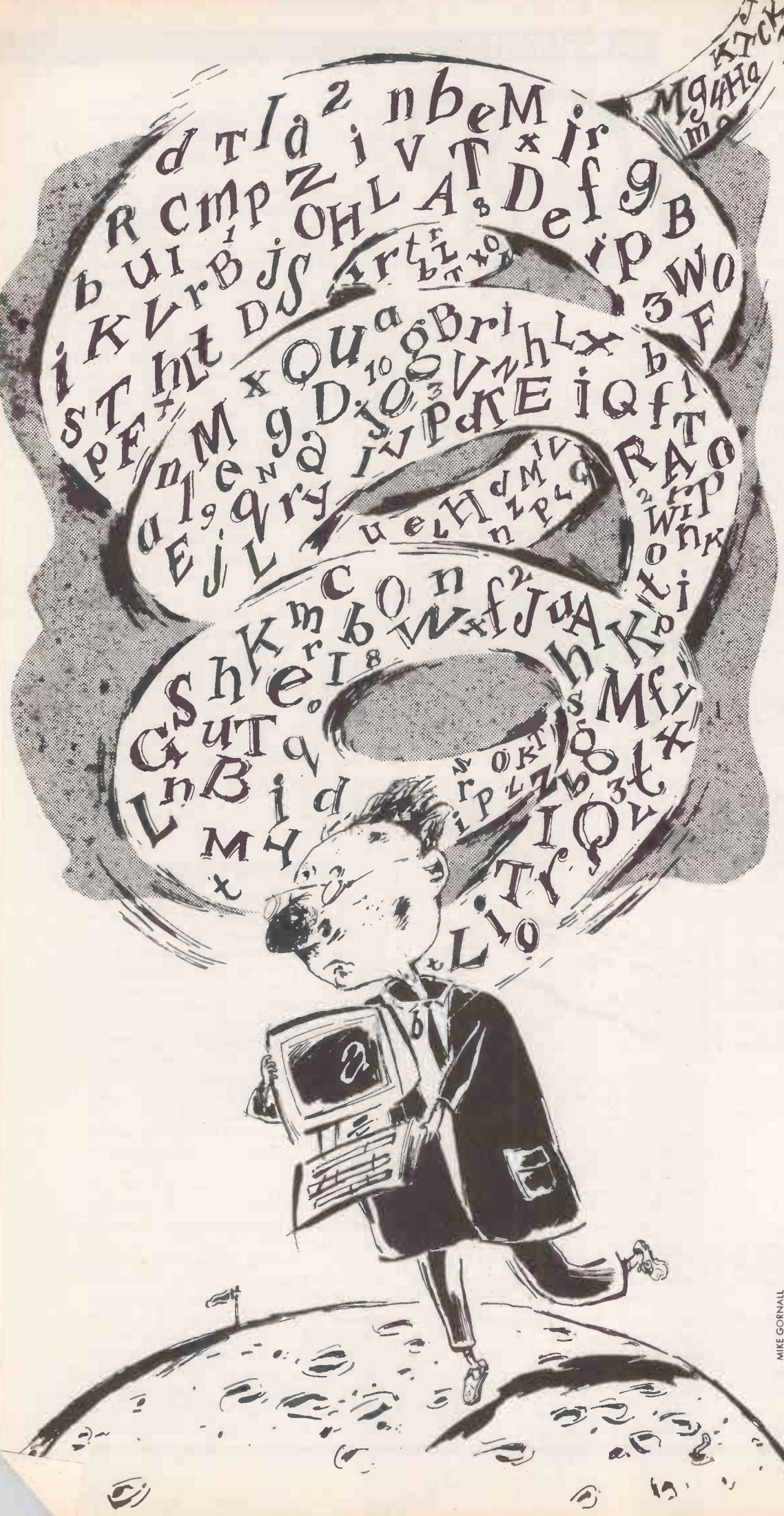
Unfortunately there are also serious disadvantages to this method. For one thing, errors of command syntax in the original program will not be discovered until the compilation stage. Errors in data handling may not become apparent until the program is run, and even then may only appear under very special combinations of circumstances. Once errors are detected, program execution may cease, returning control to the operating system and thus losing the values of all the variables. In extreme cases processing will go into an infinite loop, making it necessary to reboot the machine.

Software manufacturers are aware of the advantages and disadvantages of each method and have recently tried to combine the best of both worlds by providing all that the programmer needs in one package. Some of the more popular languages now provide a text editor along with compiling, error-checking, debugging and linking facilities all in one program environment. It thus becomes possible to return immediately to the program text if errors are encountered, thereby simplifying program construction.

DECIDING FACTORS

Program-development time is a most important consideration, and can be a critical factor in deciding which language to use. The actual commands and structure are what give the high-level language its flavour; strengths and weaknesses are decided when a language is initially designed and developed. The command structures of languages vary enormously and are nearly always a compromise between program readability and the efficiency in the eventual code. Some languages are so well suited to their particular purpose that their popularity continues to grow; some remain alive simply through the inertia of having so many users; yet others emerge briefly and then fade away. If you are new to programming, the languages that you choose to learn can set your programming style for the rest of your days.

Good professional programmers will have knowledge of at least two or three high-level languages and an adequate grounding in assembly language. Knowledge of assembler can often be put to excellent use to improve or extend the existing capabilities of some high-level languages. In this way, knowledge of differing syntax, structure and capability can be acquired and applied to the evaluation of new languages as they arrive.



MIKE GORNALL

TOP 10

APL

APL has been around for a long time. It was created by Dr Kenneth Iverson in 1962 as a problem-solving language. The name simply stands for A Programming Language. It uses complex algorithms which may be expressed in a highly compacted and succinct form. As a result, APL tends to place emphasis on the shape and structure of data rather than the quantity. The notation and command syntax is extremely concise, which makes programs very difficult to read. It is a good example of a highly specialised language.

FOR: Excellent data type specification.
AGAINST: Difficult to read. Does not handle high volumes of data very well.

BASIC

INITIALLY designed as a teaching language, Basic proved so successful that it is still number one in terms of the number of users. The name is said to be an acronym derived from Beginners' All-purpose Symbolic Instruction Code. Its initial advantages were English-like commands, a fairly relaxed command syntax and no structure to speak of. With Basic running in an interpretive environment it is easy to type in a quick program and run it to see what the effect is. It was much maligned at first because its lack of structure made it easy to write untidy programs. Recent versions like Borland's Turbo Basic and Microsoft's Quick Basic have provided lots of extra features, including the speed of a compiler and the ability to build structured programs.

FOR: Easy to learn and easy to read.
AGAINST: Can be slow in comparison to some other languages.

C

THIS compiler-based language was developed at Bell Laboratories in the 1970s. It is closely associated with the Unix operating system — most of which was written in C — and has grown in popularity along with it. C is a general-purpose language which resembles Pascal in its structure but has several unique features. Command syntax and structural requirements make it quite difficult to learn, but it does allow close access to the lower-level functions of the hardware, giving power and flexibility to the programmer.

FOR: Fast. Economical with memory.
AGAINST: Difficult to learn and read.

COBOL

COBOL is one of the old warhorses — a compiler-based language originally developed on mainframe machines by the US Department of Defense. The name is an acronym of Common Business Oriented Language. As this implies, Cobol was designed to handle large amounts of data as efficiently as possible. The syntax of Cobol is largely self-documenting, which makes programs reasonably easy to read. Many versions for micros have now been introduced, with some changes to handle differing hardware requirements. Cobol requires large amounts of memory, and this effectively prevented its spread into micros until very recently.

FOR: Excellent file handling. Handles large amounts of data.
AGAINST: Memory-hungry.

FORTRAN

ANOTHER of the older languages, although it is still quite popular. The name is a contraction of Formula Translation. Fortran is a compiler-based language. It was developed by IBM in the 1950s and, as its name implies, it is extremely powerful at number handling. As with most of these older languages originally developed on mainframes, it requires large amounts of memory; full implementations have only recently become available on micros. Developing Fortran programs can be quite a long-winded process.

FOR: Powerful number handling.
AGAINST: Difficult to read. Poor alpha string handling.

LISP

LISP is a list-processing language developed at the Massachusetts Institute of Technology. It is available in interpretive and compiler versions and is structured in a similar way to Prolog, which it pre-dates by about 10 years. Lisp offers the ability to manipulate lists of symbolic alpha and numerical data recursively. Recursive processing is a relatively new idea in programming: it means that a routine can repeatedly call itself until particular conditions are satisfied . This is a powerful concept, but it can be a difficult one for new programmers to grasp. Lisp is excellent for artificial-intelligence (AI) applications and knowledge-based — or expert — systems.

FOR: Powerful symbolic processing capabilities.
AGAINST: Mainly useful for AI applications.

OCCAM

THE most recent of the languages listed here, Occam is highly specialised and was developed for the Inmos Transputer chip. It emphasises a parallel-processing capacity that will be best realised in multi-processing environments. This emphasis on concurrence of operation naturally makes Occam somewhat strange to learn, but it appears to be a language of the future; a working knowledge could repay handsome dividends as multi-processing Transputers become more widespread in their applications.

FOR: Statement concurrency and multi-processing.
AGAINST: Limited to specific machines.

PASCAL

NAMED after the 15th-century scientist and mathematician, Blaise Pascal, this rigidly structured language demands a disciplined and organised approach from the programmer. Pascal was developed by Dr Niklaus Wirth from a mathematically based language called Algol — the name is a contraction of Algebraically Oriented Language — in the early 1970s. It originally had rather weak user I/O facilities, and being compiler based it was quite slow during program development. Borland's Turbo Pascal and upgrades of older implementations have improved on this, and on the programming environment.

FOR: Good file- and number-handling features.
AGAINST: Awkward to learn.

PROLOG

PROLOG — short for Programming in Logic — has been called the European version of Lisp, having been developed at the University of Marseilles. But this notion does Prolog a disservice: although there are superficial similarities, Prolog has a power and style all of its own. Like Lisp, it is intended for use with artificial-intelligence applications and knowledge-based systems. It is usually a compiler-based language, and the programming methods can be difficult to grasp. This is because where most languages provide a sequence of operations to be performed on data, Prolog declares a number of rules, and data is checked against them to ascertain the truth or falsehood of program statements. Turbo Prolog, the recent implementation by Borland, has boosted the popularity of this language enormously.

