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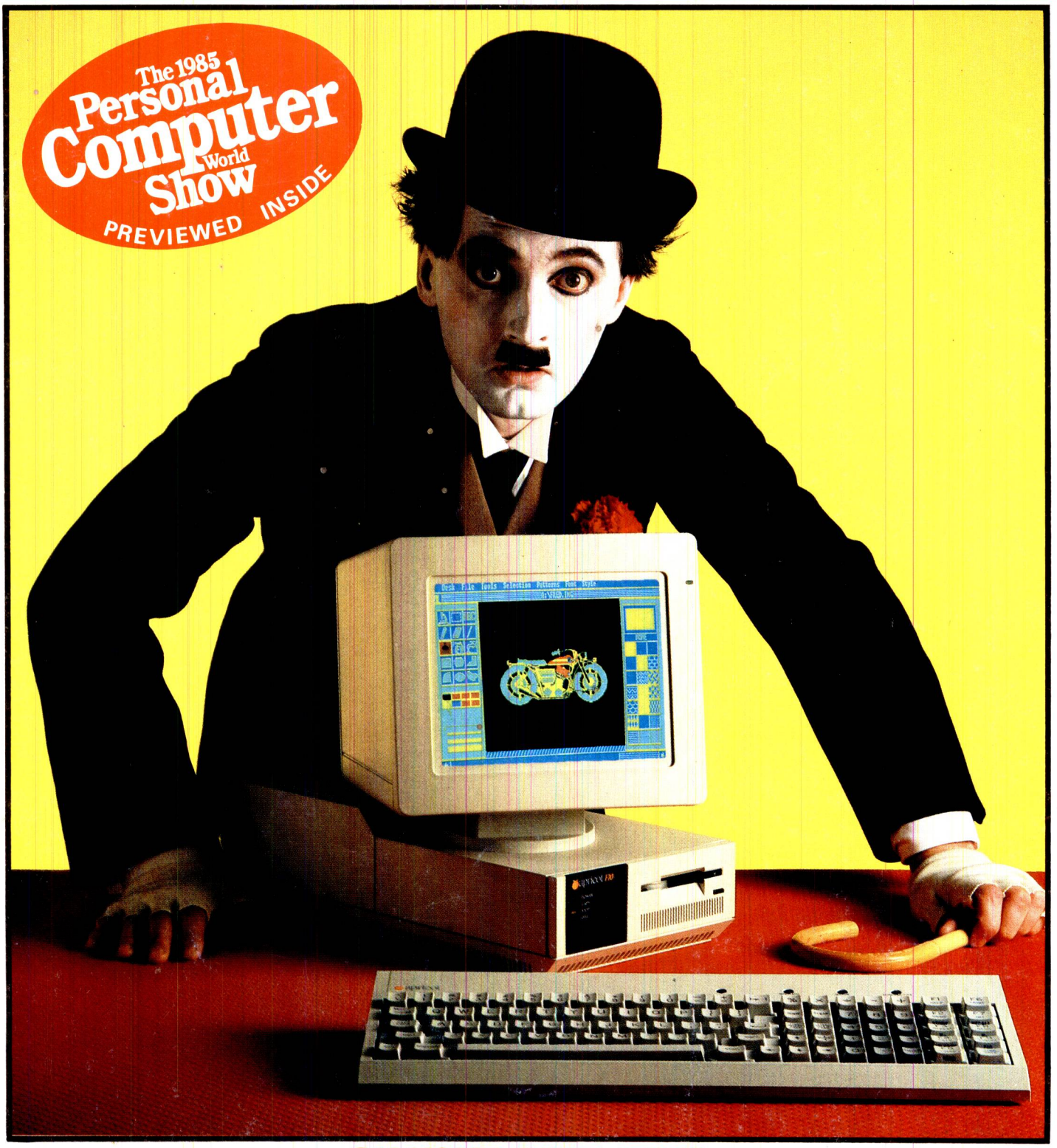

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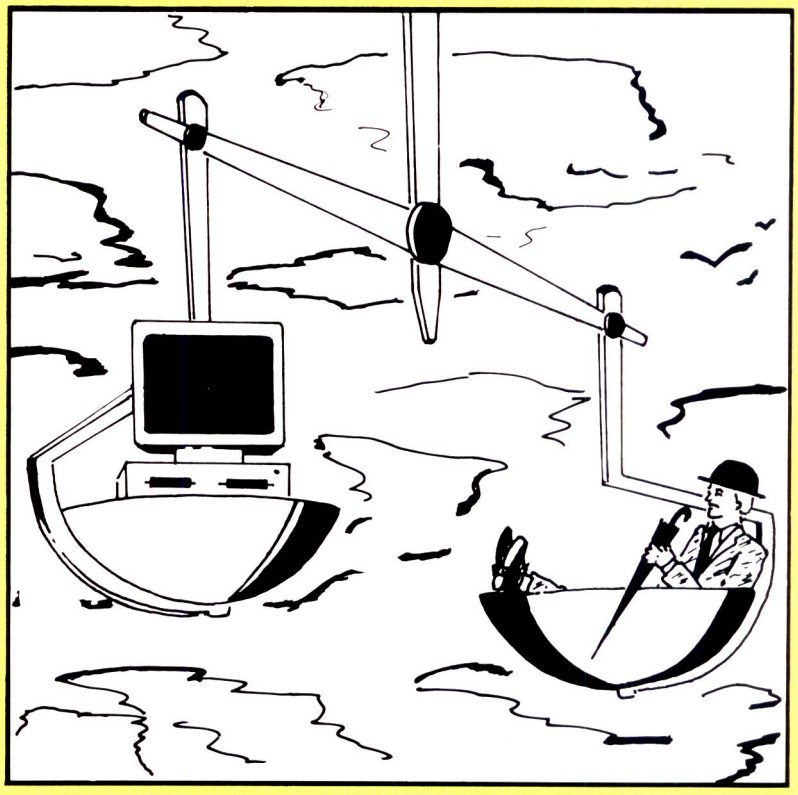

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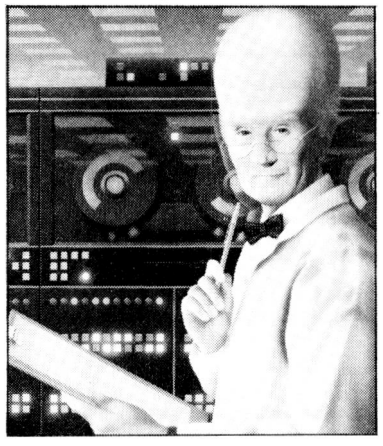

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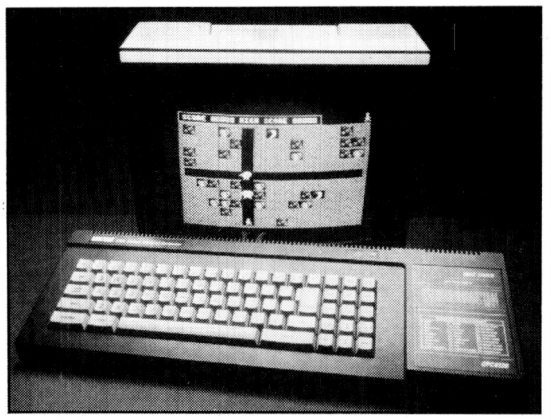

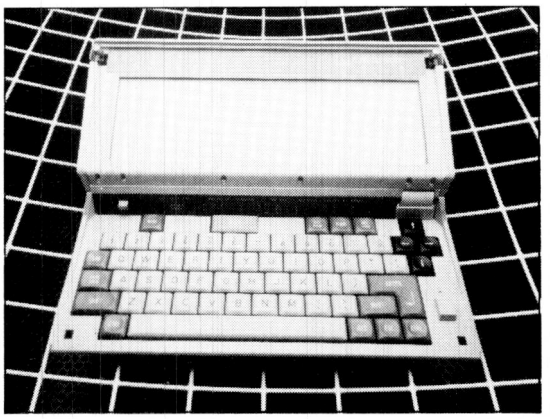

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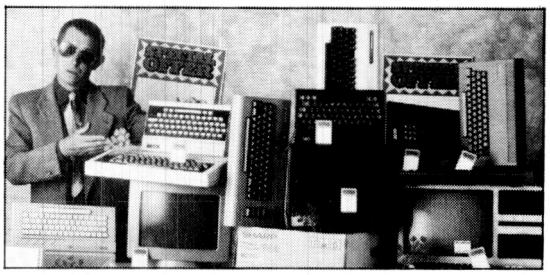

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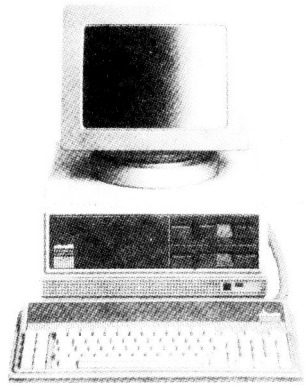

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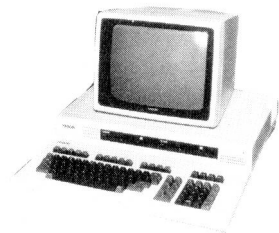

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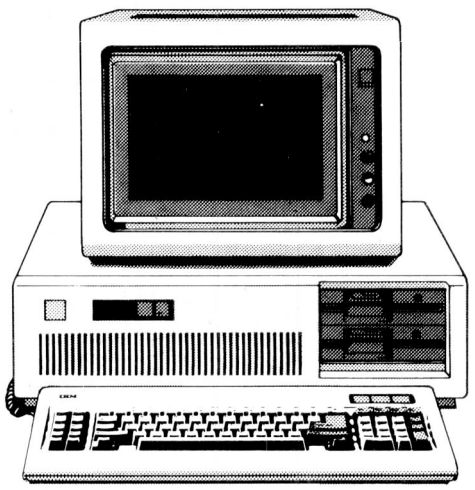

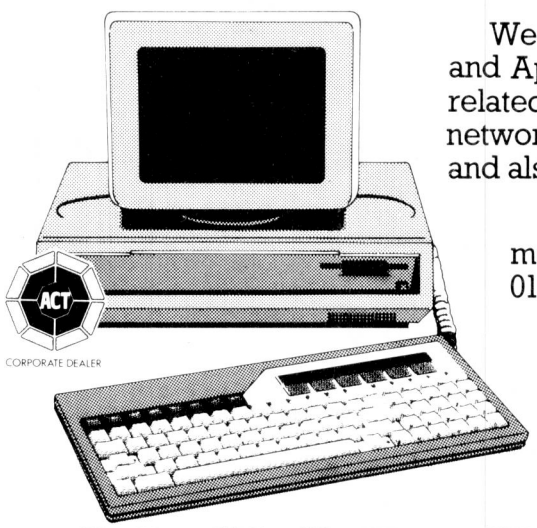

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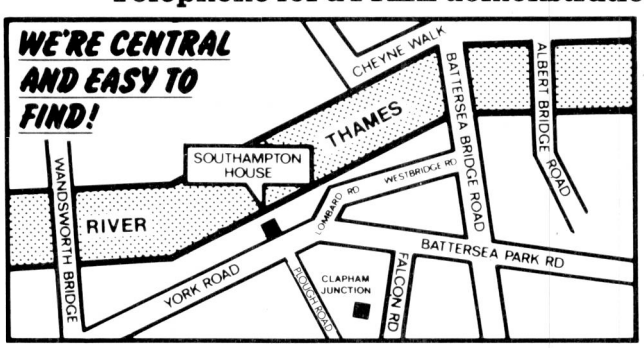

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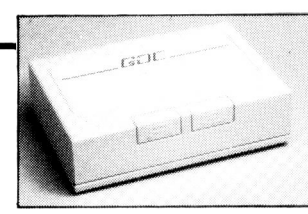
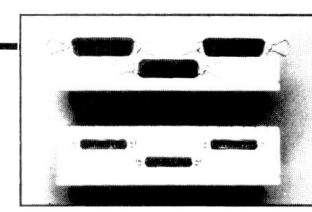

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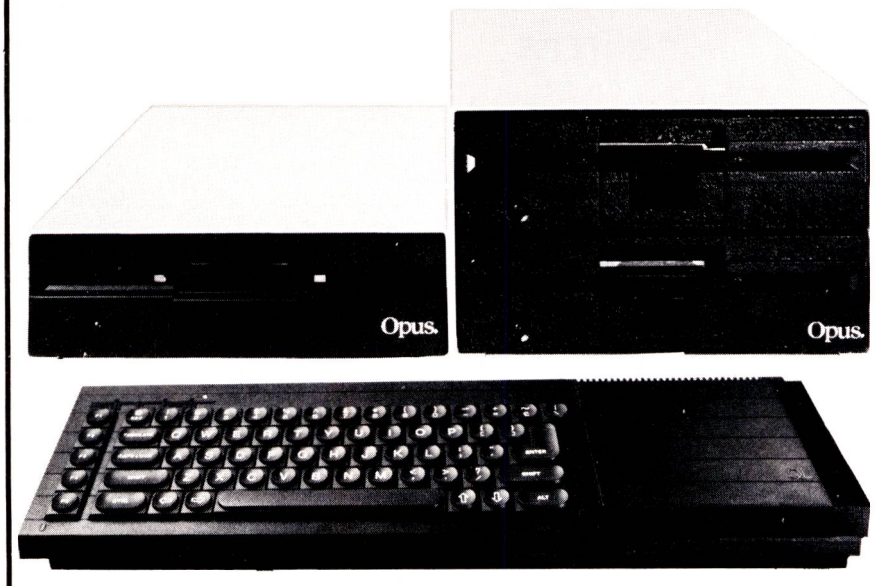

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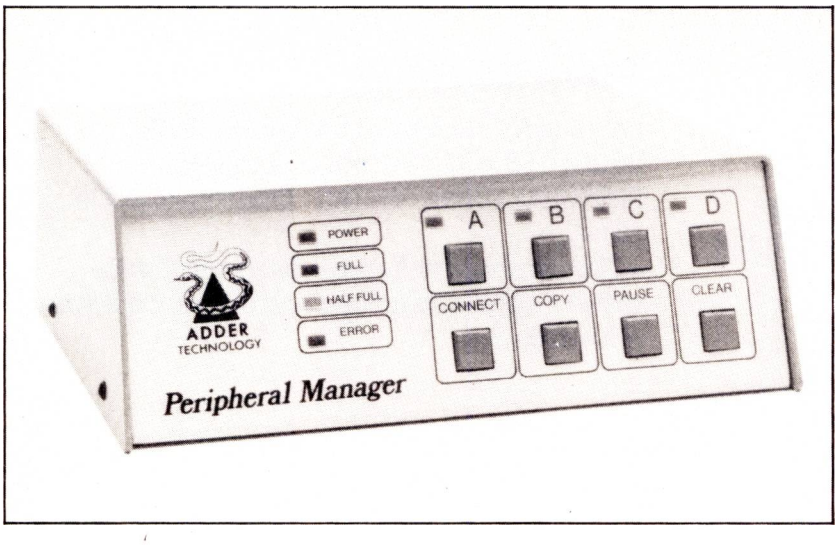

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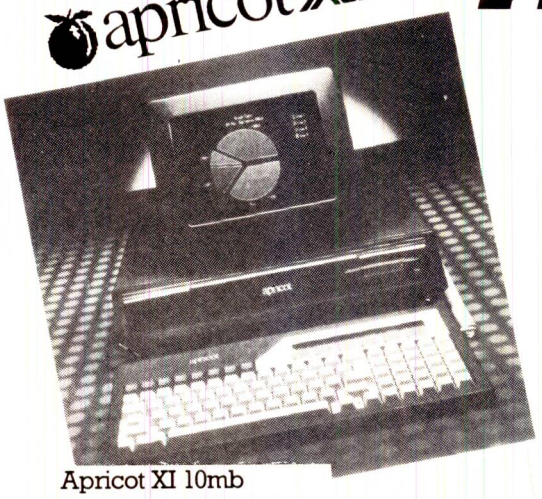

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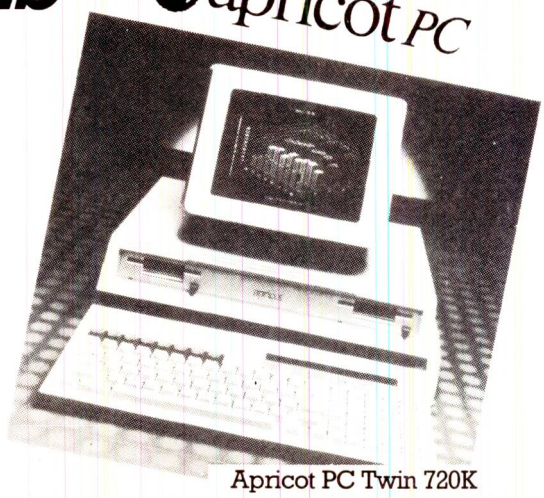

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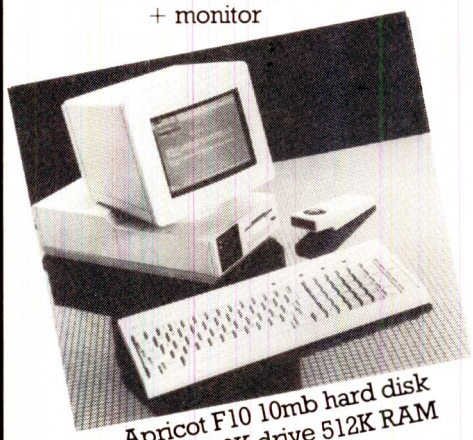

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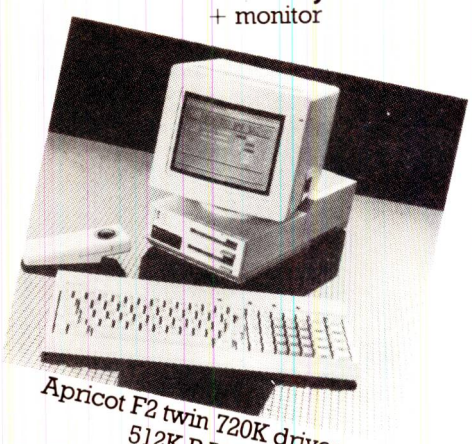

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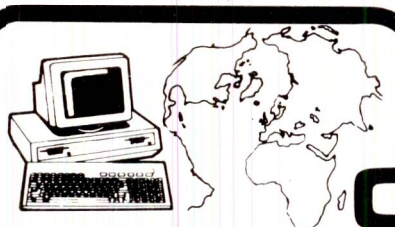

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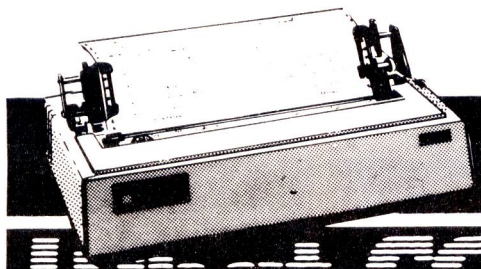

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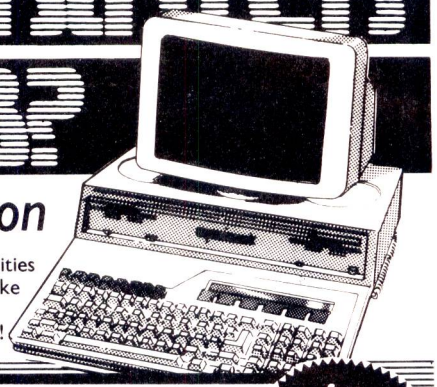

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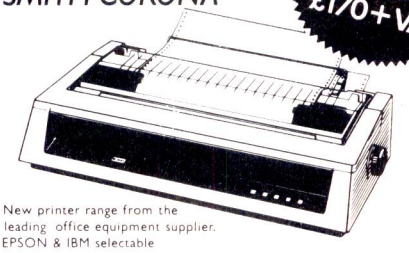

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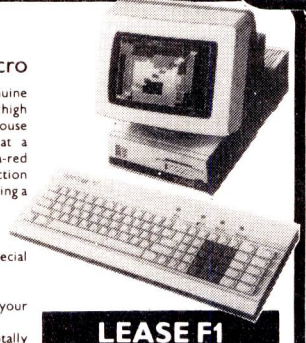

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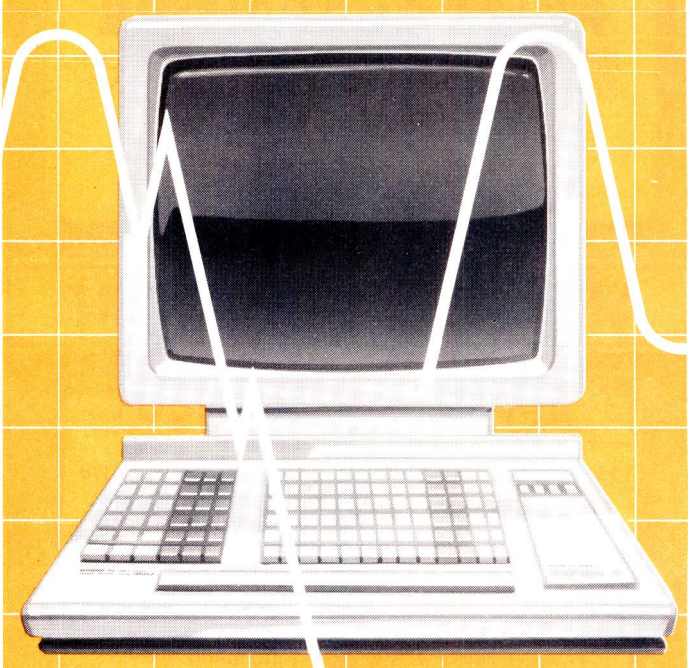

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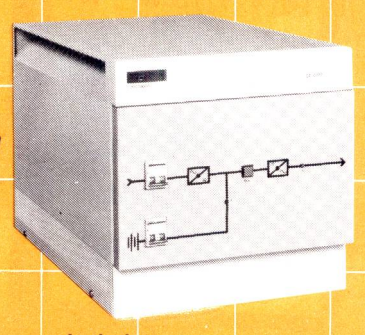

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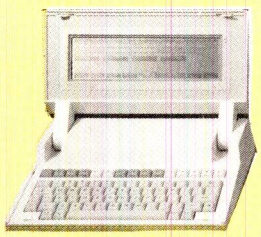

HP 110

HP 110: Uses industry standard operating system, MSDOS and is made more friendly with HP's PAM which gives easy access to the program packages. Lotus 123 and Memomaker are built into ROMs giving spreadsheets, simple graphics and note making — making it a useful tool for the executive on the move.

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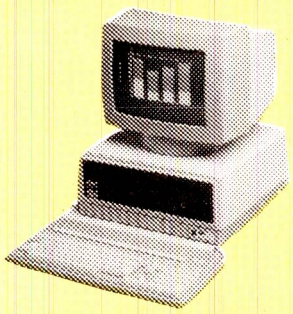

M24: Not only is it stylish but technically superior to the IBM PC. It uses the full 16 bit 8086 chip running at 8MHZ, which makes it more than twice as fast. It combines monochrome text and colour graphics, offering a 640 by 400 pixel higher resolution mode. The quality of the screen is excellent. The M24 has 128k of RAM (can be up graded to 640k RAM), serial and parallel ports, clock/calendar and reset button and is cheaper than an IBM having the same specifications.

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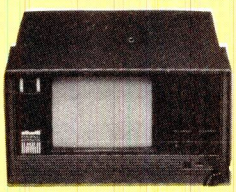
OLIVETTI M21 PORTABLE PC



M21: It is self contained with an Intel 8086-2 chip, 128k of RAM, a 9in amber screen with brightness and contrast controls, colour graphics adaptor, printer adaptor, serial RS232C port and two lockable 360K MFD 5.25in floppy disc drives. It includes a built in clock/calendar and LED indicator. The Olivetti M24 has a better screen than the IBM and runs more than twice as fast as either IBM or COMPAQ.

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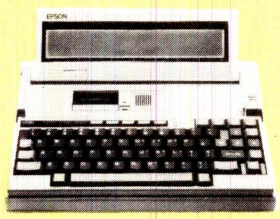
EPSON COMPUTERS & PRINTERS



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PX8: Uses CP/M operating system and has an 8 line by 80 column LCD screen. CP/M 2.2, Microsoft Basic, Wordstar, and Cardbox+ are built in ROM, with 64K RAM available

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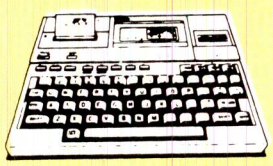
HX 20



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from £2595 inc Printer

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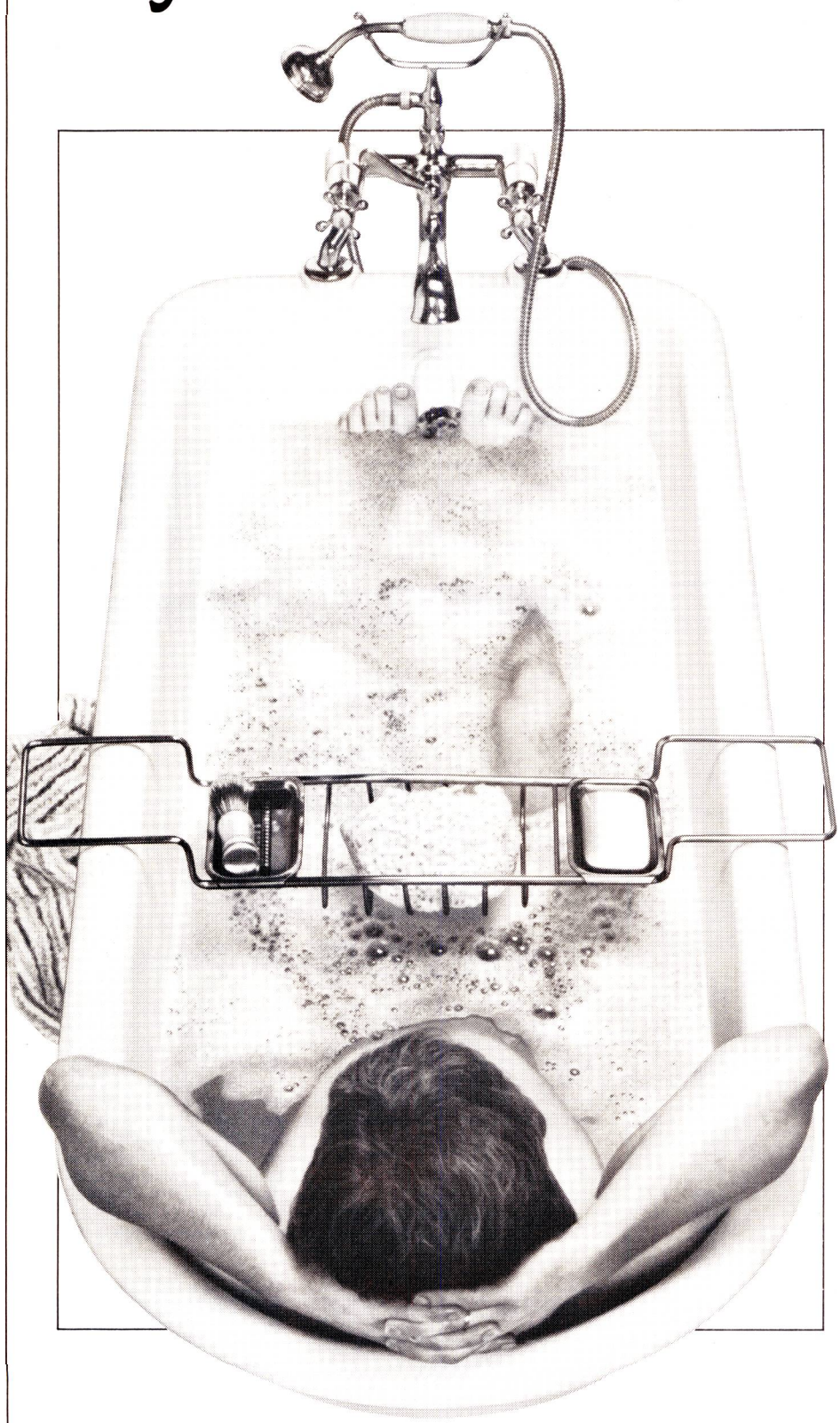

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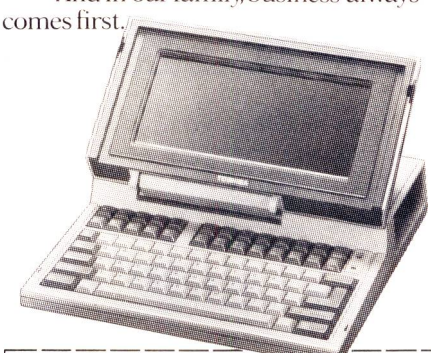