FOR: Logical structure. Easy to read. Powerful knowledge-statement handling abilities.
AGAINST: Awkward to learn. Poor number handling.

SMALLTALK

THIS seminal language was developed by the Learning Research Group at the Xerox Palo Alto Research Center in California. It is unusual in that it consists of objects that interact by the sending and receiving of messages. The programmer implements a system by describing outgoing messages and the results of particular message reception. Smalltalk uses an object-orientated point of view for normal data but uses a standard data/procedure-orientated process — similar to Algol — for number handling. It is a structured language and uses a modular program-development approach.

FOR: Excellent graphics capabilities. Good data handling.
AGAINST: Difficult to learn and read.

SUPPLIERS

APL IBM (UK), 414 Chiswick High Road, London W4 5TF. Telephone: 01-995 7700
CIS Cobol, Personal Cobol Micro Focus Ltd, 24 West Street, Newbury, Berkshire RG13 1JT. Telephone: (0635) 32646
Basic, C, Cobol, Fortran, Lisp, Quick Basic Microsoft, Excel House, 49 De Montfort Road, Reading, Berkshire RG1 8LP. Telephone (0734) 500741
Lattice C Softsel, Softsel House, Syon Gate Way, Great West Road, Brentford, Middlesex TWB 9DD. Telephone: 01-568 8866
Living C Living Software, 34 Bramble Avenue, Conniburrow, Milton Keynes MK14 7AP. Telephone: (0908) 606667
Turbo Basic, Turbo C, Turbo Prolog, Turbo Pascal Borland International, 1 Great Cumberland Place, London W1H 7AL. Telephone: 01-258 3797
Zorland C Zorland International, 144 Griffin Road, London SE1 7QA. Telephone: 01-317 7240
Pro Pascal, Pro Fortran 77 Prospero Software, 190 Castelnau, London SW13 9DH. Telephone: 01-741 8531
Fortran 77, Pascal MT+ Digital Research, Oxford House, Oxford Street, Newbury, Berkshire RG13 1JB. Telephone: (0635) 35304
Occam Inmos, 1,000 Aztec West, Almondsbury, Bristol BS12 4SQ. Telephone: (0454) 616616
Smalltalk AT Artificial Intelligence Ltd, Intelligence House, Merton Road, Watford, Hertfordshire WD1 7BY. Telephone: (0923) 47707

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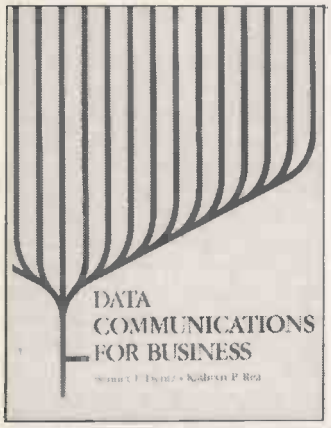


COMMUNICATIONS

DATA COMMUNICATIONS FOR BUSINESS

By Bennet P Lientz and Kathryn P Rea ● Published by Blackwell Scientific Publications, £24.50 ● ISBN 0 8016 3023 4

THIS IS an American book, primarily intended for college undergraduates studying the business applications of technology. However, at no time is the tone condescending and *Data Communications for Business* succeeds in covering its subject matter thoroughly.

It is divided into two parts, complete with informative diagrams and photographs. Part 1 covers the technical aspects of communications technology, such as the different types of hardware and software available. Part 2 discusses how to go about putting them into use. Each part is divided into chapters which end with exercises and problems — the book's one obvious display of its academic intention.

To finish, there is a useful glossary of terms and a list of abbreviations, acronyms and definitions; there is even an index of minicomputer models. The reference section gives the names of books and magazines to look at, the latter unfortunately being US publications. But on the whole, the American origins of *Data Communications* are not apparent and British readers do not suffer from a lack of information.

The authors are communications consultants and this is obvious in the way they approach writing their book. They start off by giving detailed explanations of what options there are and what each one can be used for. For example, they explain what a packet switching network is, and discuss the pros and cons of twisted-pair, coaxial and fibre-optic cabling. They even say what each pin on an RS-232 interface is used for.

They go on to assess the advantages and disadvantages of different approaches and how to buy, plan and implement a system. Tips on how to evaluate a manufacturer's proposal and how to compare the estimated cost of one system against another are also given. The authors acknowledge that readers need to look after, say, their LAN once it is in operation and alert them to the need to think of security, maintenance, training and disaster recovery. There is also a section on forward planning and what to do once a setup becomes obsolete or fails to meet changed requirements.

If you are thinking of installing a network and would like a primer to help you decide how to go about doing it, this book could prove useful, though it obviously cannot help you with specifics like which kit to go for. *CH*

UNIX

THE UNIX FOR BEGINNERS BOOK

By Bryan Strong and Jay Hosler ● Published by John Wiley and Sons, £27.50 ● ISBN 0 471 80666 8

THERE IS something faintly paradoxical about a book called *Unix for Beginners*. It is a bit like Arc Welding Made Easy: somehow it seems unlikely. Yet this book is aimed not just at the Unix ignorant, but even at the non-computer-literate, and is designed to give a thorough grounding in the basic Unix system. Amazingly, it largely succeeds.

The background of the authors probably has something to do with this: Strong is a lecturer in psychology, while Hosler has the detailed computing experience. Between them, they have put together a book which is designed to be used very much as a hands-on guide. In addition there are chapter reviews in the form of self tests, and spaces for notes.

After a slighty superfluous whiz through the history of computers, dragging in poor old Babbage again, there is a basic introduction to the procedure for starting up a Unix system. This is followed by sections on Vi, the text utility, as well as the mail and interactive-dialogue facilites. The book is rounded off with several parts on file structures and text formatting. Although inevitably designed for the user of the larger system, it has a useful appendix for PC-based Unix, followed by Unix command summaries, a good glossary and index, and command reference cards. In addition to all this, the book is clearly written and unpatronising. Who could ask for more? It is enough to make you believe that Unix might almost be usable. *GM*

DICTIONARIES

SCHNELLMANN-VERLAG BILINGUAL DICTIONARIES OF COMPUTERS AND DATA PROCESSING

Volumes available for two-language combinations of English, German, French, Dutch, Italian, and Spanish ● Published by Schnellman-Verlag of Widnau, Switzerland. ● Available from Grant & Cutler, 55-57 Great Marlborough Street, London W1V 2AY; £16.50 each. ● ISBN 3 907971 63 9 English/German ● ISBN 3 907971 70 1 English/French

OTHER Western European computer markets are now just as active as Britain's. The products are still mainly American or Japanese, but the computing terms which also arrive suffer a variety of fates. Some are imported unchanged, but others are rejected in favour of a local term or are so radically altered as to become unrecognisable.

As computer terms are increasingly turning up in the course of ordinary business transactions there is clearly a need for a range of good bi-lingual dictionaries. The computer field moves too fast for ordinary dictionary publishers, so this is an ideal niche for the specialist publisher.

Schnellmann-Verlag of Switzerland produces a daunting range of such books. Its Computing and Data Processing series alone consists of around 100 separate books, each one a two-language combination of German, English, Italian, French, Spanish or Dutch.

We looked at two: the English/French and English/German volumes. Each book is about 120 pages long, in two sections so you can translate both ways, with a page or two at the end of each section dealing with units. Production is pretty basic: the books appear to be computer printed rather than typeset, and are paperback. But this will not matter if the information they contain is the stuff you want.

For the needs of personal-computer users, the hit rate of appropriate terms seems low. There are no RAM or ROM, spreadsheets or floppy discs, but lots of things like card punches, Or-circuits and take-up reels. But even given the data-processing bias — which is acknowledged in the title — we still found plenty of relevant terms that you would be unlikely to guess.

Matrixdrucker might be fairly obvious as German for matrix printer but you would be unlikely to guess *Zugriff*, which means access, or *Aufzeichnung*, which means record, or even *Formularvorschub*, which means form feed.

But there was a worrying problem with the French volume: many of the terms given seem archaic or even incorrect. "Computer", for instance is given as *calculateur*, whereas the usual term now is *ordinateur*; PC is OI in French, standing for *ordinateur individuel*. We checked with the French Technology Press Bureau who confirmed that *calculateur* is just not what the French would say.

The French take their language seriously, especially when it comes to the introduction of foreign terms. A special body, the Associaion Generale de Usages de la Langue Francaise (Agulf) regulates their use and oversees the coining of new French terms to take over the role of foreign imports. Some of them are especially apt: RAM in French is *memoire vive*, ROM *memoire morte*, which both seem rather better than the originals.

Agulf has the power to take people to court for the use of unpermitted terms, and often does. The regulations apply to anything printed — invoices and headed paper as much as magazines or newspapers. This makes it especially important for any French technical dictionary to be up to date and accurate. Perhaps Schnellmann-Verlag falls down because it is Swiss; certainly the German volume is better.

To go with the computer boom there is flourishing European computer press. Some of the magazines are well worth reading,

(continued on next page)

BOOK REVIEWS

(continued from previous page)

expecially if you are interested in reading reviews of the latest hardware, as American and Japanese machines do not always arrive in Britain first. Best German magazines are the monthly *Chip*, and *Computer Personlich*, which comes out twice a month. *Chip* is a thick magazine which has program listings and game reviews alongside reviews of up-market business hardware.

Computer Personlich is a pure business magazine, and has been getting steadily better over recent months. It has particularly good printer reviews. Both magazines concentrate on IBM-compatible kit, but they cover Commodore and Atari machines more than we would do here, reflecting their strength in the German market.

The equivalent French magazine is probably *L'Ordinateur Individuel*. This monthly gives the Macintosh more coverage than most British magazines, and has more general features and interviews than *Practical Computing*, but again coverage of the IBM world predominates. *IS*

OFFICE AUTOMATION

MANAGEMENT GUIDE TO OFFICE AUTOMATION

By Joseph St. John Bote ● Published by Blackwell Scientific Publicotions, £7.95 ● ISBN 0 00 383353 4

THE cover of the *Management Guide to Office Automation* claims that it is a guide to planning and managing office automation. It also says that it is aimed at senior and middle management in commerial, administrative and financial organisations. Its audience certainly does determine the way the book is written, since it is as much about dealing with staff during a changeover as about what to buy.