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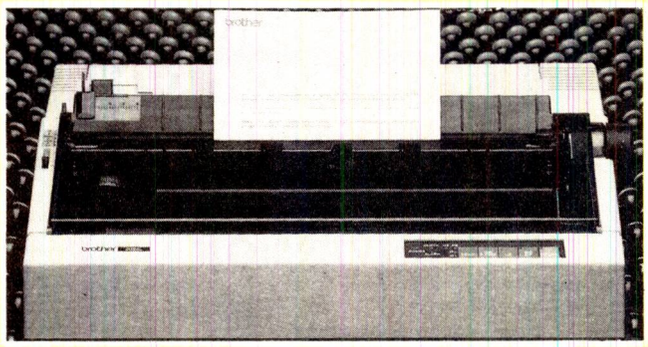

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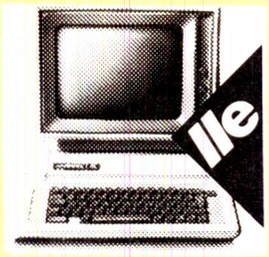

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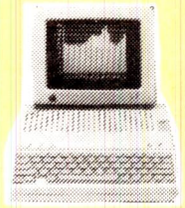

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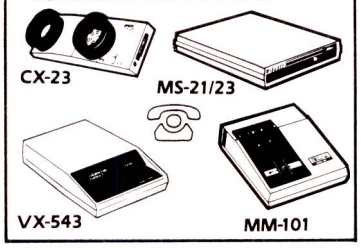

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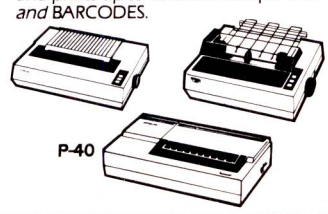

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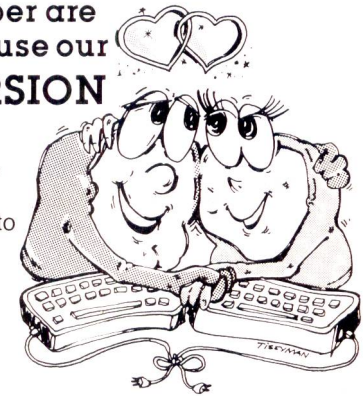

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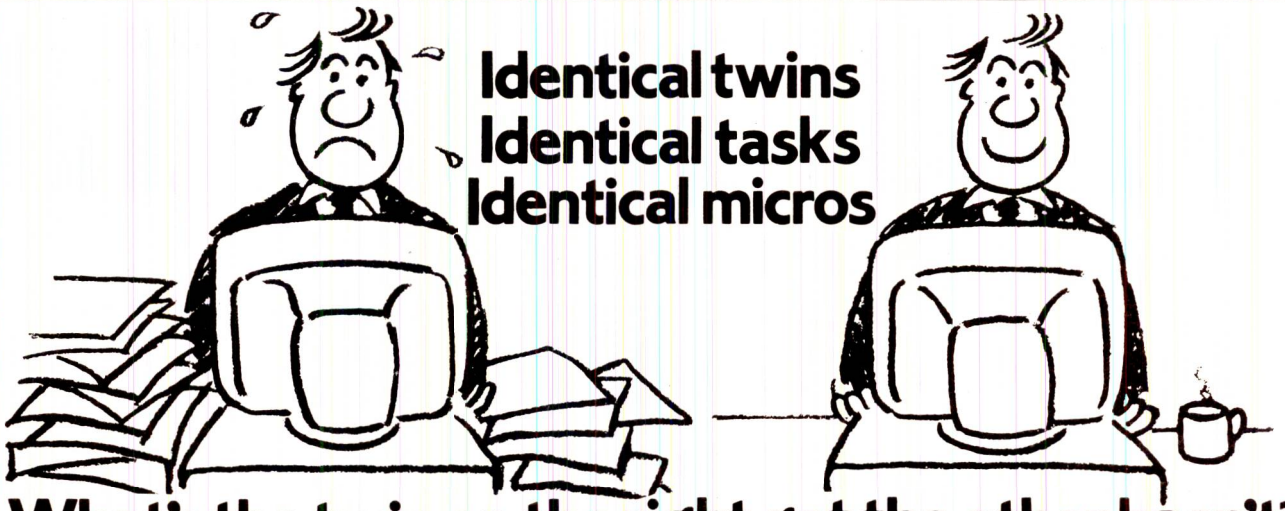

Identical twins Identical tasks Identical micros

What's the twin on the right got the other hasn't?

In short, the **Recall** full text retrieval system. It's a revolutionary new software package for micros.

It means the twin on the right has instant access to information regardless of its size, shape or content.

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Recall is compatible with the IBM PC/xT, DEC Rainbow and ACT Apricot.

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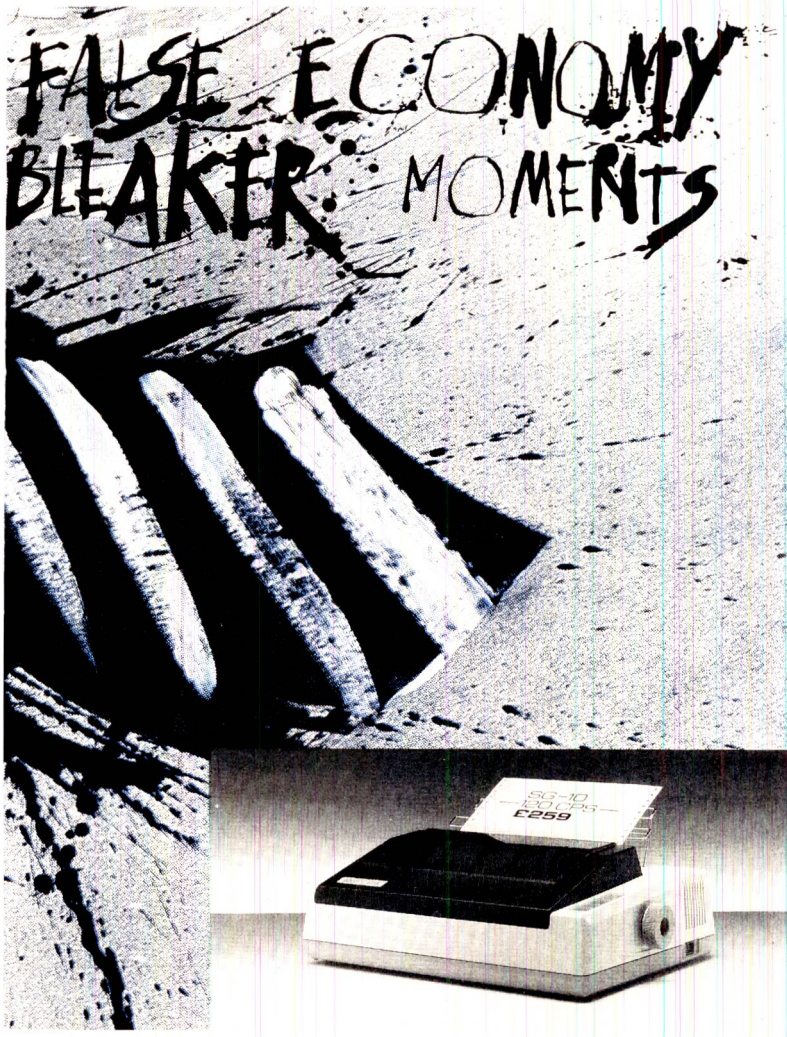

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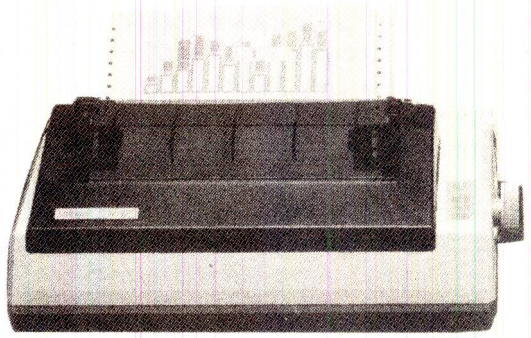

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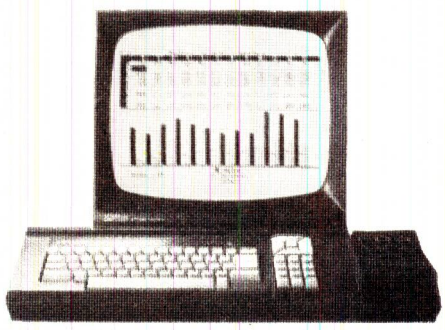

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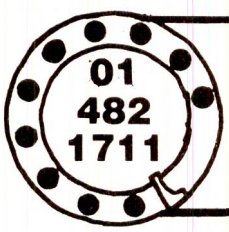

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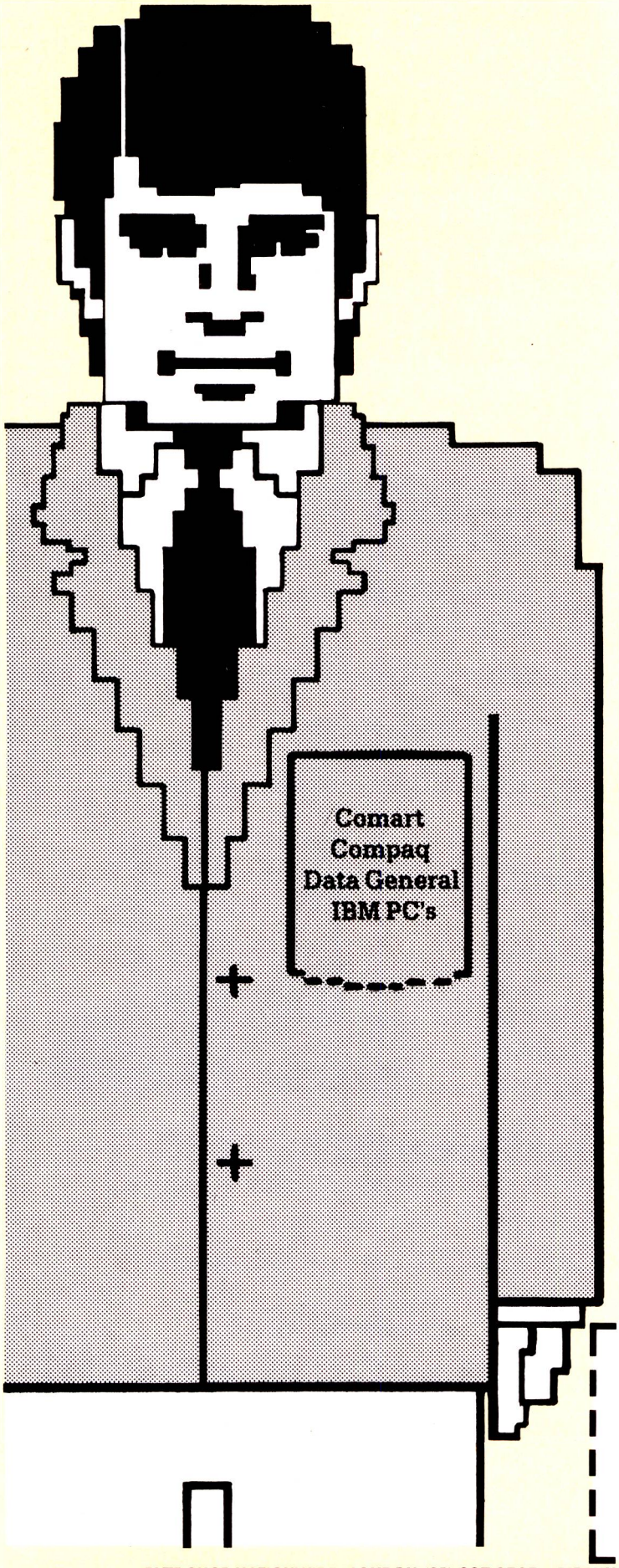

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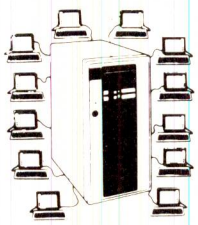

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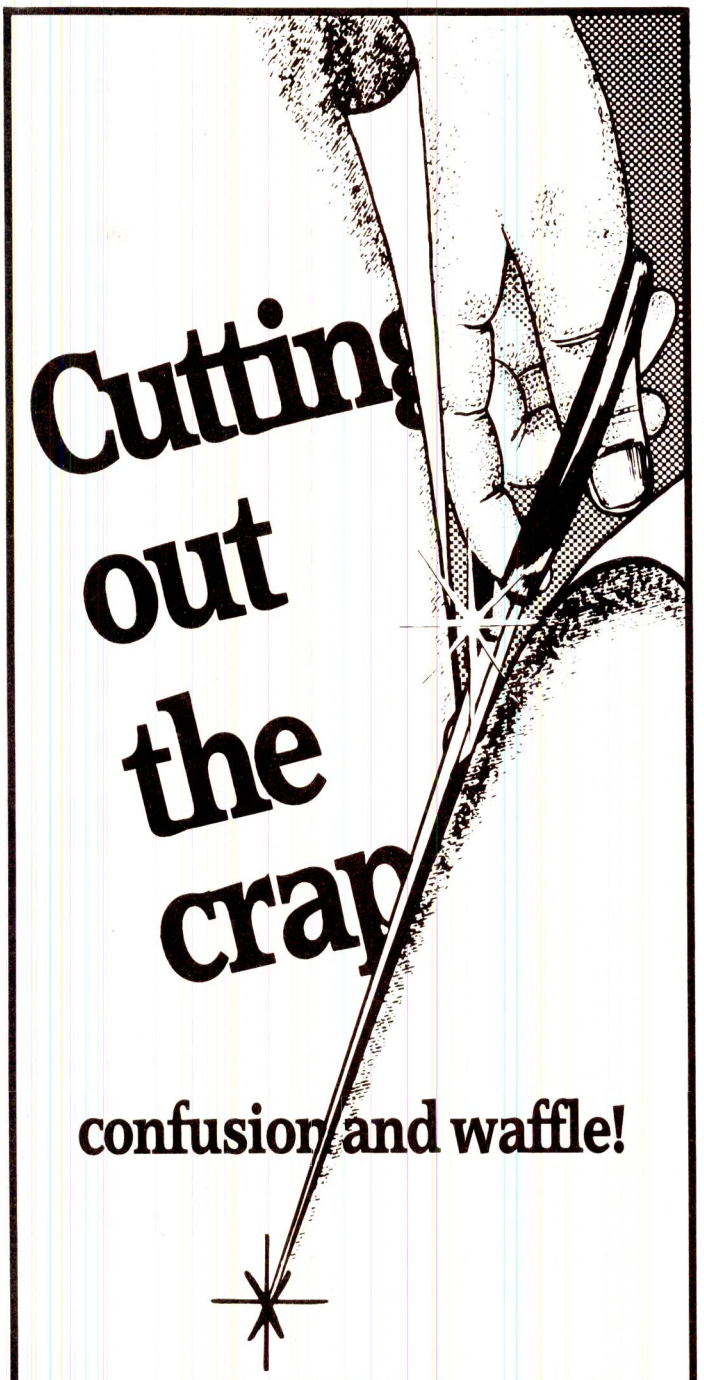

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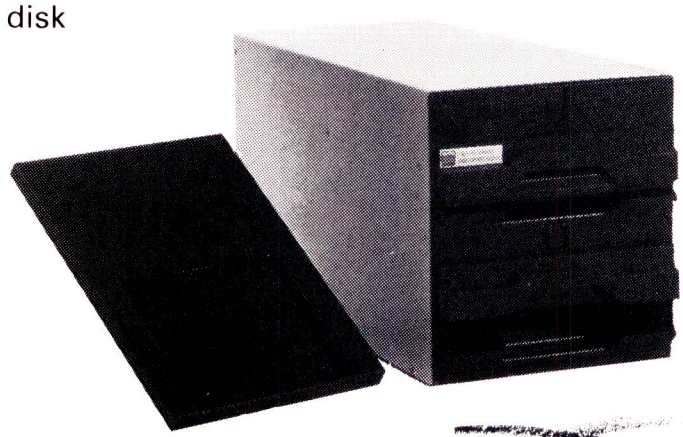

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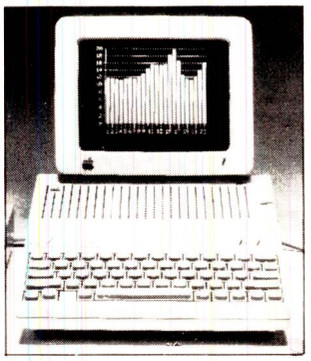

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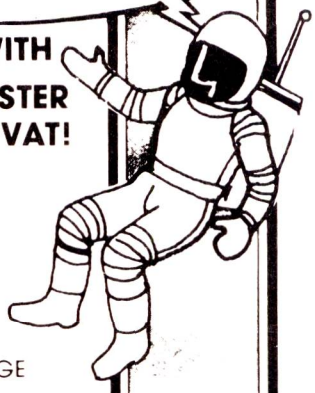

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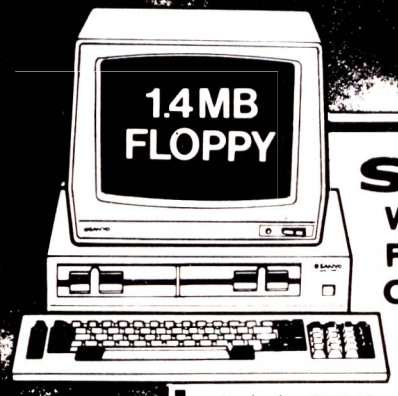

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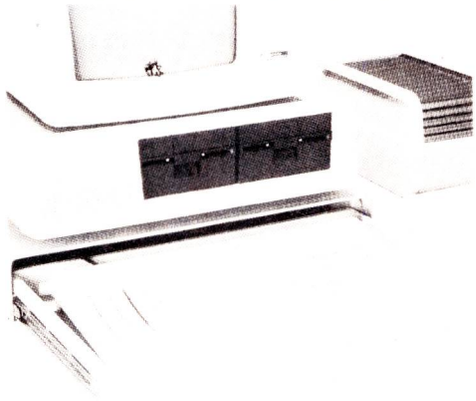

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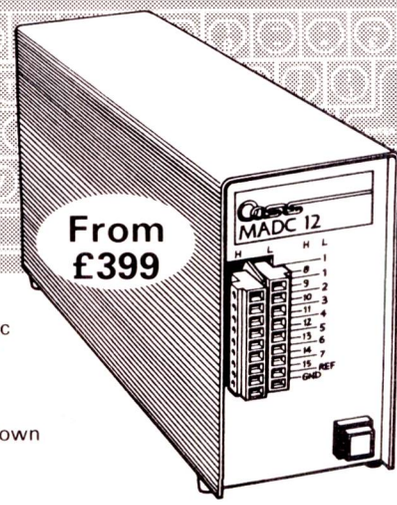

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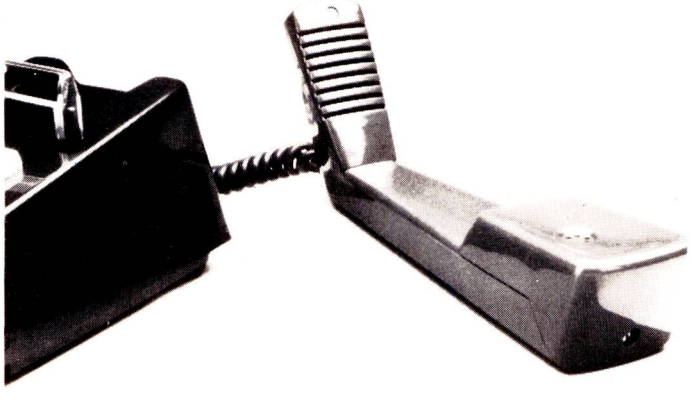

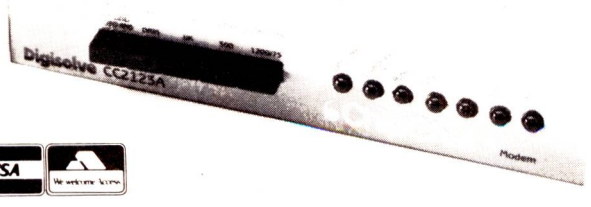

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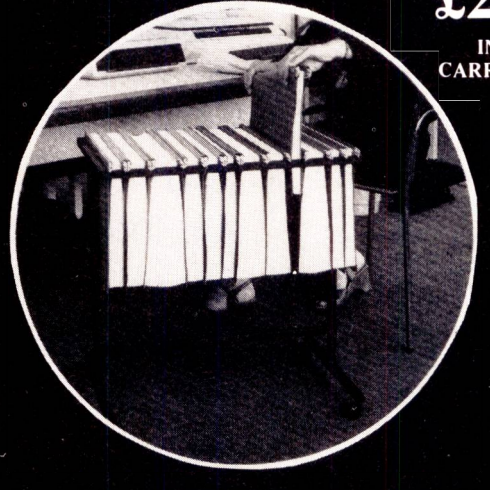

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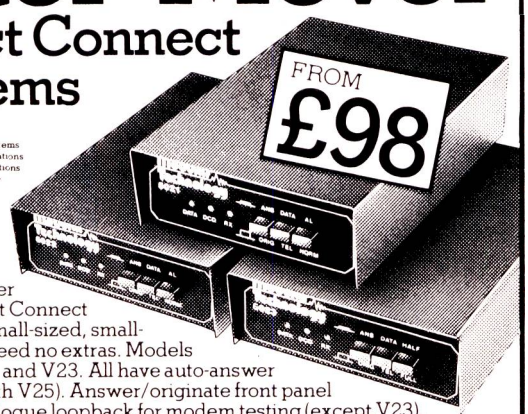

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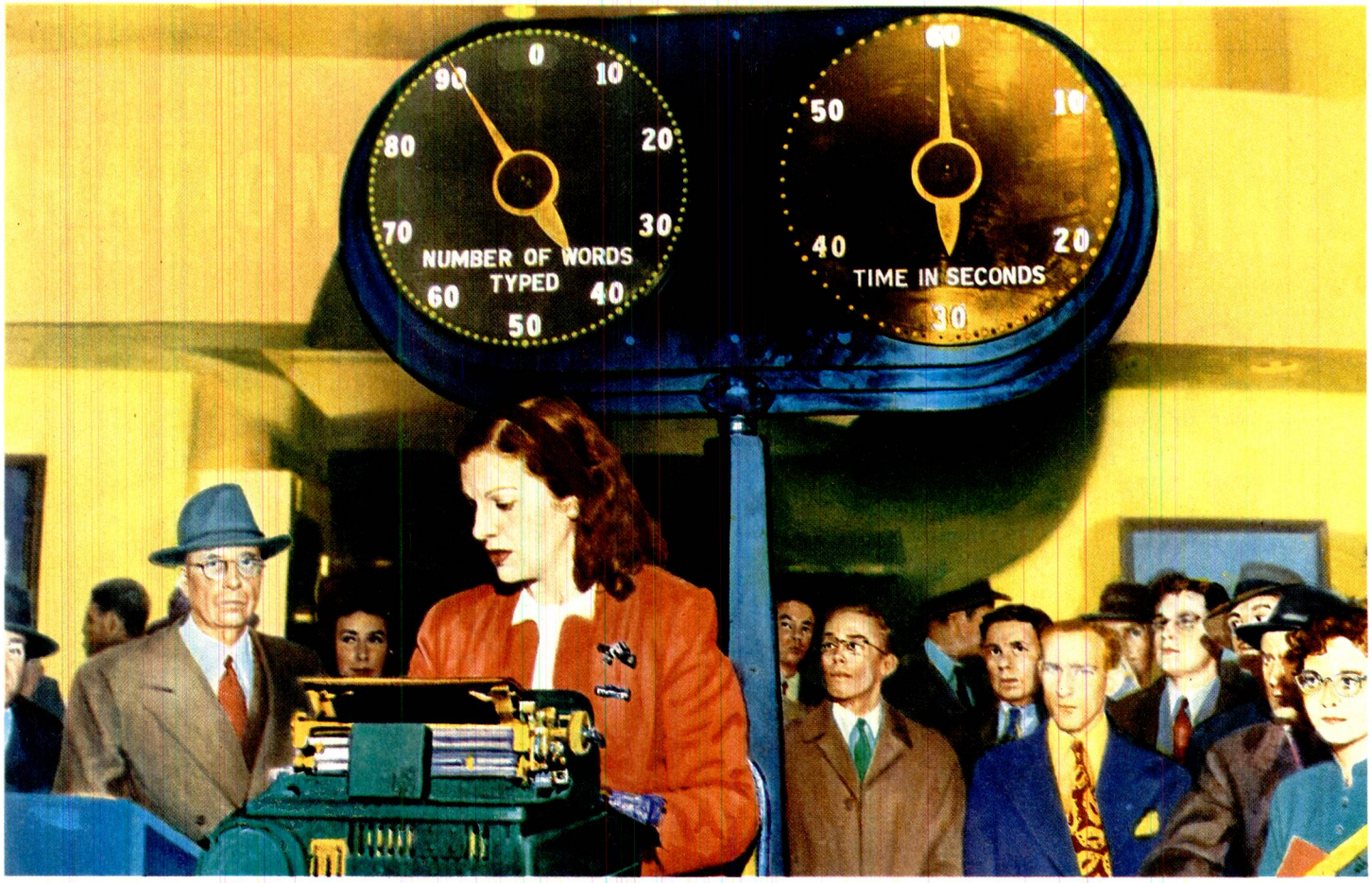

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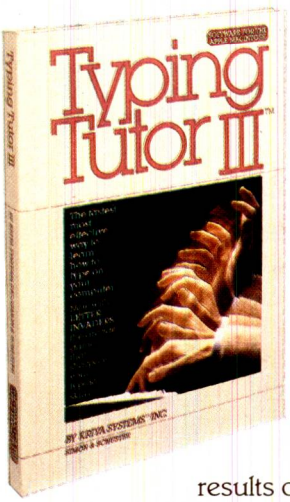

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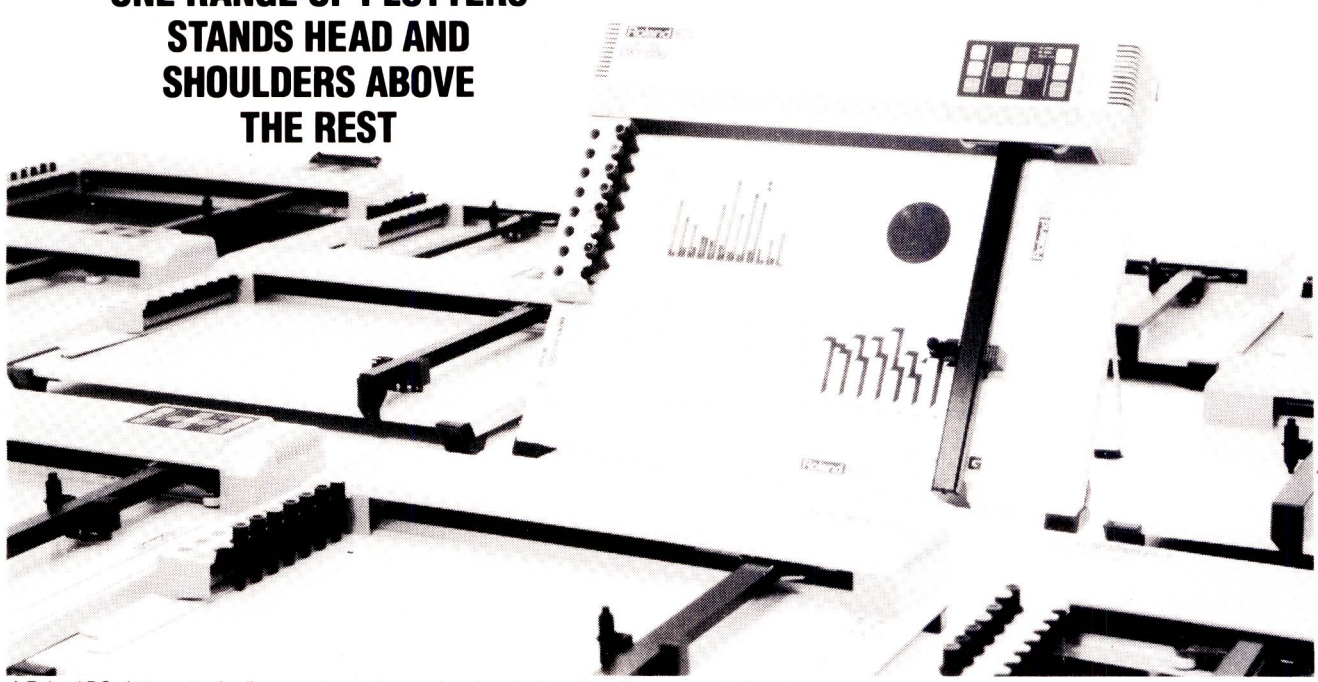


A Roland DG plotter not only allows you to create the most stunning computer generated graphics, but every Roland plotter operates even better at a 60° incline than others do flat on their backs. And unless you have a huge space in which to work, you'll find that equally important.