The book is very much concerned with evaluating what staff do, how they will fit into an automated office and how their jobs might change in the future. It even looks at how computerising an office will affect people's future career outlook. It really is what it says it is: a guide for managers who have to computerise an office. It looks at what types of application would be needed to replace the functions of different staff, with little emphasis on particular packages or how to choose them.

Worthy as the book is, I found it long-winded. It contains a lot of useful information, but it could be better organised. I also felt it could have explained the technology in a more comprehensive manner. But that said, it does at least approach one problem often forgotten about: the people who have to use the kit. *CH*

SPREADSHEETS

SPREADSHEET MARKETING

By Alon West ● Published by Gower, £29.50 ● ISBN 0 566 02663 5

EVERYONE knows that spreadsheets are wonderfully adaptable — perhaps too adaptable. Yet when it comes to the crunch, few people are prepared to spend much time using the full range of facilites to set up applications which fit specific needs. *Spreadsheet Marketing* is welcome for that reason, because it shows how spreadsheets can be used to address quite complex marketing problems.

There are 14 chapters containing listings for constructing spreadsheets which cover marketing areas such as product viability, export pricing, marginal profitability and many others. After an introduction to the field in question, there are pages of typeset output. This is slightly worrying, since it is hard not to introduce a few errors when typesetting; direct dumps to the printer would have been far better.

The writing is occasionally sloppy, but the author seems to be well informed; he worked for Unilever and Mars, and draws on these companies for examples.

Ideally, this book should come with a set of templates, presumably for Lotus 1-2-3; the price certainly seems to demand it. As it stands, it is hard to see hard-pressed marketing managers tapping all this stuff in. This is a pity, since the aims of introducing some systematics into the subject and using the humble spreadsheet in an unusual area are good ones. A near miss. *GM*

Reviewers this month: Carol Hammond, Glyn Moody and Ian Stobie.

PRINTER CONTROLLER

Jim Bates presents a pop-up utility that offers direct control of your printer from within any application.

THIS MONTH'S program is a true pop-up resident utility which I have called Ppop. It intercepts the keyboard-handling routine, interrupt 9, to give you instant control of the printer direct from the keyboard.

When the Alt and Caps Lock keys are pressed simultaneously, a pop-up box appears on the screen which offers options to send prearranged control characters direct to the printer. Provision is made to indicate if the printer is busy or off-line. Pressing the Esc key removes the box, restores the screen and returns you to your program at the point that you left it.

When pop-up programs first began to appear on the software market, I was fascinated to know where the contents of the screen behind the box were stored until required for restoration. I am still not sure, but for this program I have developed a simple swap routine that takes data from the buffer Box__Buf and swaps it with the contents of the screen at the appropriate point. The screen is restored simply by calling the same routine and swapping the data back.

BASIC LOADER

I have had a lot of letters from people who use the Basic loader to get the utilities in this series on to their machines, so I have made some slight changes to the layout in this program to cut down the number of lines needed for the Basic loader. By placing the uninitialised buffer and data areas at the end of the program, these bytes do not need to be entered on the loader listing. The program will simply grab as much memory as it requires — around 1.5K — when it is installed, effectively protecting beyond the end of the existing data area. The eventual resident section of program code will take up more space than it strictly needs, but it is only an extra 500 bytes or so, and it saves Basic users an extra 51 lines of listing.

This month I have made more extensive use of equates than before, and I have used the assembler's ability to complete simple calculations. The first three equates are all attribute bytes which will produce certain colours and effects when placed in the correct locations of screen memory. These colour details are noted in the remarks.

LF, FF, CR and Esc refer simply to the numeric value of the individual characters. Box__Wid and Box__Len refer to the actual size, measured in characters, of the pop-up box that will appear on the screen. Box__Lin and Box__Col are only used in the calculation of Box__Pos and Box__Cur; they indicate respectively the line and column where the top right-hand corner of the box will appear. Remember that MS-DOS for the IBM counts screen lines and columns from zero.

Box__Pos is the actual value used by the program to locate the box on the screen. Each character shown on the screen actually occupies two bytes in video memory, so one 80-column line on-screen occupies 160 bytes in memory. The position, in bytes, from the start of the screen can thus be calculated by multiplying the line number by 160 and adding the column number multiplied by 2.

The Box__Cur value is used by interrupt 10hex to set the position of the cursor inside the box. This interrupt requires line and column positions to be placed in a register as a word in which the high byte contains the line number and the low byte the column number. Multiplying the line number by 256 to make it the high byte and adding the column number gives the position of the top right-hand corner of the box. An additional line and column figure is added to correct for the position of the cursor within the box itself.

The Msg__Len equate indicates the length of the "Printer not ready" message, and the final two equates indicate the segment addresses of mono and colour RAM. Using equates in this way makes it easy to change both the size of the box and its position on the screen: you only need to alter the Wid, Len, Lin and Col equates.

The code section starts with the usual jump to the Install routine, which sets up the program and links it into the system by hooking the relevant interrupt. The Install routine first displays the Sign__On message and then goes on to prepare the buffer area with the interleaved Scnbox message.

MESSAGES

It would be possible to write the message area with interleaved character and attribute bytes, but this makes the assembler code much more difficult to read. I therefore decided to leave the message area in plain text and add this little routine to interleave the appropriate attribute bytes into the Box__Buf buffer area.

Normally the Box__Buf buffer and all the data bytes and words would be located before the Install routine, and the ScnBox message would be lost along with the Install routine when the terminate and stay resident (TSR) protection was applied. However, in this instance there is a loop with the number of words to transfer in CX, SI pointing to the message area Scnbox, DI pointing to the beginning of Box__Buf and the attribute in AH.

Taking a byte at a time from [SI] into AL, and then transferring AX to [DI], gives the correct character/attribute interleave. During this loop the source must be incremented by 1 — equivalent to one byte — while the destination is incremented by 2, equivalent to one word. Once this loop has completed, the current interrupt 9 address can be collected by using function 35hex of interrupt 21hex. Into this address is placed code at Old__Int9__Off and Old__Int9__Seg for use by the new interrupt routine.

The address of the routine is now placed into the vector table using function 25hex of interrupt 21hex. The final step is to protect the code from subsequently being overwritten by DOS.

The Protector label in this instance is marked as

$+(BOX__WID*BOX__LEN*2)

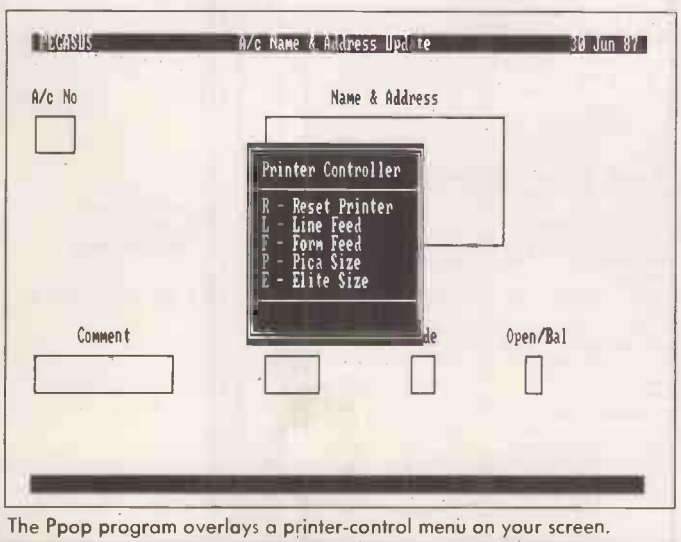
This is actually way beyond the end of the code as generated by the assembler: the expression translates as the current memory location — shown by the $ sign — plus twice the number of characters required by the box. Thus Protector indicates a location which is 506 bytes beyond the end of the code. Since these bytes are initialised it does not matter what their value is when the program is loaded. It is these bytes which users of the Basic loader do not need to enter.

KEY PRESS

The program is now loaded and functioning. Each time a key is requested interrupt 9 is called and the routine is invoked from New__Int9. The first task is to ensure that other interrupts are enabled. The flag register must also be saved on to the stack to allow the original interrupt 9 to be called.

Like all interrupts, this routine will terminate with an Iret instruction, which takes the top two words off the stack to form the return address and also takes the next word into the flag register. By pushing the flags on to the stack

(continued on page 107)



The Ppop program overlays a printer-control menu on your screen.