The Roland DXY 980 plotter, for example, is virtually silent in operation, very fast (230mm/sec) and, like all Roland plotters, has the capability of producing dynamic graphics onto either paper or overhead projection film. The range starts at around £350 and with the top model at a mere £1200, you'll find the latest technology is well within your reach.

Every Roland DG Plotter is compatible with IBM PC, Apple, Apricot and most other micros through standard RS232C serial and Centronics parallel interfaces.

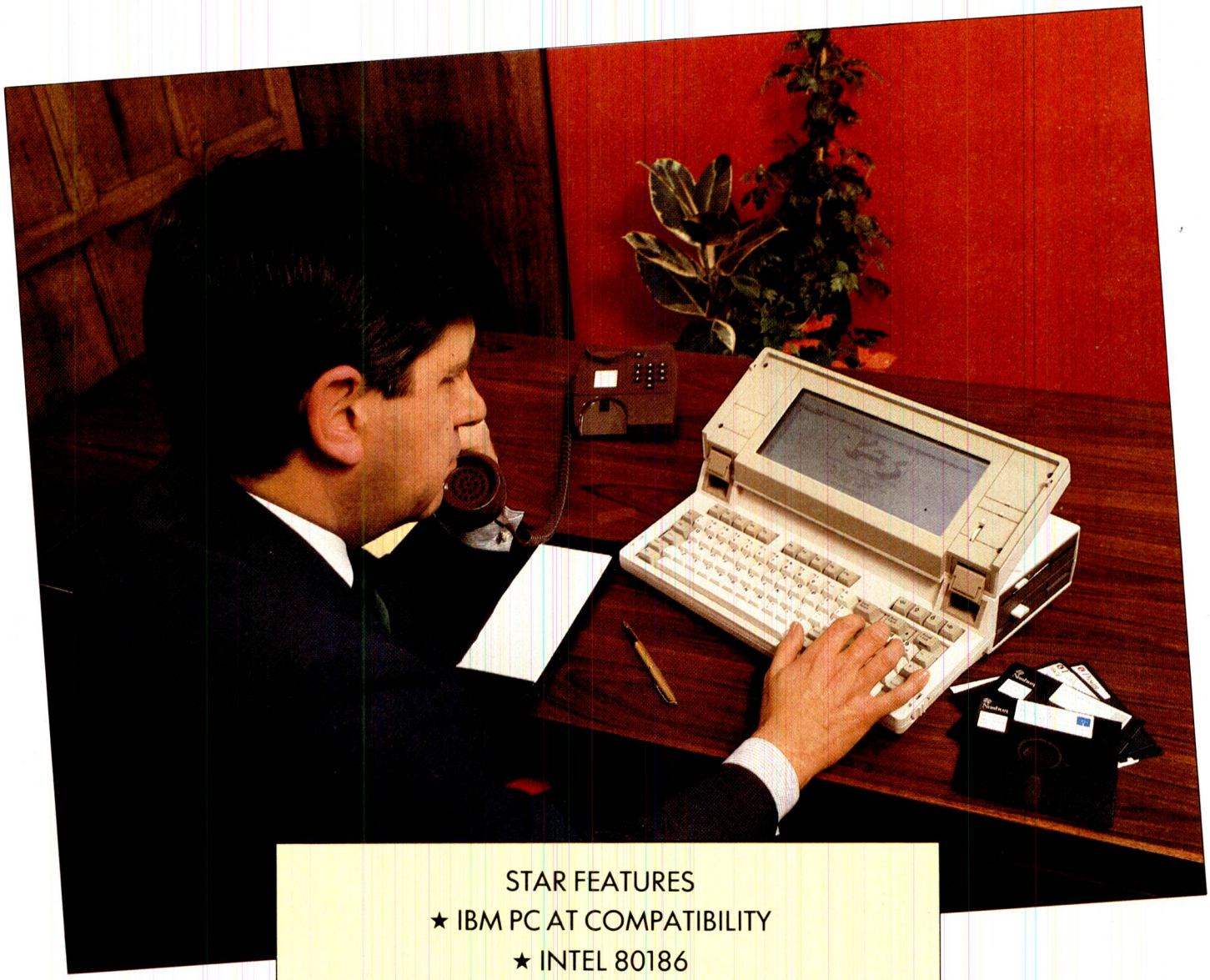
In short, choose a Roland DG Plotter — it will fit your software, fit your needs and fit on your desk.

Roland DG The natural choice

Roland DG, 983 Great West Road, Brentford, TW8 9DN Middx. U.K. Tel: 01-568 4578

Please send full details of Roland DG plotters. ☐
Please arrange for a demonstration. ☐
Name
Company
Address
Telephone
Send to: Roland DG, 983 Great West Road, Brentford TW8 9DN Middx. U.K.

TAVA FLYER



STAR FEATURES

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· THE NEW AMSTRAD CPC 664 WITH BUILT-IN DISC DRIVE



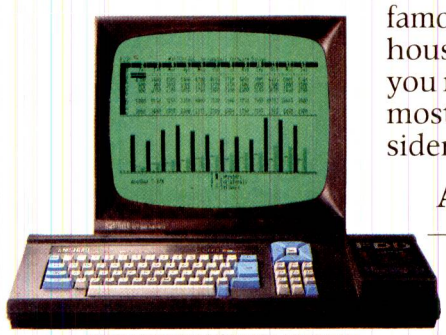
· THE NEW AMSTRAD CPC 664 ·

· AVAILABLE AT BOOTS · COMET · CURRYS · DIXONS · GREENS · JOHN MENZIES · RUMBELOWS

THE LOW COST COMPUTER FOR HOME AND BUSINESS ·



WITH COLOUR MONITOR AROUND
· £449 ·



WITH GREEN SCREEN AROUND
· £339 ·

THE HOME COMPUTER THAT MEANS BUSINESS.

If you know anything about computers you'll know that disc drives are up to fifty times faster than cassette when you're loading and saving programs. In fact, a disc drive makes computing faster, more reliable, more efficient and more fun. But up till now the only way to gain these advantages for a home computer was to buy a separate disc drive attachment. Now Amstrad are pleased to announce the first complete home computer with built-in disc drive: The Amstrad CPC 664.

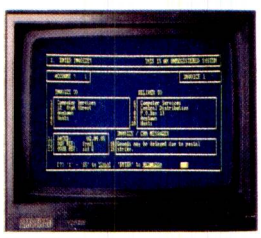
And when you buy a CPC 664 you'll find it's not just the disc drive that's built-in.

You'll get everything you need, including a monitor (green screen or full colour). We'll even give you a free CPM and Logo disc, so all you do is plug in and you're in business.

BUSINESS OR · PLEASURE ·

Although a disc drive will make games more fun (and there are loads of them to choose from) it also makes the CPC 664 a serious proposition for the business user.

There are accounting, word-processing, spread-sheet and data-base programs (to name but a few).



Amsoft Business Control, is a complete suite of programs for integrated sales invoicing, stock control and sales ledger for around £99. (Requires an additional FD-1 disc drive around £159 and DL-2 cable around £7).

The CPC 664 is also supplied with CP/M* to help make your business more efficient and effective by providing access to the famous range of CP/M* software.



Wordprocessing with Amsword can improve the productivity of everyone from unskilled typist to trained secretary. Around £23.95.

HIGH PERFORMANCE · LOW COST ·

The one thing you won't need a computer to work out is that the Amstrad CPC 664 represents outstanding value for money.

You only have to check the cost of buying all the elements separately (64K computer, disc-drive, monitor) to realise that the Amstrad package is very hard to beat.

With a green screen monitor the cost is just £339. With a full colour screen it costs £449. And after you've saved money on the price of the computer itself, you go on saving on the price of software.

There are hundreds of programs for business or pleasure available on disc (and cassette) to CPC 664 users. Many from Amsoft, others from other famous-name software houses. Few will cost you more than £49 and most will cost you considerably less.

AN EXPANDING · SYSTEM ·

There is a complete range of peripherals available to CPC 664 users which plug directly into the built-in interfaces.

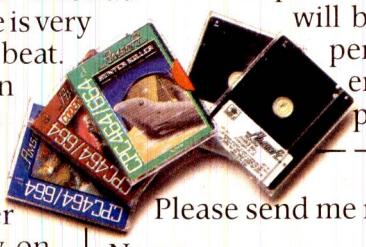
These include a joystick, additional disc drive (to double your on-line storage) and the Amstrad DMP-1 dot-matrix printer. (There's also a cassette interface so that you can use CPC 464 programs on tape). And there are many more peripherals from Amstrad and other manufacturers which can be used to enhance the CPC 664.

· AMSTRAD USER CLUB ·

Join the optional Amstrad User Club and we'll keep you informed with our monthly user magazine, and information on all software as it is introduced. Your membership details will be recorded on your personal club card, which entitles members to various privileges and offers.



Figure analysis made easy with Microspread. An easy to use spreadsheet with pull-down menus and a wide range of mathematical options. Around £49.



Please send me more information

Name _____

Address _____

_____

_____

Amstrad CPC 664

Amstrad, P.O. Box 462, Brentwood, Essex CM14 4EF

PCW/664/4

*CP/M is a trademark of Digital Research Inc.

SPECTRUM · W.H. SMITH · WIGFALLS · AND GOOD INDEPENDENT COMPUTER STORES ·

LOGISTIX (n) a powerful spreadsheet with an extensive database and containing truly superior presentation-quality graphics. *Logistix also includes:* the fourth dimension — (1) time management; (2) resource allocation; (3) task scheduling; (4) project planning. Commonly referred to as *'... the best idea in business software since the spreadsheet'.*



THE INDISPENSABLE PLANNING AND DECISION AID

No business remains static. You need to know not only what is going on today, but what should be happening next week, next month or next year. So you need the right kind of information in a form you can use and understand, you need to be able to analyse it in various ways and you need to be able to present it to others. Most important of all, you need to make decisions about the future. In short, you need to plan.

Logistix adds the all-important feature of time management to classic spreadsheet features, an extensive database capability and presentation quality graphics, to provide a versatile, powerful and easy to use planning and decision aid for managers and professionals.

LOGISTIX – The best idea in business software since the spreadsheet.

- DATABASE
- TIMESHEET
- SPREADSHEET
- GRAPHICS

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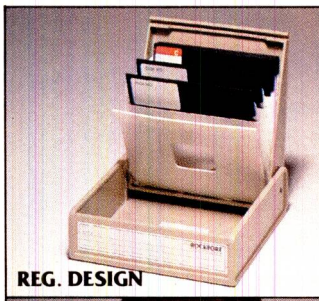
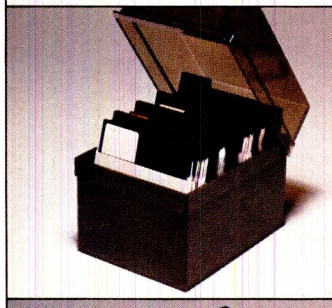
Rockfort Disk Storage System



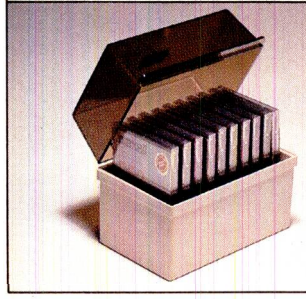


REG. DESIGN

M.F. 10 Floppy Disk Box
Holds 10 – 5¼" Disks
£2.45
Incl. VAT, Post & Packing



M.F. 50 Floppy Disk Box
Holds 50 – 5¼" Disks
£9.50
Incl. VAT, Post & Packing



M.D. 12/30 Micro Disk Box
Holds 12 to 30 – 3½" Disks according to thickness
£7.85
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Rockfort Diskfile Range of products not only offer an easy reference and attractive disk filing system but also offer complete protection from damaging dust particles. Post for your order today!

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Manufactured by Projectron Ltd — Trade inquiries invited

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M.D. 12/30	MICRO DISK BOX			
		TOTAL		

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Exciting products for your Apricot PC, Xi, Fl and Fle!



XF-800:
IBM PC Compatible Disc Drive

The **unique** XF-800 floppy disc drive sub-system comprises a slim 40/80 track switchable, double-sided 5.25" floppy disc drive and on-board power supply, with MS-DOS driver software and an interface/controller card that locates in an expansion slot.

The sub-system is thus configured as a second or third drive, as appropriate and has two principle applications:

- **Will format, read and write diskettes for use with the IBM PC, giving total file compatibility. This includes all four principle IBM PC formats.**
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- **Other formats available to order P.O.A.**

XE-6: Six Port Expansion Unit.

Another new PROFESSIONAL product from Alpha Disc. The perfect complimentary product to the XF-800, **and more . . .**

Features:

- Five usable expansion slots.
- Sits neatly alongside your system.
- Very simple installation.
- On-board power supply.

XF-800	**£495 + VAT.**
XF-800 (without IBM PC compatibility)	**£395 + VAT.**
XE-6	**£245 + VAT.**

A special customer price on an XF-800 plus XE-6 is available on application.

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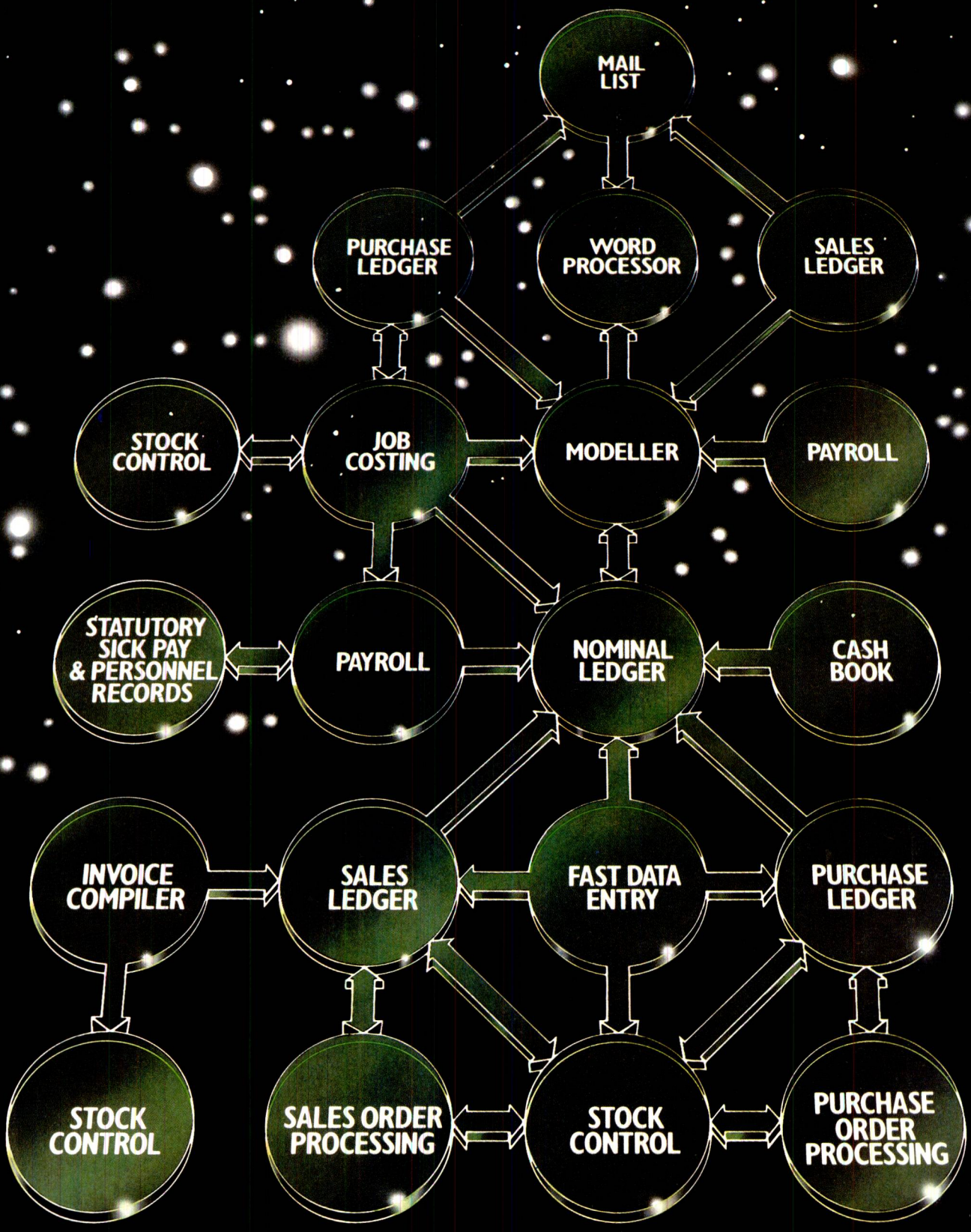
One stop. accounting software...



...quite simply, none better.

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

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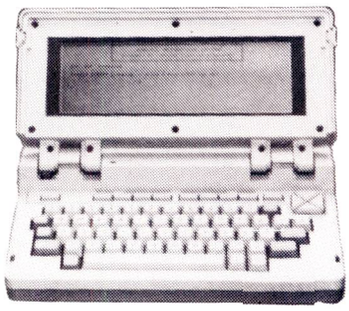
0722-338668



The world didn't need another portable.

Just a better one.



The Bondwell 2 is a truly portable computer that offers instant computing power when you're on the move.

And it offers some pretty remarkable features.

Small, light, powerful.

The Bondwell 2 is a 64K RAM portable that is the size of an attache case and weighs just 5.5 Kg. The fold-up LCD screen offers 80 characters × 25 lines with a brilliant resolution of 640 × 200. It also tilts 0° — 180° to offer the best viewing angle in all light conditions.

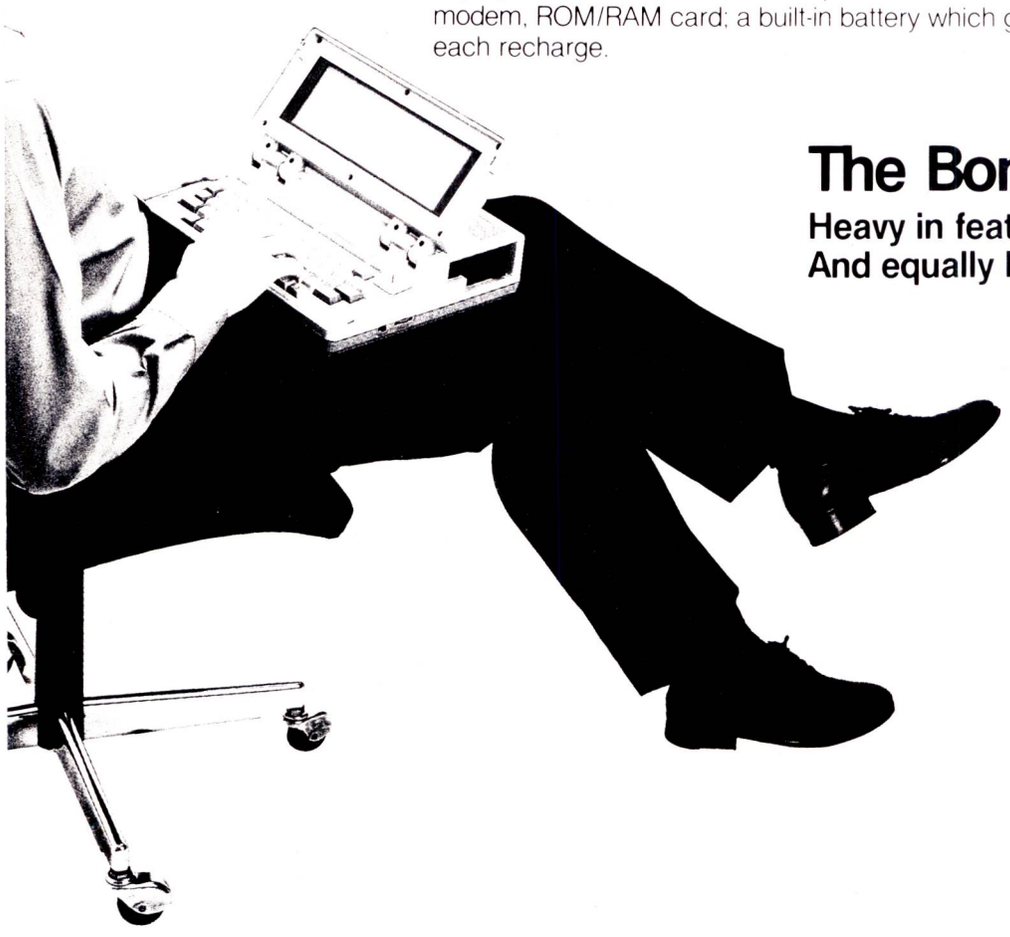
There's also a built-in 3½" microfloppy disk drive with a 360K formatted capacity. So you get maximum software flexibility without the limitations of built-in ROM programs on most portables.

And because the Bondwell 2 has a CP/M 2.2 operating system you have access to a huge library of business programs.

Five top programs are offered free with the Bondwell 2 — WordStar, Mailmerge, DataStar, CalcStar and ReportStar. As well a "Scheduler Plus" program is yours, free, for better organisation of executive time.

Features. Features. Features.

Other Bondwell 2 features include a full-stroke keyboard with 8 user-defined function keys; ports for data transmission, printer and a second disk drive; expansion slots for modem, ROM/RAM card; a built-in battery which gives 8 hours of continuous use with each recharge.



The Bondwell 2 Portable.

Heavy in features. Light in weight.
And equally light on the pocket

AT **£1575**

Barbatan Limited

35 – 38 High Street
Bristol BS1 2AW
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Attractive trade discounts are available.
Dealer enquiries welcome.

AMSTRAD COMPUTER USER SHOW

WIN
A COMPLETE AMSTRAD SYSTEM
When you book an advance ticket you enter the prize draw

Everything for the Amstrad Computer User

NOVOTEL EXHIBITION CENTRE
Saturday 5th and Sunday 6th October

The first show specifically for Amstrad computer users

The Amstrad Computer User Show at the Novotel will house the largest display of Amstrad products ever assembled under one roof. There'll be all the latest new machines, software, peripherals and services.

The show will be two days of fun, entertainment, information and bargains. We'll be organising competitions, prize draws, advice centres and lots of bargains.
If you're an Amstrad owner, or just thinking about being one, you can't afford to miss the Amstrad Computer User Show.

Opening hours

10.00am to 6pm both days.

Admission charges

On the door: Adults £3 under Sixteens £2 but you can save £1 per ticket and the queues by using the coupon below.
10% discount for parties of 10 or more.
Buses: Frequent service from Central London.
Tubes: Hammersmith Broadway (Metropolitan, District and Circle Lines).
Car Parking: Several car parks in the immediate area.

Exhibitors

If you're interested in exhibiting, stands can cost as little as £99. Just write or ring Tim Collins, at the address below and we'll send you a full exhibitors pack.
Computer Marketplace (Exhibitions) Ltd., 20, Orange Street, London WC2H 7ED Tel: (01) 930 1612

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Please send____Adult tickets at £2 and____under sixteen tickets at £1 for the Amstrad User show.
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PCW 9/85

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ATARI ST

520 ST

POWER WITHOUT THE PRICE

THE NEW ATARI 520ST

Under the new leadership of Jack Tramiel (former boss and founder of Commodore Business Machines), Atari Corporation have marked their entry into the world of business/personal computers with a machine which leaves the competition standing. Tramiel's slogan 'Power Without the Price' has been implemented in the manufacture of the new 512K Atari 520ST colour computer which offers the user amazingly high performance at an incredibly low price. Launched as a work-station, this new system incorporates seven software packages as well as the 520ST computer with 512K RAM, mouse controller, high resolution monochrome monitor (640x400), 95 key keyboard (with 18 key numeric keypad), MIDI interface, GEM and a 500K 3½ inch disk drive, all for the package price of only £651.30 (+VAT = £749). Dubbed the 'Mac beater' and the 'Jackintosh' (after Atari's Chief, Jack Tramiel), Atari's new machine has been directly compared with the Apple Macintosh RRP £2595 (+VAT = £2985) which offers similar features and capabilities but at a much higher price. Favourably reviewed by the UK's highly critical specialist computer press, the 520ST is likely to make a great impact in this country as a sophisticated alternative to an IBM PC, APRICOT or APPLE MACINTOSH. Unlike its overpriced competitors, the Atari 520ST can be linked up to a colour monitor to unleash a choice of up to 512 colours. The addition of colour brings out the full potential of graphics packages such as GEM.

USER FRIENDLY GEM OPERATING SYSTEM

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

FREE SOFTWARE AND FUTURE EXPANSION

The Atari 520ST comes supplied with seven free software packages as listed below. 1) TOS -Tramiel Operating System based on CPM 68K. 2) GEM Graphics Environment Manager by Digital Research (DR) giving a WIMP (Window, Icon, Mouse, Pull down menu) environment. 3) DR GEM Paint for creating graphics masterpieces. 4) DR GEM Write for word processing. 5) Logo learning language to enable you to write your own programs easily using turtle graphics. 6) DR Personal Basic a powerful user friendly version of the Basic programming language. 7) BOS operating system giving you access to dozens of business applications packages already available on the market. Designed with future expansion in mind, the ST also features a host of different interfaces to the outside world and an impressive list of accessories is planned. Atari will soon be releasing a 1000K (1MB) 3½ inch disk drive, and a 15MB hard disk storage system as well as a mass storage compact disk (CD) player capable of storing an entire 20 volume encyclopedia on one disk. A full range of inexpensive printers are planned including dot matrix, daisywheel and thermal colour printers. With its unbeatable graphics, speed and software at a price which is far below that of any comparable personal computer currently on the market, the ST is all set to do battle with the competition. To receive further details of the ST from Silica Shop, just fill in the coupon below with your name and address details and post it to us.

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

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

£749

ATARI 520ST SPECIFICATION

MEMORY
512K RAM (524,288 bytes)
16K ROM expandable to 320K
Port for addnl 128K plug-in ROM cartridges
200K TOS operating system

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

ARCHITECTURE
4 custom designed chips:
GLUE Chip - MMU Memory Mngmnt Unit
DMA Controller - Graphics Processing Unit
16/32 bit Motorola 68000 processor at 8MHz
eight 32 bit data registers
eight 32 bit address registers
16 bit data bus/24 bit address bus
7 levels of interrupts/56 instructions
14 addressing modes/5 data types

DATA STORAGE
High speed hard disk interface
Direct memory access 1.33 Mbytes per second
CD (Compact Disc) interface
Built in cartridge access
Dedicated floppy disk controller

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

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

KEYBOARD
Separate keyboard microprocessor
Standard QWERTY typewriter styling
Ergonomic angle and height
95 keys including 10 function keys
Numeric keypad — 18 keys including ENTER
One touch cursor control keypad

MONITOR
12" screen - high res monochrome monitor
640x400 monochrome resolution

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

COMMUNICATIONS
Bidirectional centronics parallel interface for printers, or modems capable of input/output
RS232C serial modem/printer interface
VT52 Terminal Emulation Software
Maximum Baud Rate up to 19,200
High speed hard disk interface
Floppy disk controller (Western Digital)
2 joystick ports (one for 2 button mouse)
MIDI interface for external music synthesizers

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

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

VARIOUS
Dimensions: 470mmx240mmx60mm
Replaceable external power supplies
Expansion: 3½" floppy disk drives 500K/1,000K (two drives can be connected)
3½" 15Mb hard disk
CD (compact laser disc)
Dot matrix & d/wheel prntrs (black)
Thermal dot matrix (colour)
RGB & monochrome monitors

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

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

MACINTOSH v F1e v 520ST

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

	APPLE	APRICOT	ATARI
FEATURES OF BASIC SYSTEM	**MACINTOSH**	**F1e**	**520ST**
Price Includes B/W Monitor	YES	NO - extra £200	**YES**
Keyboard size mm (LxDxH)	330x147x50	450x167x28	**470x240x60**
Keyboard size ins (LxDxH)	13x5¾x2	17½x6½x1	**18½x9½x2½**
3½" D/Drive (Unformatted)	500K	500K	**500K**
3½" D/Drive (Formatted)	399K	315K	**349K**
WIMP (Window, Icon, Mouse ...)	Apple	ACT - Activity	**GEM**
Real-time Clock	YES	YES	**YES**
Polyphonic Sound Generator	YES	NO	**YES**
RS232 Serial Port	YES	YES	**YES**
Centronics Parallel Printer Port	NO	YES	**YES**
Dedicated Floppy Disk Controller	NO	YES	**YES**
Hard Disk DMA Interface	NO	YES	**YES**
Full stroke keyboard	YES	YES	**YES**
Number of keys on keyboard	59	92	**95**
Numeric Keypad	NO	YES (16 Keys)	**YES (18 keys)**
Cursor Control Keypad	NO	YES	**YES**
Function keys	NO	10	**10**
16-bit processor	68000	Intel 8086	**68000**
Processor running speed	8MHz	4.77MHz	**8MHz**
RAM size	512K	256K	**512K**
Number of graphics modes	1	4	**3**
Number of colours	Monochrome	16	**512**
Max Screen Resolution (pixels)	512 x 342	640 x 256	**640 x 400**
Mouse included	Single Button	NO - extra £95	**Two Button**
Replaceable External Power Pack	NO	NO	**YES**
Cartridge Socket	NO	NO	**YES**
Joystick Ports	NO	NO	**YES (two)**
MIDI Synthesiser Interface	NO	NO	**YES**
Monitor Size	9"	9" - extra £200	**12"**
RGB Video Output	NO	YES	**YES**