PPOP.ASM. ASSEMBLER LISTING

```
COMMENT *

This program sets a resident printer controller routine
into memory which can be called by pressing ALT CapsLock.
Routine produces Pop-Up Menu with LF and FF options for
printer.  Other Options may be added as required.
*
;================================================
;              EQUATES
;================================================

NORMATT   EQU   1FH
CMNDATT   EQU   1BH
FREDATT   EQU   0CFH
LF        EQU   0AH
FF        EQU   0CH
CR        EQU   0DH
ESC       EQU   1BH
BOX_WID   EQU   23
BOX_LEN   EQU   11
BOX_LIN   EQU   6
BOX_COL   EQU   28
BOX_POS   EQU   (BOX_LIN*160)+(BOX_COL*2)
BOX_CUR   EQU   (BOX_LIN*256)+BOX_COL+0903H
MSG_LEN   EQU   17
MONRAM    EQU   0B000H
COLRAM    EQU   0B800H

;================================================
;        RESIDENT CODE AREA
;================================================

CODE      SEGMENT
MAIN      PROC  FAR

   ASSUME CS:CODE,DS:CODE,ES:CODE

   ORG 100H
START:
   JMP    INSTALL
QUITSTEP:
   JMP    INT_RET              ; Return from interrupt
NEW_INT9:
   STI                         ; Must enable interrupts
   PUSHF                       ; Prepare for interrupt return
   CALL   DWORD PTR CS:OLD_INT9_OFF   ; Call original INT 9
   PUSH   BX                   ; Save registers
   PUSH   ES
   MOV    BX,40H
   MOV    ES,BX                ; Point ES to Data Area
   TEST   BYTE PTR ES:17H,8    ; Check ALT Key
   JZ     QUITSTEP             ; Not pressed
   TEST   BYTE PTR ES:18H,40H  ; Check Caps Lock
   JZ     QUITSTEP             ; Not pressed
   XOR    BYTE PTR ES:17H,40H  ; Reset Caps Lock
   CMP    BYTE PTR CS:PROG_FLAG,0   ; Check if PPOP is running
   JNZ    QUITSTEP             ; Yes it is - so quit
   PUSH   AX                   ; Save Registers
   PUSH   DS
   PUSH   CX
   PUSH   DX
   PUSH   SI
   PUSH   DI
   MOV    BX,CS
   MOV    DS,BX                ; Ensure that DS = CS
   MOV    CS:PROG_FLAG,1       ; Mark Program Active
   MOV    DX,ES:63H            ; = Video Controller Port Address
   ADD    DX,6                 ; Set to Access Indicator
   MOV    PORT_ADD,DX          ; Store it
   MOV    BH,ES:62H            ; = Current Video Page
   MOV    CRNT_VPAGE,BH        ; Store it
   MOV    AH,3                 ; Get current Cursor Position
   INT    10H
   MOV    CRNT_CUR_MODE,CX     ; Store it
   MOV    CRNT_CUR_POS,DX
   MOV    AX,COLRAM            ; Set for Color Ram
   MOV    CURSOR_TYPE,607H     ; Set Cursor type
   MOV    BX,ES:10H            ; = Hardware Check
   AND    BX,30H               ; Gate out unwanted bits
   CMP    BX,30H               ; Check Video Mode
   JNZ    PROCESS01            ; is Color so continue
   MOV    AX,MONRAM            ; Set for Mono Ram
   MOV    CURSOR_TYPE,0B0CH    ; Set Cursor type
   CMP    CRNT_CUR_MODE,607H   ; Is it Color Type
   JNZ    PROCESS01            ; No - so continue
   MOV    CRNT_CUR_MODE,0B0CH  ; Set to standard

PROCESS01:
   PUSH   AX
   MOV    AX,ES:4EH            ; Set Page Offset into Screen Ram
   POP    ES                   ; Point ES to Screen Ram
   MOV    VPAGE_OFFSET,AX      ; Store it
   MOV    SI,OFFSET BOX_BUF    ; Point SI to BOX
   MOV    DI,BOX_POS           ; Point DI to Screen Position
   ADD    DI,VPAGE_OFFSET      ; Make sure it's the right page
   PUSH   DI                   ; Save it
   MOV    BX,BOX_LEN           ; Set Box Length for line count
PUT_BOX:
   MOV    CX,BOX_WID           ; Set Box Width for character count
   CALL   SWAP                 ; Swap BOX and Screen (1 line)
   POP    DI                   ; Restore Screen Position
   ADD    DI,160               ; Bump by 1 line
   PUSH   DI                   ; Save it
   DEC    BX                   ; Decrease Line Count
   JNZ    PUT_BOX              ; Go again if more
   POP    DI                   ; Clear the stack
   MOV    DX,BOX_CUR           ; Now set Cursor into Screen Box
   CALL   SET_CURS
   MOV    AH,1                 ; Turn cursor off
   MOV    CX,2000H
   INT    10H
   MOV    DX,0                 ; Get Printer Status
   MOV    AH,2
   INT    17H
   CMP    AH,90H               ; Check Selected and not Busy
   JZ     GET_CMND             ; Printer OK so continue
   MOV    BL,FREDATT           ; FLASHING RED Attribute
   MOV    BH,CRNT_VPAGE        ; Current Screen Page
   MOV    CX,MSG_LEN           ; Characters to display
   MOV    SI,OFFSET PRT_BUSY_MSG   ; Point to message
   MOV    DX,BOX_CUR           ; Position in BOX
   CALL   PRT_MSG              ; Display message
QUIT_CHAR:
   MOV    AH,0                 ; Ask for Character
   INT    16H
   CMP    AL,ESC               ; Escape?
   JNZ    QUIT_CHAR            ; No - so ask again
   MOV    BL,NORMATT           ; Normal Attribute
   MOV    BH,CRNT_VPAGE        ; Current Screen Page
   MOV    CX,MSG_LEN           ; Number of characters
   MOV    DX,BOX_CUR           ; Position in BOX
   CALL   SET_CURS             ; Set the Cursor
   MOV    AH,9                 ; Display CX characters
   MOV    AL,' '               ; Make them spaces
   INT    10H
   JMP    QUIT                 ; Quit

;================================================

GET_CMND:
   CALL   GET_CHAR             ; Get a Character from Keyboard
   CMP    AL,CR                ; Is it CR?
   JZ     QUIT                 ; Yes - so quit
   CMP    AL,ESC               ; Is it Escape?
   JZ     QUIT                 ; Yes - so quit
   AND    AL,0DFH              ; Convert to Upper Case
   CMP    AL,'R'               ; Is it 'R'?
   JNZ    GC1                  ; No - so continue
   MOV    SI,OFFSET PT_RESET   ; Point to LF character
   MOV    CX,2                 ; Character count
   JMP    GCPRINT              ; Go and LPRINT
GC1:
   CMP    AL,'L'               ; Is it 'L'?
   JNZ    GC2                  ; No - so continue
   MOV    SI,OFFSET LIN_FEED   ; Point to LF character
   MOV    CX,1                 ; Character count
   JMP    GCPRINT              ; Go and LPRINT
GC2:
   CMP    AL,'F'               ; Is it 'F'?
   JNZ    GC3                  ; No - so continue
   MOV    SI,OFFSET FRM_FEED   ; Point to FF character
   MOV    CX,1                 ; Character count
   JMP    GCPRINT              ; Go and LPRINT
GC3:
   CMP    AL,'P'               ; Is it 'P'?
   JNZ    GC4                  ; No - so continue
   MOV    SI,OFFSET PICA       ; Point to PICA sequence
   MOV    CX,2                 ; Character count
   JMP    GCPRINT              ; Go and LPRINT
GC4:
   CMP    AL,'M'               ; Is it 'M'?
   JNZ    GET_CMND             ; No - so go again
   MOV    SI,OFFSET ELITE      ; Point to ELITE sequence
   MOV    CX,2                 ; Character count

GCPRINT:
   CALL   LPRINT               ; Go and Print string
   JMP    GET_CMND             ; Go again

;================================================

QUIT:                          ; Prepare to restore screen
   MOV    SI,OFFSET BOX_BUF    ; Point SI to Buffer
   MOV    DI,BOX_POS           ; Point DI to Screen
   PUSH   DI                   ; Save DI
   MOV    BX,BOX_LEN           ; Set line count
GET_BOX:
   MOV    CX,BOX_WID           ; Set column count
   CALL   SWAP                 ; Swap 1 line
   POP    DI                   ; Restore screen position
   ADD    DI,160               ; Bump by 1 line
   PUSH   DI                   ; Save it
   DEC    BX                   ; Decrement line count
   JNZ    GET_BOX              ; Go again
   POP    DI                   ; Clear stack
EXIT:

   MOV    DX,CRNT_CUR_POS      ; Reset original cursor position
   CALL   SET_CURS
   MOV    CX,CRNT_CUR_MODE     ; Reset original cursor type
   MOV    AH,1
   INT    10H
   MOV    BYTE PTR PROG_FLAG,0; Mark PPOP as inactive
   POP    DI                   ; Restore registers
   POP    SI
   POP    DX
   POP    CX
   POP    DS
   POP    AX
INT_RET:
   POP    ES
   POP    BX
   IRET                        ; Return from INT 9 call

MAIN ENDP
```

```
;=================================================
;           Subroutines
;=================================================
SBRS PROC NEAR

SET_CURS:
   MOV     BH,CRNT_VPAGE        ; Get current Video Page
   MOV     AH,2                 ; Set cursor according to
   INT     10H                  ; contents of DX
   RET

;=================================================

GET_CHAR:
   MOV     AH,0                 ; Collect character
   INT     16H                  ; from keyboard into AL
   RET

;=================================================

PRT_MSG:
   PUSH    CX                   ; Save loop count
   CALL    SET_CURS             ; Set cursor from DX
   MOV     CX,1                 ; Send 1 character
   MOV     AH,9                 ; and attribute (in BL)
   MOV     AL,BYTE PTR CS:[SI]  ; to screen at cursor
   INT     10H
   INC     DX                   ; Bump cursor
   INC     SI                   ; Bump message pointer
   POP     CX                   ; Restore loop count
   LOOP    PRT_MSG              ; Go again CX times
   RET

;=================================================

LPRINT:
   MOV     DX,0                 ; Select Printer 1
   MOV     AH,0                 ; Print character in AL
   MOV     AL,CS:[SI]           ; Get character to print
   INT     17H                  ; Print it
   INC     SI                   ; Bump Pointer
   LOOP    LPRINT               ; Go again CX times
   RET

;=================================================

SWAP:




   PUSH    BX                   ; Save line count
   MOV     DX,CS:PORT_ADD       ; Get Video Controller Address
   CLI                          ; Stop interrupts for next bit
WAIT00:
   IN      AL,DX                ; Read status
   TEST    AL,1                 ; Check Video Access bit
   JNZ     WAIT00               ; Loop until access denied
WAIT01:
   IN      AL,DX                ; Read status
   TEST    AL,1                 ; Check Video Access bit
   JZ      WAIT01               ; Loop until access allowed
   MOV     BX,ES:[DI]           ; NOW access screen (READ)
   XCHG    DS:[SI],BX           ; Exchange words
WAIT02:
   IN      AL,DX                ; Read status
   TEST    AL,1                 ; Check Video Access bit
   JNZ     WAIT02               ; Loop until access denied
WAIT03:
   IN      AL,DX                ; Read status
   TEST    AL,1                 ; Check Video Access bit
   JZ      WAIT03               ; Loop until access allowed
   MOV     ES:[DI],BX           ; NOW access screen (WRITE)
   STI                          ; Re-enable interrupts
   INC     SI                   ; Bump buffer pointer
   INC     SI                   ; to next word
   INC     DI                   ; Bump screen pointer
   INC     DI                   ; to next screen position
   LOOP    WAIT00               ; Go again CX times
   POP     BX                   ; Restore line count
   RET

SBRS ENDP
```

```
;=================================================
;    Program Installation Code
;=================================================

INST PROC NEAR

INSTALL:
   LEA     DX,SIGN_ON           ; Display Sign on Message
   MOV     AX,900H
   INT     21H
   MOV     SI,OFFSET SCNBOX     ; Point SI to Screen Box
   MOV     CX,BOX_WID*BOX_LEN   ; Width and Length of Screen Box
   MOV     DI,OFFSET BOX_BUF    ; Position of Buffer
   MOV     AH,NORMATT           ; Background Color for Box
SETUP:
   MOV     AL,[SI]              ; Set up Buffer with message
   MOV     [DI],AX              ; interleaved with attribute bytes
   INC     SI                   ; Move source (SI) one byte
   INC     DI                   ; Move destination (DI) one word
   INC     DI
   LOOP    SETUP                ; Go again for whole box
   MOV     AH,35H               ; Collect INT 9 Vector
   MOV     AL,9
   INT     21H
   MOV     OLD_INT9_OFF,BX      ; Save Offset and
   MOV     OLD_INT9_SEG,ES      ; Segment
   LEA     DX,NEW_INT9          ; Set our NEW_INT9 start address
   MOV     AH,25H               ; as INT 9 Vector
   MOV     AL,9
   INT     21H
   MOV     DX,OFFSET PROTECTOR  ; Set protect limit
   INT     27H                  ; Terminate and stay resident



;=================================================
;      Message and Data Area
;=================================================

SIGN_ON   DB   'BATES Associates - '
          DB   'Pop-Up Printer Controller  Version 1.10$'

; Screen Box is 11 lines high by 23 characters wide.
; Cursor rest position is at line 10 col 8 of box.

SCNBOX  DB   '                       ';
        DB   '  Printer Controller   ';
        DB   '                       ';
        DB   '  R - Reset Printer    ';
        DB   '  L - Line Feed        ';
        DB   '  F - Form Feed        ';
        DB   '  P - Pica Size        ';
        DB   '  E - Elite Size       ';
        DB   '                       ';
        DB   '                       ';
        DB   '                       ';

PRT_BUSY_MSG   DB   'Printer not ready'

LIN_FEED       DB   LF          ; Line Feed Character
FRM_FEED       DB   FF          ; Form Feed Character
PT_RESET       DB   ESC,'@'     ; Reset sequence
PICA           DB   ESC,'P'     ; Set to PICA Size
ELITE          DB   ESC,'M'     ; Set to ELITE Size

;=================================================
;      Un-initialised Data Area
;=================================================

PROG_FLAG      DB   0
CRNT_VPAGE     DB   0
PORT_ADD       DW   00
CRNT_CUR_MODE  DW   00
CRNT_CUR_POS   DW   00
CURSOR_TYPE    DW   00
VPAGE_OFFSET   DW   00
OLD_INT9_OFF   DW   00
OLD_INT9_SEG   DW   00
BOX_BUF        DB   0

PROTECTOR      EQU  $+(BOX_WID*BOX_LEN*2)

INST  ENDP
CODE  ENDS          ; End of the CODE SEGMENT

END   START         ; End of program. Instruct assembler to start
                    ; execution at the label, START:
```