System Cost with: Mouse - Monochrome Monitor - 512K RAM - 500K Disk Drive

Price of basic system (exc VAT)	£2595+VAT	£595+VAT	**£652+VAT**
+ Mouse	Included	£95+VAT	**Included**
+ Monochrome Monitor	Included	£200+VAT	**Included**
+ Expansion to 512K RAM	Included	£295+VAT	**Included**
Price of complete system (exc VAT)	£2595+VAT	£1185+VAT	**£652+VAT**
PRICE rounded down including VAT	**£2,984**	**£1,362**	**£749**

PRESS COMMENT

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

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

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

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

"I found it (GEM) extremely easy to use and was very impressed with the way in which it disguises the unfriendly hardware and operating systems lurking under the surface."
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"The electronics in the machine are a work of art ... The heart of the 520ST is a Motorola 68000, one of the most powerful 16-bit processors around and in many respects it is close to being a 32-bit chip ... when the machine appears in the shops, I'll be at the front end of the queue to buy one."
Peter Bright June 1985 **PERSONAL COMPUTER WORLD**

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May 11th 1985 **PERSONAL COMPUTER NEWS**

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May 23rd 1985 **POPULAR COMPUTING WEEKLY**

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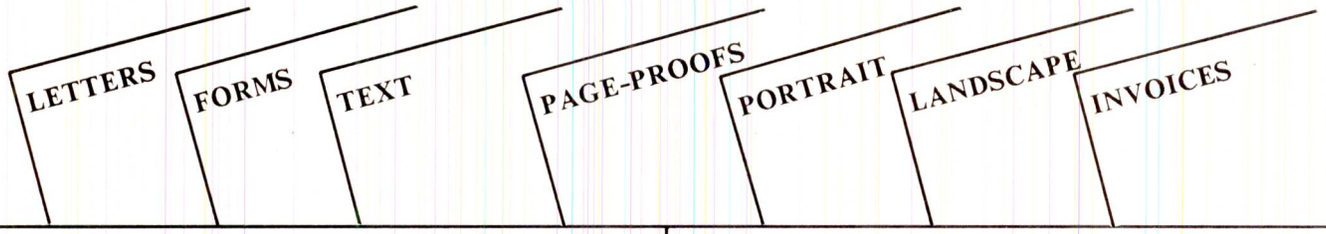

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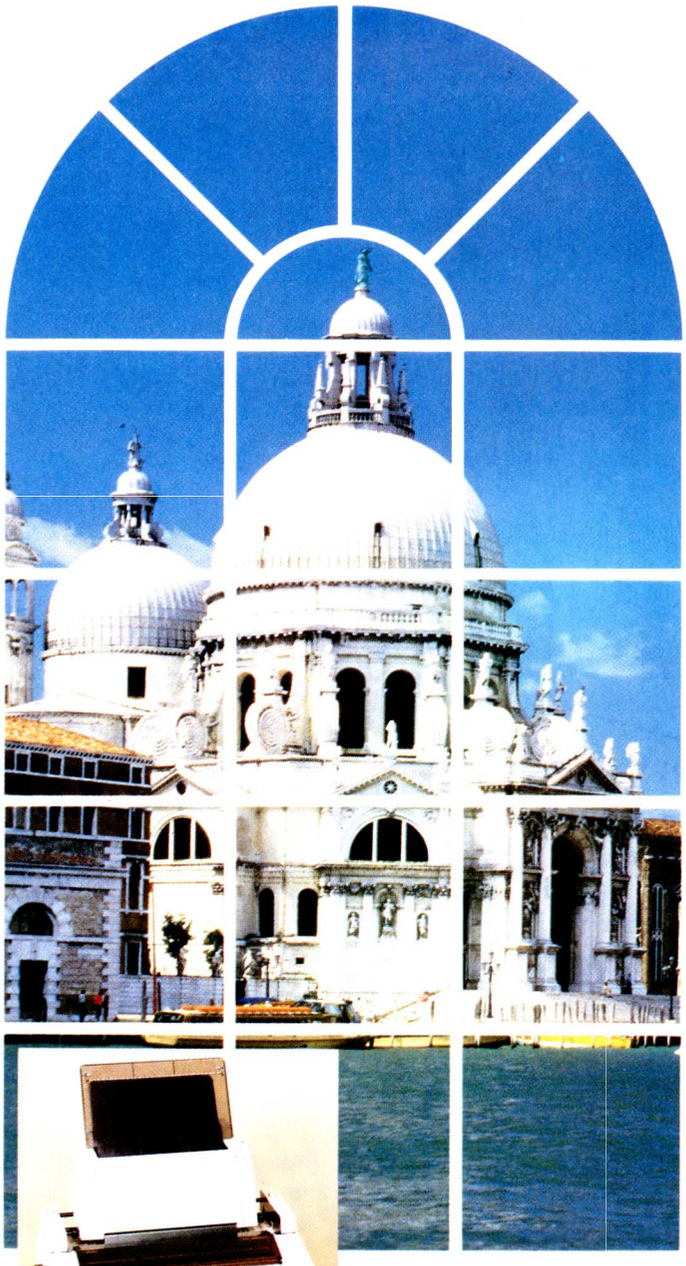

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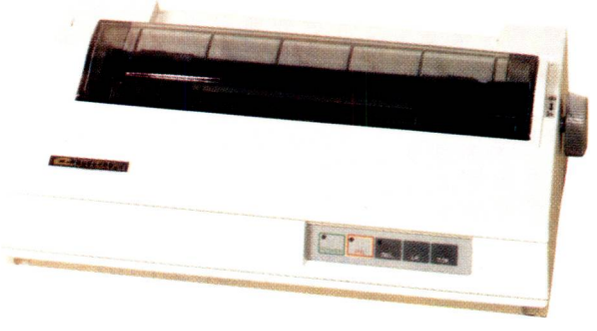

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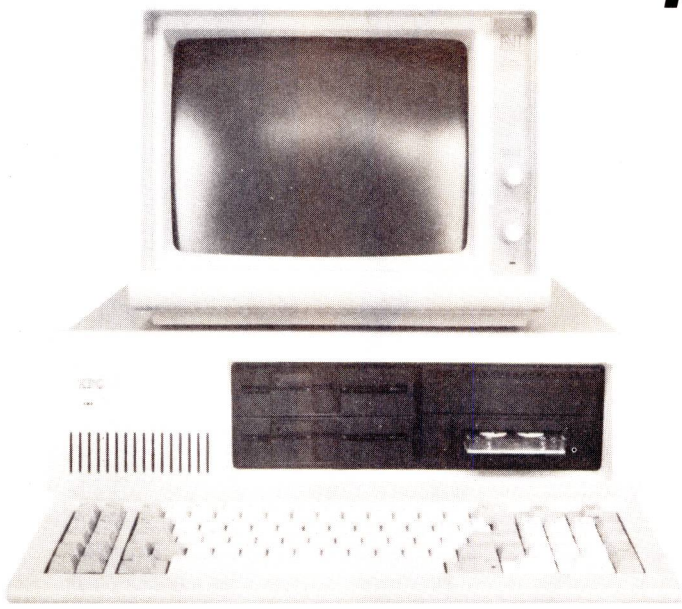

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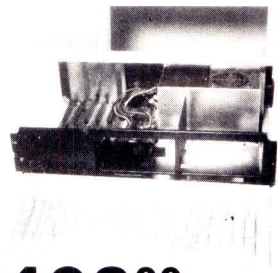

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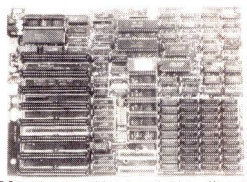

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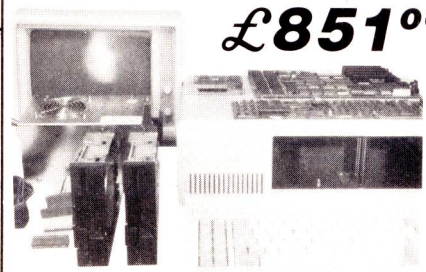

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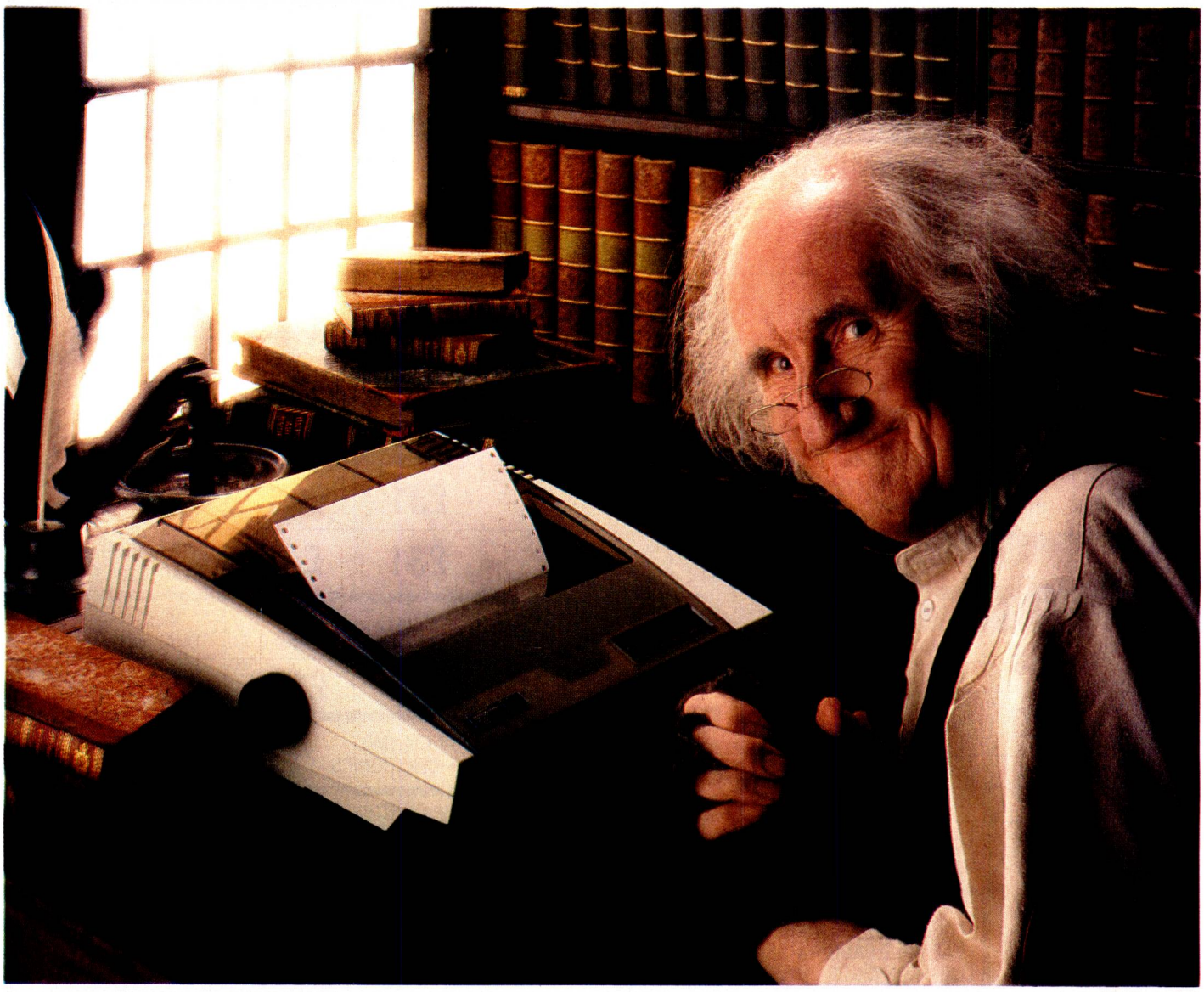

Keen on saving money? But not prepared to sacrifice quality and performance? Then the new MT80+ serial matrix printer has plenty to offer at a price that will have you rubbing your hands with glee.

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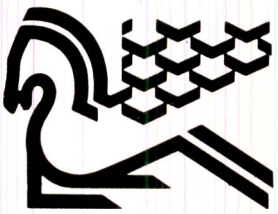

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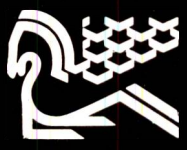

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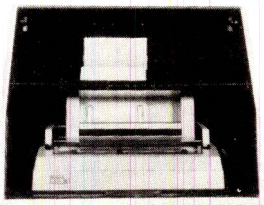

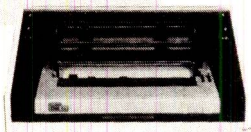

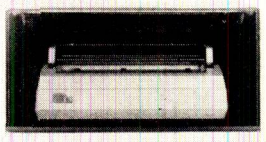

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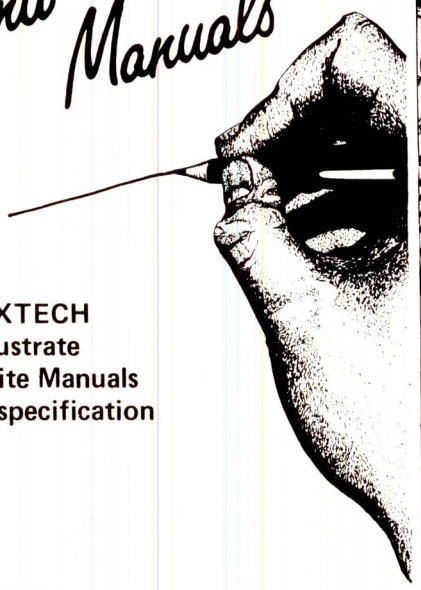

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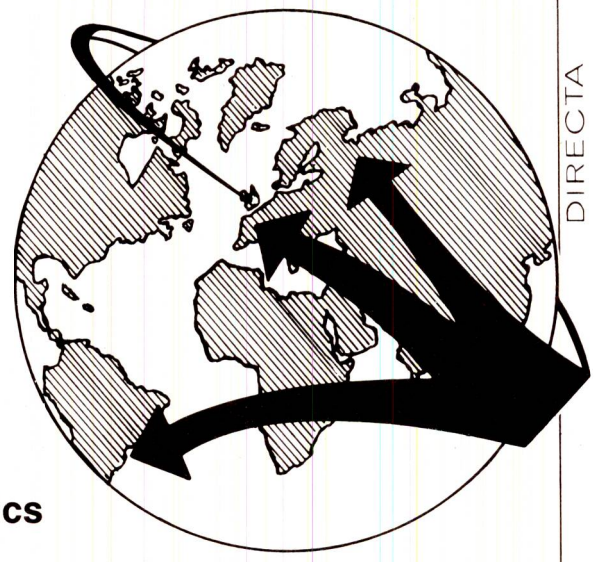