(continued from page 105)

the old interrupt 9 can be called as an ordinary subroutine, and the Iret instruction will simply pop the flags back when it returns. The normal work of interrupt 9 having been completed, BX and ES are saved on the stack. ES can now be pointed to the data segment at location 40:0hex and the program checks the bytes at offsets 17hex and 18hex, the two bytes that store the state of various keys.

If either the Alt or the Caps Lock key is not pressed, the program jumps via Quitstep to the end of the routine where the ES and BX registers are restored, and an Iret is executed to allow processing to continue. If they are both pressed, the program checks to see if the routine is active by looking at the contents of the Prog__Flag byte. If it is 1 then the program is active and it quits as before.

If Prog__Flag contains a zero the program can continue by saving all the registers and ensuring that the DS register points into the current code segment. The program must also be marked as active so that future interrupts will bypass it.

The next task is to get a couple of video addresses that will be needed later. The first is the address of the current video controller chip, which is stored at offset 63hex into the data segment; the second is the number of the current display page, stored at offset 62hex. Both these addresses must be stored in the program's own data area. Details of the current cursor position and type are collected by using function 3 of interrupt 10hex, and these too are stored in the data area.

On the assumption that a colour monitor is in use, the program moves the address of colour

(continued on page 109)

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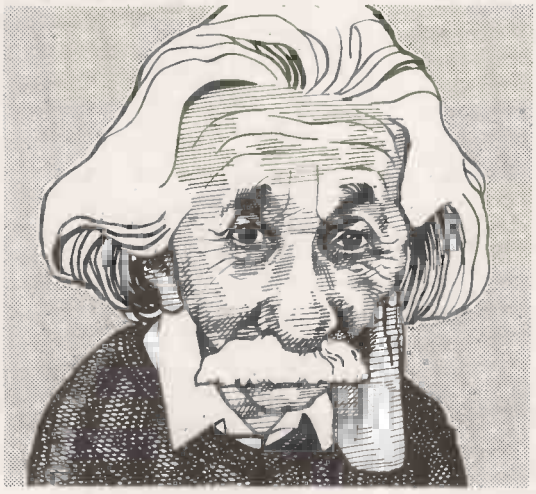

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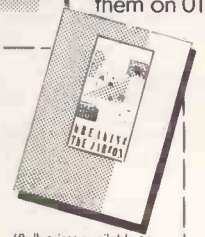

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PPOP. DATA FOR BASIC LOADER

```
Line  1   233, 228,   1, 233, 130,   1, 251, 156,  46, 255, 1534
Line  2    30, 126,   4,  83,   6, 187,  84,   0, 142, 195,  837
Line  3    38, 246,   6,  23,   0,   8, 116, 231,  38, 246,  952
Line  4     6,  24,   0,  64, 116, 223,  38, 128,  54,  23,  676
Line  5     0,  64,  46, 128,  62, 114,   4,   0, 117, 209,  744
Line  6    80,  30,  81,  82,  86,  87, 140, 203, 142, 219, 1150
Line  7    46, 198,   6, 114,   4,   1, 144,  38, 139,  22,  712
Line  8    99,   0, 131, 194,   6, 137,  22, 116,   4,  38,  747
Line  9   138,  62,  98,   0, 136,  62, 115,   4, 180,   3,  798
Line 10   205,  16, 137,  14, 118,   4, 137,  22, 120,   4,  777
Line 11   184,   0, 184, 199,   6, 122,   4,   7,   6,  38,  750
Line 12   139,  30,  16,   0, 129, 227,  48,   0, 131, 251,  971
Line 13    48, 117,  23, 184,   0, 176, 199,   6, 122,   4,  879
Line 14    12,  11, 129,  62, 118,   4,   7,   6, 117,   6,  472
Line 15   199,   6, 118,   4,  12,  11,  80,  38, 161,  78,  707
Line 16     0,   7, 163, 124,   4, 190, 130,   4, 191, 248, 1061
Line 17     3,   3,  62, 124,   4,  87, 187,  11,   0, 185,  666
Line 18    23,   0, 232,  12,   1,  95, 129, 199, 160,   0,  851
Line 19    87,  75, 117, 241,  95, 186,  31,  15, 232, 204, 1283
Line 20     0, 180,   1, 185,   0,  32, 205,  16, 186,   0,  805
Line 21     0, 180,   2, 205,  23, 128, 252, 144, 116,  50, 1100
Line 22   179, 207, 138,  62, 115,   4, 185,  17,   0, 190, 1097
Line 23    89,   4, 186,  31,  15, 232, 181,   0, 180,   0,  918
Line 24   205,  22,  60,  27, 117, 248, 179,  31, 138,  62, 1089
Line 25   115,   4, 185,  17,   0, 186,  31,  15, 232, 144,  929
Line 26     0, 180,   9, 176,  32, 205,  16, 235,  81, 144, 1078
Line 27   232, 141,   0,  60,  13, 116,  73,  60,  27, 116,  838
Line 28    69,  36, 223,  60,  82, 117,   9, 190, 108,   4,  898
Line 29   185,   2,   0, 235,  50, 144,  60,  76, 117,   9,  878
Line 30   190, 106,   4, 185,   1,   0, 235,  37, 144,  60,  962
Line 31    70, 117,   9, 190, 107,   4, 185,   1,   0, 235,  918
Line 32    24, 144,  60,  80, 117,   9, 190, 110,   4, 185,  923
Line 33     2,   0, 235,  11, 144,  60,  77, 117, 187, 190, 1023
Line 34   112,   4, 185,   2,   0, 232,  91,   0, 235, 176, 1037
Line 35   190, 130,   4, 191, 248,   3,  87, 187,  11,   0, 1051
Line 36   185,  23,   0, 232,  87,   0,  95, 129, 199, 160, 1110
Line 37     0,  87,  75, 117, 241,  95, 139,  22, 120,   4,  900
Line 38   232,  22,   0, 139,  14, 118,   4, 180,   1, 205,  915
Line 39    16, 198,   6, 114,   4,   0,  95,  94,  90,  89,  706
Line 40    31,  88,   7,  91, 207, 138,  62, 115,   4, 180,  923
Line 41     2, 205,  16, 195, 180,   0, 205,  22, 195,  81, 1101
Line 42   232, 238, 255, 185,   1,   0, 180,   9,  46, 138, 1284
Line 43     4, 205,  16,  66,  70,  89, 226, 237, 195, 186, 1294
Line 44     0,   0, 180,   0,  46, 138,   4, 205,  23,  70,  666
Line 45   226, 243, 195,  83,  46, 139,  22, 116,   4, 250, 1324
Line 46   236, 168,   1, 117, 251, 236, 168,   1, 116, 251, 1545
Line 47    38, 139,  29, 135,  28, 236, 168,   1, 117, 251, 1142
Line 48   236, 168,   1, 116, 251,  38, 137,  29, 251,  70, 1297
Line 49    70,  71,  71, 226, 221,  91, 195, 141,  22,  33, 1141
Line 50     3, 184,   0,   9, 205,  33, 190,  92,   3, 185,  904
Line 51   253,   0, 191, 130,   4, 180,  31, 138,   4, 137, 1068
Line 52     5,  70,  71,  71, 226, 247, 180,  53, 176,   9, 1108
Line 53   205,  33, 137,  30, 126,   4, 140,   6, 128,   4,  813
Line 54   141,  22,   6,   1, 180,  37, 176,   9, 205,  33,  810
Line 55   186, 125,   6, 205,  39,  66,  65,  84,  69,  83,  928
Line 56    32,  65, 115, 115, 111,  99, 105,  97, 116, 101,  956
Line 57   115,  32,  45,  32,  80, 111, 112,  45,  85, 112,  769
Line 58    32,  80, 114, 105, 110, 116, 101, 114,  32,  67,  871
Line 59   111, 110, 116, 114, 111, 108, 108, 101, 114,  32, 1025
Line 60    32,  86, 101, 114, 115, 105, 111, 110,  32,  49,  855
Line 61    46,  49,  48,  36, 201, 205, 205, 205, 205, 205, 1405
Line 62   205, 205, 205, 205, 205, 205, 205, 205, 205, 205, 2050
Line 63   205, 205, 205, 205, 205, 205, 187, 186,  32,  80, 1715
Line 64   114, 105, 110, 116, 101, 114,  32,  67, 111, 110,  980
Line 65   116, 114, 111, 108, 108, 101, 114,  32,  32, 186, 1022
Line 66   199, 196, 196, 196, 196, 196, 196, 196, 196, 196, 1963
Line 67   196, 196, 196, 196, 196, 196, 196, 196, 196, 196, 1960
Line 68   196, 196, 182, 186,  32,  82,  32,  45,  32,  82, 1065
Line 69   101, 115, 101, 116,  32,  80, 114, 105, 110, 116,  990
Line 70   101, 114,  32,  32,  32, 186, 186,  32,  76,  32,  823
Line 71    45,  32,  76, 105, 110, 101,  32,  70, 101, 101,  773
Line 72   100,  32,  32,  32,  32,  32,  32,  32, 186, 186,  696
Line 73    32,  70,  32,  45,  32,  70, 111, 114, 109,  32,  647
Line 74    70, 101, 101, 100,  32,  32,  32,  32,  32,  32,  564
Line 75    32, 186, 186,  32,  80,  32,  45,  32,  80, 105,  810
Line 76    99,  97,  32,  83, 105, 122, 101,  32,  32,  32,  735
Line 77    32,  32,  32,  32, 186, 186,  32,  69,  32,  45,  678
Line 78    32,  69, 108, 105, 116, 101,  32,  83, 105, 122,  873
Line 79   101,  32,  32,  32,  32,  32,  32, 186, 199, 196,  874
Line 80   196, 196, 196, 196, 196, 196, 196, 196, 196, 196, 1960
Line 81   196, 196, 196, 196, 196, 196, 196, 196, 196, 196, 1960
Line 82   182, 186,  32,  32,  32,  32,  32,  32,  32,  32,  624
Line 83    32,  32,  32,  32,  32,  32,  32,  32,  32,  32,  320
Line 84    32,  32,  32, 186, 200, 205, 205, 205, 205, 205, 1507
Line 85   205, 205, 205, 205, 205, 205, 205, 205, 205, 205, 2050
Line 86   205, 205, 205, 205, 205, 205, 188,  80, 114, 105, 1717
Line 87   110, 116, 101, 114,  32, 110, 111, 116,  32, 114,  956
Line 88   101,  97, 100, 121,  10,  12,  27,  64,  27,  80,  639
Line 89    27,  77,   0,   0,   0,   0,   0,   0,   0,   0,  104
```

(continued from page 107)

RAM into AX and the settings for a colour cursor into the Cursor_Type word. Once again it accesses the data area for details of current hardware at offset 10hex. The program checks two bits of the data to see if a colour monitor really is being used. If so, it continues at Process01; otherwise it resets the address in AX to mono RAM, and the cursor type to a mono setting.

If memory other than page 1 of colour video is being used, the video processor will be accessing memory which is offset some distance into the colour RAM area. This number is read into AX from offset 4Ehex in the data segment. Since AX was first pushed on to the stack, this value for the video-RAM address can now be popped into the ES register, which will be used for all direct accesses to the screen memory from now on. The video page offset amount is stored in the Vpage_Offset word.

SHOW BOX

The program is now ready to pop the box on to the screen. The first step is to point the SI register to the start of the Box_Buf message and the DI register to the relevant point on the screen. Any offset from Vpage_Offset must be added in case the machine is not using video page zero. DI is then saved on the stack and the number of lines is put into BX to allow one line to be transferred at a time.

Execution has now reached the Put_Box label in the program. It puts the number of characters per line into CX and then calls the Swap routine. This swaps a line of characters between the screen and the Box_Buf area each time it is called. Once one line has been swapped, the program must restore the starting value of DI and increment it by 160 bytes or one whole screen line. The process of saving and decrementing the line count in BX can be repeated until BX is empty.

Once all the lines have been swapped the value of DI must be cleared from the stack. Now the Set_Curs routine can be used to position the cursor inside the box on the screen and then turn the cursor off.

The next part of the program checks the printer condition by using the printer status function 2 of interrupt 17hex. It returns a byte of information indicating whether the printer is on-line, busy, etc. This byte is checked and if the printer is available the program continues at Get_Cmnd. If the printer is not available a message must be displayed to that effect.

First the Fredatt attribute is loaded into BL and the current page number is loaded into BH. Then the number of characters to display is loaded into CX, SI is set to point to the Prt_Busy_Msg message and the cursor position is put into DX. The program now calls the Prt_Msg subroutine to display the message in flashing red in the correct position in the box on the screen.

The program is now at Quit_Char in the program, where it asks for the Escape key to be pressed before the program can terminate. Once the Escape key has been pressed the screen must be restored before exiting.

A minor problem here is that the screen and Box_Buf must be swapped back to clear the "Printer not ready" message; otherwise Box_Buf will be left containing this message after swapping is completed.

CHARACTER DISPLAY

Fortunately, this is easily accomplished by using function 9 of interrupt 10hex, which allows up to 255 characters to be displayed from any point on the screen. After positioning the cursor, the attribute and page number are loaded as usual into BX, the number of characters into CX and finally the character — in this case a space — into AL. This function will then display [CX] spaces on the screen at the appropriate place, and with the appropriate attributes. The program continues to Quit where the box will be swapped back off the screen.

If the printer checks out as available, processing will branch to the Get_Cmnd label. This is where you can make changes to accommodate differing printer requirements. At Get_Cmnd, the Get_Char routine is called to collect a character from the keyboard. Return or Escape at this point will cause the program to terminate. Other characters are checked to see if they are acceptable command characters.

The checking process is in the form of the chain GC1 to GC4. If a particular section finds that the character is a valid command, then SI and CX are loaded accordingly before processing jumps out of the chain to Gcprint. Here the relevant characters are sent to the printer via the Lprint subroutine. If a character is not valid the processing returns to Get_Cmnd from the end of the chain at GC4.

This method makes it comparatively easy to add more command characters, simply by adding more links into the chain and more strings of code sequences to send to the printer. In this simple version I have included just the five sequences noted at Lin_Feed, Frm_Feed, Pt_Reset, Pica and Elite.

On entry into Lprint, SI is set to point at the appropriate string of characters, and CX has the number of characters to be sent. Once the call to Lprint has completed, processing returns to Get_Cmnd for the next command character. This will continue until Return or Esc is pressed to terminate the program by a jump to Quit.

(continued on next page)

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Between Quit and Exit, exactly the same process is performed as at Put_Box and the contents of the screen and Box_Buf are swapped. The final steps necessary to put things back as they were are restoration of the cursor position and type, and then marking Prog_Flag to indicate that the program is no longer active. The registers can then be restored and the program exits via an Iret instruction to whichever routine called it in the first place.

The Set_Curs, Get_Char, Lprint and Prt_Msg routines are all very simple, and should require no further explanation than that provided by the comments in the listing. The Swap routine uses a special technique to prevent snow on IBM CGA screens. When accessing the screen memory directly there is a clash of interests between the main processor and the video processor. On CGA systems this will cause random flashes on the screen as the two processors access the same area of memory at the same time.

The effect is avoided by making the main processor wait until the video processor is not accessing memory. The video processor is constantly scanning the screen RAM area and sending the data to the monitor, only pausing during the time that the monitor is in vertical retrace, so the timing of this operation is quite critical.

The video processor has a number of registers which can be accessed from within the program, one of which gives an indication of when the vertical retrace is taking place. It takes the form of a single bit which constantly switches between 0 and 1. When this bit is 1, the video processor is accessing memory normally; when it is 0, vertical retrace is taking place. To locate the earliest point at which the 0 period starts it is necessary first to wait until it switches to 1, and then wait for the switch back to 0. Once this happens, there is just time to sneak in and access one word of screen memory data without causing snow before the video processor comes along again.

The actual swap process works as follows. The first step is to save the line count BX on the stack and load the port address of the video processor status register into DX. Since the next piece of coding is so timing-sensitive, the interrupt flag CLI is cleared to prevent software interrupt from occuring. The port is now read and the access bit is tested.

The program loops until the bit becomes a 1. Once this has happened, the program goes to the next loop, which waits in a similar fashion for the bit to become 0. When that occurs it immediately reads the required word from screen memory.

The screen word is now in the BX register and can be exchanged with the corresponding word in Box_Buf, putting the original screen word in Box_Buf and the original Box_Buf word into BX. Processing continues, with another couple of wait loops similar to the first, until the contents of BX can be written into screen memory.

BUILT-IN ROUTINE

Once this is done, interrupts can be allowed to operate once again, and both the SI and DI registers are incremented to point to the next words to be transferred. The whole routine repeats until the CX register is empty, indicating that the whole line has been swapped. There is an instruction that allows direct exchange between ES:[DI] and CS:[SI], but it appears to take longer than the time allowed during vertical retrace so some snow still appears on the screen.

To create the box on the screen the program makes use of the box-graphics characters within the IBM character set. The characters are numbered from 179 to 223, and can prove extremely useful in giving a final polished appearance to the output of utility programs. If your word processor or text editor does not make special provision for these characters, they can usually be entered by holding down the Alt key while tapping out the character number on the numeric keypad.

Some printers will not reproduce these characters correctly, so your printed program listing may not display them correctly. Even on printers that do handle these characters, no difference shows between double- and single-line characters. This means that characters 201 and 218 will appear identical when printed. If you use the Basic loader you will find that the screen box appears as a natty combination of double and single lines.

All the programs in this series are available on IBM-formatted discs at a cost of £5 for each program. Each disc contains the assembler source code, the assembled program and a document file describing the operation of the code in detail. Please send your order to Jim Bates, c/o Practical Computing; cheques should be made payable to Jim Bates.

DESKTOP PUBLISHING
WITH PUBLISHING PARTNER™ ON THE ATARI ST

ATARI ST SOFTWARE

1 WHAT IS DESKTOP PUBLISHING?

Desktop Publishing is a method by which documents can be produced using a computer, software and a printer. These documents are near professional appearance and cost only a fraction of the price which you might otherwise pay to a designer, artwork studio and printer. Because the 'middle men' are eliminated from the production process, desktop publishing allows the user to retain total control over his or her documents, making last minute updates without panic and without incurring extra charges for 'rush' work.

2 WHAT CAN I USE IT FOR?

As we all make use of the printed word in one way or another in our daily lives, the applications for Desktop Publishing are all around us. If you belong to a club or society or if you run your own business, the possibilities are endless! Our list of example applications will give you some other ideas.

Advertisements	Distribution Leaflets	O/head Transparencies
Application Forms	Fayre Programmes	Personal Cards
Brochures	Invitation Cards	Personal Letterheads
Business Contracts	Invoices	Presentations
Charts & Tables	Labels	Price Lists
Club Certificates	Menus	Special Offer Leaflets
Club Newsletters	Office Forms	Technical Sheets
Dance Tickets	Order Forms	Work Estimates

3 PUBLISHING PARTNER

Publishing Partner, from SoftLogik Corp™, includes all of the features which you would expect in a good Desktop Publishing package. It combines word processing, page layout and graphics facilities all in one program, allowing you to create 'stunning' documents on your Atari ST. First you can do a rough page design and start adding blocks of copy. See how it fits. See how it looks. See how it flows onto the next page. Make some changes. Try a different type style, or a different size, or some borders, some shapes, or even some pictures. Because Publishing Partner incorporates WYSIWYG (What You See Is What You Get), you'll see instantly if your new idea works or not. The computer's screen will show you just how the page will look when it prints - no more guesswork. You can adjust fonts, character sizes and even character spacing, anytime and anywhere on the page. Watch an ordinary letter transform into a professional looking piece right before your eyes, as you experiment with mixing graphics and text. And, when you want to see a 'hard copy' of your masterpiece, just send it to any one of the printers which the program supports (the list is growing all the time).

SoftLogik Corp™

SoftLogik Corp™ was set up in the USA by Shawn Fogle and Deron Kazmaier to produce quality desktop publishing software with uncompromising power and features. Publishing Partner was developed after 1½ years of research, working with typesetters and printers and the results achieved are outstanding.

4 SIMPLE, POWERFUL, AFFORDABLE

Printing and publishing is a fairly complex business which takes years of training and experience to master. You wouldn't think so with Publishing Partner, which takes full advantage of the ST's user friendly GEM environment. It is so user friendly and easy to understand, most people find they can produce their first document without even opening the fully comprehensive 159 page manual which accompanies the program. Using the mouse to manipulate the self explanatory pull down menus and windows, you can be up and running in no time, creating a variety of documents quickly and easily. In addition, the flexibility of Publishing Partner allows you to choose between mouse or keyboard operation, whichever suits your personal preference. Although simple to use, Publishing Partner is by no means a simple program. Quite the contrary. Behind the user friendliness of GEM, lies a most complex and powerful publishing tool. The combination of Publishing Partner and Atari's powerful low-cost ST computers has brought an affordable alternative to the desktop publishing systems currently available from Atari's competitors.

5 THOUSANDS OF TYPE STYLES

This is no exaggeration. Unlike most other desktop publishing software packages, which offer you 2 or 3 different fonts, Publishing Partner gives you true flexibility of over 4,000 type styles per font. Publishing Partner offers you 14 variations of each font:

BACKSLANT	**MIRROR**	**STRIKE THROUGH**
BOLD	**OUTLINE**	**TALL**
DOUBLE U/L	**REVERSED**	**UNDERLINE**
ITALICS	**SHADOW**	**UPSIDE DOWN**
LIGHT		**WIDE**

And you can 'mix and match' any number and combination of styles to your own requirements. The total number of possible permutations is over 4,000. And that's not all, each style can be used in any one of 216 sizes in one point increments from 1 point to 216 points! All this is achievable on an unexpanded 520ST with just 512K RAM! Other competing packages require 1024K RAM just to get the larger sizes above 72 point and still can't match all of the variations available.

Publishing Partner is a trade mark of SoftLogik Corp™.

6 WORD PROCESSING

Publishing Partner contains the power and features that you would expect to find on a dedicated word processing package. In addition it includes facilities which a professional typesetting machine would offer. For example the program can cope with 216 different type sizes, with over 4,000 style variations of each one. The following are some of the facilities you will find within the capabilities of Publishing Partner:

- Adjust margins for any column
- Change block to uppercase or lowercase
- Change margin indents
- Character spacing from -128 to +127
- Copy text to and from the buffer
- GEM based
- Import and export files
- Insert and delete pages
- Justifies right/left/centred as you type
- Justifies to the character/word
- Kerning from -128 to +127
- Line spacing/leading in ½ points from -64 to +57
- Link columns together
- Macros
- Manual Hyphenation
- Merge files together
- Optional grid & ruler display
- Over 4,000 type style variations of each font
- Page numbering
- Pica, Inches or Centimetre measuring system
- Print to paper vertically or horizontally
- Read & merge any ASCII file
- Search and replace
- Tabs for charts/tables
- Unlimited headers & footers
- User definable page size
- User variable superscript/subscript characters

7 PAGE LAYOUT

Whatever you require, custom logos, unique borders, unusual letterheads etc. Publishing Partner is your solution. After all, it was specially designed by professionals who realize that there's more to your computer than just typing letters.

- Accurate to 3 decimal places
- Adjust character size from 1 to 216 points
- Auto text flow between columns
- Change columns on finished page
- Display 15%-1500% of original size
- Display actual size
- Display multiple pages/rulers/text routing
- Layout multiple columns
- Print to disk
- Set auto text routing
- Snap to guides
- Superimpose text on tint or tint on text

8 GRAPHICS

Not only can you load any Degas, N-Vision, Neochrome or digitized pictures into your Publishing Partner files, you can also enlarge or reduce them for an exact fit. Or, you can copy just a section of a picture and then paste it into your document as many times as you want. You can still go back and resize it at any time or crop it to delete unwanted areas.

- 3 types of line ends, square/rounded/pointed
- 7 types of line which are all editable.
- 7 weight lines ranging from ½pt to 6pt
- 40 fill patterns each with a border option making a total of 80 fill options
- Ability to produce separations for 2 colours
- Copy graphics to and from clipboard
- Cut, paste, copy or crop graphics
- Import graphics from third party graphic programs such as Degas, Neochrome, N-Vision or any art program that produces compatible ASCII files
- Select colours to use and print with
- Toolbox features include: Circles, ellipses, boxes, rounded corner boxes, horizontal/vertical lines, diagonal lines, polygons and free hand drawing

9 OUTSTANDING OUTPUT

Publishing Partner is a unique program with a large variety of printer drivers for both laser and dot matrix printers. Dot matrix is supported in both 80 column and 132 column mode, so you could even produce a tabloid width newspaper (11½" wide) on a wide body printer. Drivers are also available for the new technology 24 pin dot matrix printers which can give a fine resolution of 360×360 compared with laser printers at 300×300. The current drivers (included FREE with the program) are as follows with new ones being written on a weekly basis:

9 PIN DOT MATRIX (Various Res)

- Atari SMM804
- Blue Chip M120/10
- Cal Abco Legend 880
- C Itoh Prowriter
- Mannesman Spirit-80
- NEC 8023
- Panasonic KXP
- Star Gemini & SG

9 PIN DOT MATRIX (240×216 Res)

- Citizen MSP
- Epson RX/FX/EX
- Mannesman Tally MT
- Star NX/SD

18 PIN DOT MATRIX (240×288 Res)

- Okidata Microline 292
- Okidata Microline 293

24 PIN DOT MATRIX (360×180 Res)

- C Itoh C-715
- Epson LQ
- Epson SQ
- Toshiba P321

24 PIN DOT MATRIX (360×360 Res)

- NEC P6/P7
- NEC XL new series

LASER PRINTERS (300×300 Res)

- Centronics PP-8 In Epson or H.P. Laserjet mode 1½Mb RAM
- Any other H.P. Laserjet compatible with 1½Mb RAM
- QMS PS800 or Apple LaserWriter - Postscript
- Any other Postscript compatible printer

SEEING IS BELIEVING

We have already told you how powerful Publishing Partner is and how easy it is to use. However, the recipients of your finished work will only be able to gauge the package by the end results of your work. The true test of any Desktop Publishing software is in the output it produces and it is here that Publishing Partner excels. With its graphics capabilities and the thousands of type styles it produces, there is no end to the design possibilities which you can create. And, with drivers for a variety of printers, including Postscript at no extra charge, you can be sure that you will be able to output in the quality your work deserves. The output quality is truly remarkable. But don't just take our word for it. Before you go any further with your enquiries into Desktop Publishing, return the coupon below for samples of Publishing Partner's output on a variety of printers. We will also send you details and prices of each printer as well as further information on Publishing Partner and the Atari range of ST computers. We don't expect you to take our word for it. We want you to see for yourself how Publishing Partner outshines the competition. So, complete and return the coupon today. Remember, SEEING IS BELIEVING!

OFFICIAL UK VERSION

The official UK version of Publishing Partner has a pound (£) sign as a standard part of its character set. Other versions have also been imported unofficially from the USA and have a dollar ($) sign instead of a £ sign. These versions will not be supported by the UK distributors or their dealers. The UK version also contains clip art, different fonts and a full range of printer drivers. Ensure that you buy the official UK version, not an unofficial import with incorrect characters.

£139.00

(+VAT=£159.85)

Publishing Partner is available from Atari ST Dealers throughout the UK. If your local dealer does not have Publishing Partner in stock, it can be obtained by mail order (Postage & Packaging free) from:

SILICA SHOP Ltd, 1-4 The Mews, Hatherley Road, Sidcup, Kent, DA14 4DX **Tel: 01-309 1111**

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STOP BIT

●WHAT it is to be wanted. Wordplex Information Systems, an 11-year-old manufacturer of word-processing equipment, seems to have some secret attraction. Everyone and their dog has been queuing up to buy into it.

The saga began back in June, when Wordplex was trying to put together a refinancing package with Octagon Industries to inject some sorely needed capital into the manufacturer, which lost £4.5 million in the last financial year.

Just as it seemed that the deal was likely to go through, in stepped Apricot with an offer of shares or cash to shareholders. After much squabbling between the two managements, it looked as if Apricot would get its way.

But then along came Norsk Data, the highly successful Norwegian manufacturer of minicomputers, with an even better offer. At the time of writing it seemed likely that the Norsk package would be accepted by the shareholders. On the other hand, it could be time for a fourth suitor to show up.

Perhaps the biggest mystery in all this is why companies should want to buy Wordplex in the first place. Hasn't anyone realised that dedicated word processors died about five years ago? Those who haven't should look at the current Wordplex line. Its 90 Series starts with a twin-floppy machine plus daisywheel. The price — a mere £6,000. You could buy an IBM PS/2 Model 80 for that.

The explanation usually invoked is that both Apricot and Norsk want Wordplex for its user base. But this amounts to not much more than 1,500 sites in the UK and around the same abroad. It also ignores the likelihood that anyone daft enough to buy word-processing systems these days probably couldn't cope with the kind of shiny new technology Apricot and Norsk have in mind.

●The sceptically minded may be a little concerned about OS/2 — the operating system of the future, as we are continually being told. After all, it was initially launched by only one company, and many people remember the bad old days when each manufacturer seemed to have its own incompatible operating system.

However, Compaq has acted swiftly to put potential users' minds at rest. Together with Microsoft, Lotus and Ashton-Tate, Compaq held a press conference in New York on 6 July to set the record straight. America's leading clone maker was at pains to emphasise that OS/2 does not belong to the company which launched it, and that Compaq will be supporting it fully, even producing one or two extras which will be sent out to users of the OS/2 development kit.

Anyone contemplating buying equipment in the future will find this added backing for OS/2 comforting. Such wholehearted support emphasises that it is increasingly likely to form the next standard for corporate computing. What is less useful is that this press conference follows earlier comments from Compaq that what the world really wants is DOS, not OS/2, and that the latter is something of a wild goose that no one should waste time chasing.

To quote Rod Canion, president and chief executive officer of Compaq, on 28 April: "Only the users who really need the capabilities of OS/2 will switch to it. Everyone else will continue to be happy with DOS" Not much enthusiasm there — and yet by 6 July OS/2 has become "a revolutionary advance in the benefits to individuals and organisations by personal computers." It's a fast-moving world, computers.

●ICL has been doing well lately. Profits are up, and far from being propped up by its parent, STC, it is doing most of the supporting itself. A recent announcement by ICL may indicate the secret of this success.

It's all about niche markets. So your mainframes and micros aren't making much headway against Big Blue? Never mind: all you have to do is to find some nice little specialist area, and corner the market. For Britain's biggest mainframe manufacturer it's games — or to be more precise, management games. ICL has set up a joint venture with Cranfield School of Management to organise and market business games. They will include both off-the-shelf packages, bespoke games, and the running of a national management game competition. Has ICL found its true forte at last?

●Eagle-eyed readers tempted by Sir Clive Sinclair's latest piece of consumer gee-whizzery may have spotted that the advertisement for the Z-88 in our May issue is different from the one which appeared in the previous month. Cambridge Computer no longer lists its full address or invites readers to send off for goods by mail order. Instead it suggests that anyone wishing to place an order or obtain more information should ring its hotline.

The change could be the result of a complaint to the Advertising Standards Authority by an aggrieved member of the public who objected to Cambridge Computer's advertisement and its direct-mailing leaflet. The grounds for the complaint were that the ad did not include the full address and that expanding the RAM to 3Mbyte was not possible. The complainant also questioned whether the computer was available at the time, and pointed out that the ad failed to explain that there would be a delivery delay in excess of 28 days. The ASA has since upheld the complaint.

●In the sophisticated world of computing it seems that companies are prepared to put forward some very convoluted arguments to market their products. A Hampshire-based firm, CBT, claims that its Easyreader monitor could save UK companies millions of pounds, and gives figures to prove it.

The argument goes like this. An estimated 900,000 users of traditional computer VDUs suffer from eyestrain, headaches and, as a result, absent themselves from work from time to time. The cost to industry is estimated to be £12 million a year. Ordinary screens are small, and so people are forced to run off copies to see what their work looks like. The cost is estimated to be around 60p a wasted copy, not counting the cost of corrections.

The Easyreader is claimed to solve the eyestrain problem, and because its screen is A4 size and upright — just like a piece of paper — it solves the trial copies problem too. CBT says that on this basis savings could exceed £20 per week, so if only one in 10 of the estimated 900,000 screens in use in Britain today was changed over to an Easyreader, industry could save itself £1.8 million a week, that is without looking at absenteeism costs.

●Sadly we can't get round to reviewing every product that comes our way on *Practical Computing*. One of the more bizarre items that slipped through the net is Inmac's Alarm Box. It lurks on your desk under the guise of a floppy-disc storage box with a beige base and smoke-coloured lid. But once the alarm circuit is switched on and the lid is locked, moving the box will trigger off a 15 second alarm blast of 98 decibels. Would-be thieves should get a nasty surprise and the cleaner will at last have the perfect excuse for not polishing your desk.

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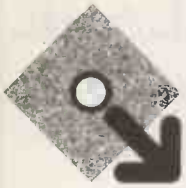

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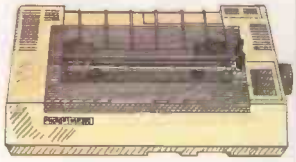

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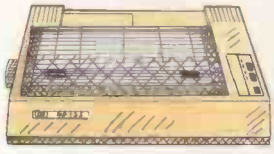

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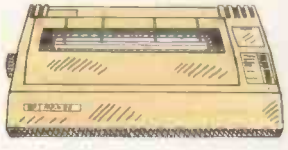

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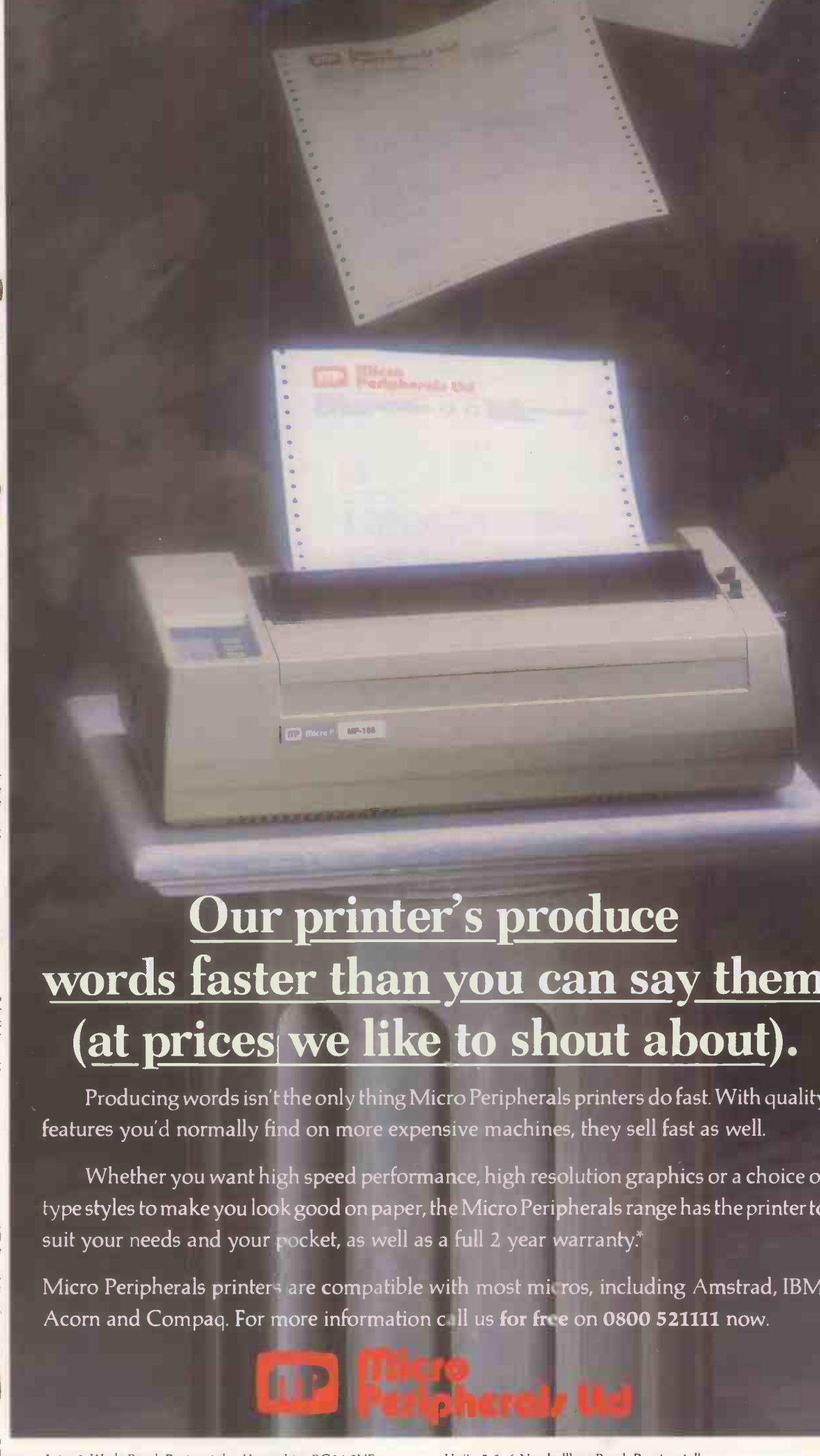

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