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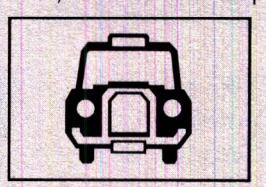

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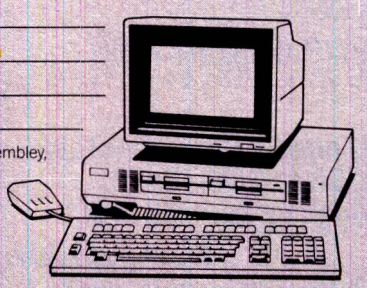

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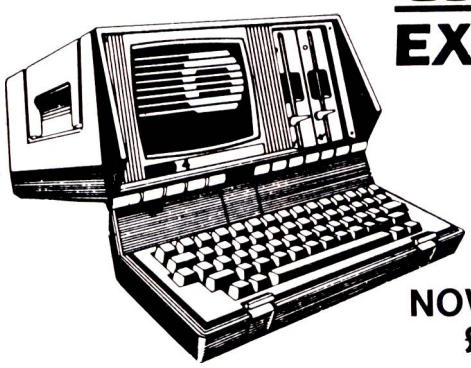

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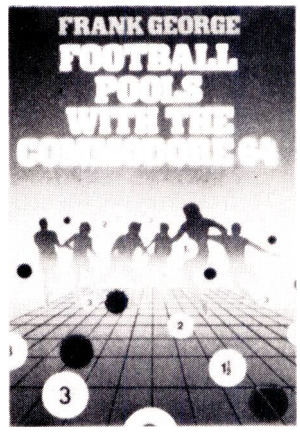

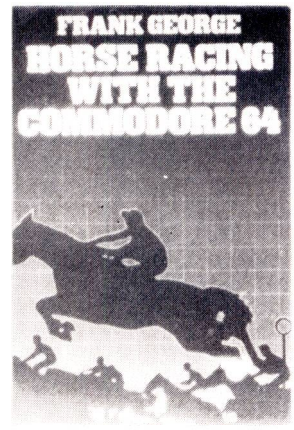

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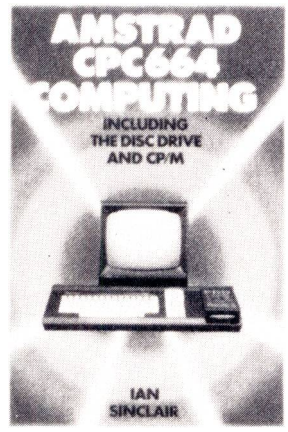

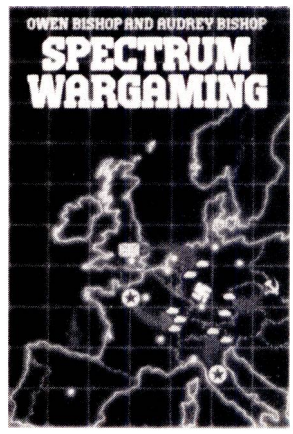

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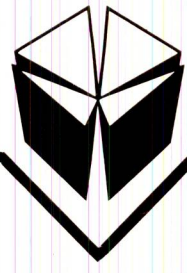

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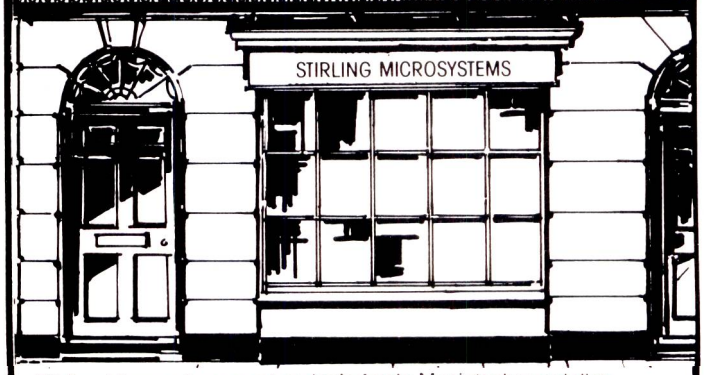

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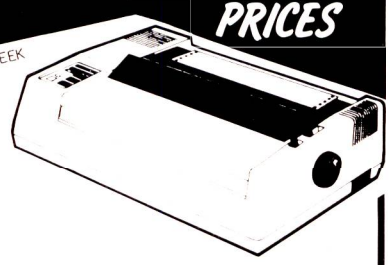

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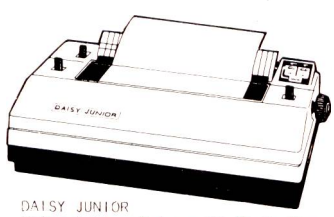

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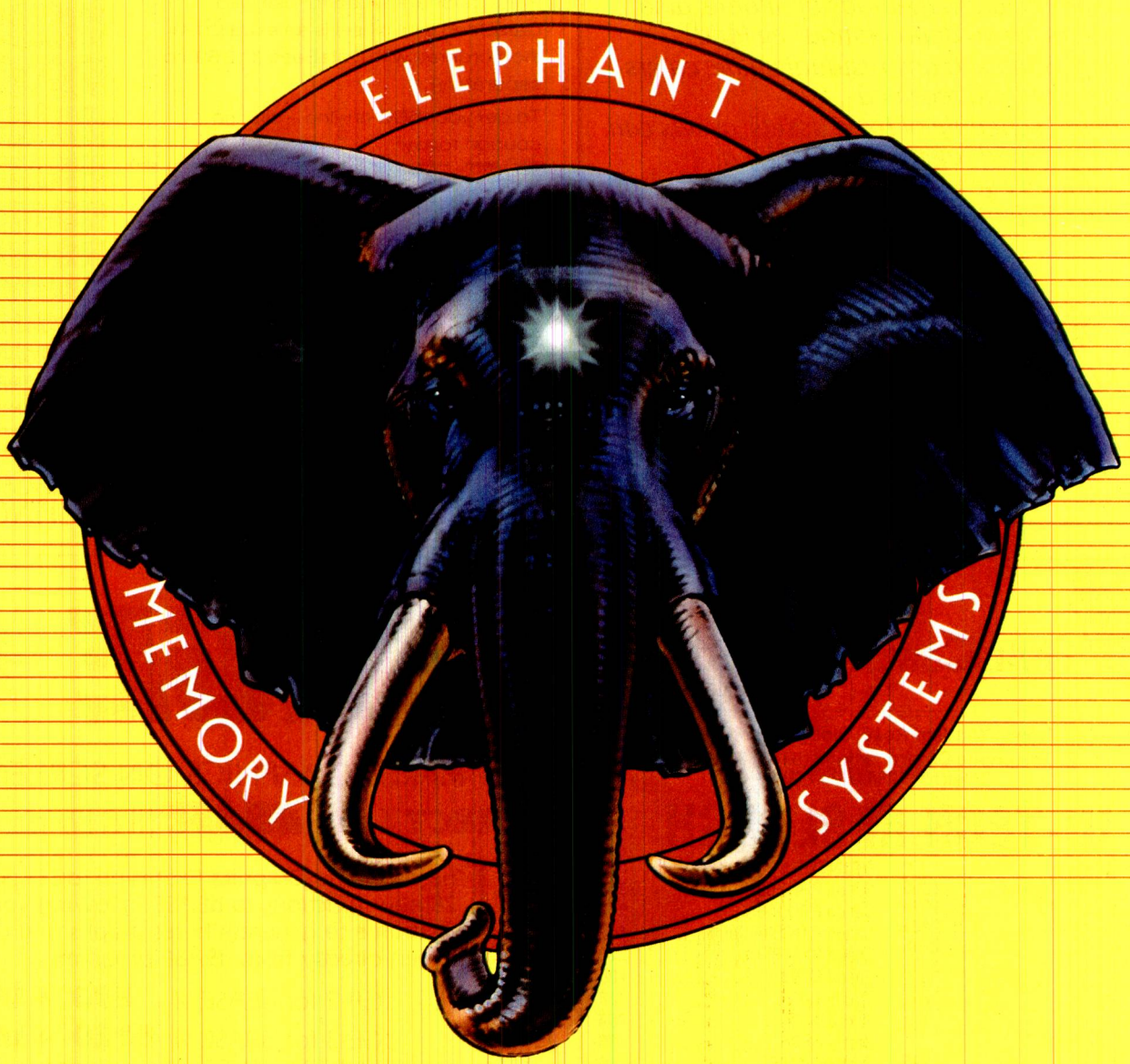



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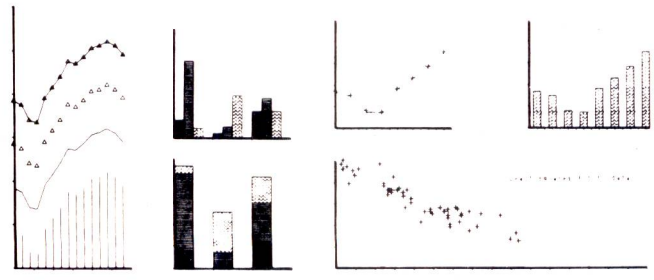

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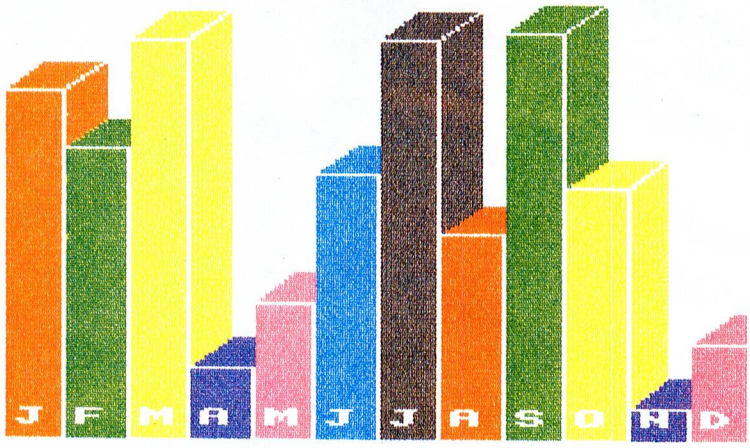

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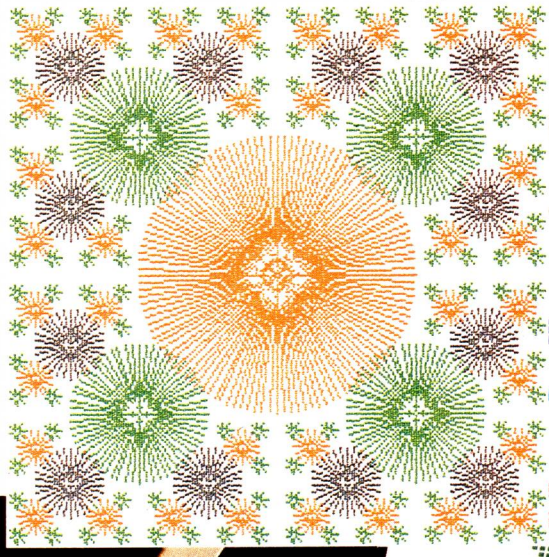



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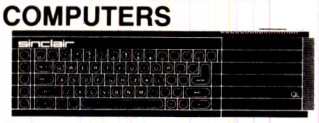

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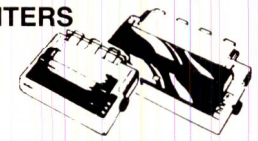

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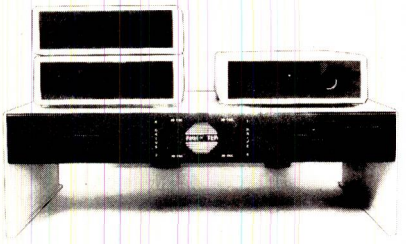

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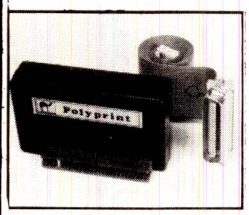

. . . The interface which likes to say . . . Ja and Oui and Si and of course YES! A spectrum Centronics interface with multilingual chars in EPROM. User FX80 printer. Printer driver also in EPROM. User notes show how to use EPROM for UTILS or down loadable chars.

POLYPRINT from Silicon City **£44.95**
PRINT-SP **for Spectrum**
Low cost Centr. I/F with CABLE. S'ware on tape **£31.25**

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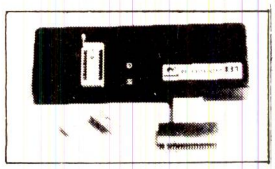

Eprom programmer for the 2516/32/32A/64/64A/128/128A. CHECK, READ PROGRAM & VERIFY all or part of EPROM.

So immensely user friendly you'll hardly need the manual. Designed for the beginner but includes a single key entry route for the professional. Supplied as firmware, the m/c driver routine alone is worth more than the price of BLOPROM-SP. No Personality Cards, or other additions, just a Spectrum. Several inbuilt safety features. Onboard Vpp generation. 28 pin ZIF socket. Cabled connector extender plug. ABS case **£89.95**

STATUS NO. OF SYSTEM —HEX
EPROM TYPE —27128
RAM START ADDR —4000
EPROM ST. ADDR — 0000
JOB LENGTH — 4000
TASK — CHECK

WHICH TASK DO YOU WISH TO DO
W) CHECK THAT EPROM IS CLEAN
X) READ THE CONTENTS OF EPROM INTO RAM
Y) BLOW AN EPROM WITH DATA FROM RAM
Z) VERIFY THAT EPROM DATA IS THE SAME AS IN RAM
Q TO QUIT R TO RESTART

FAST CODES AVAILABLE
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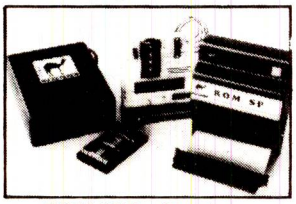

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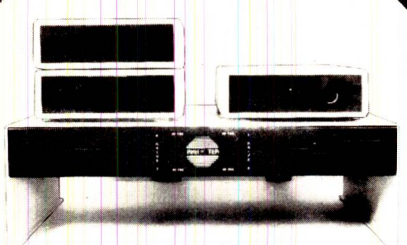

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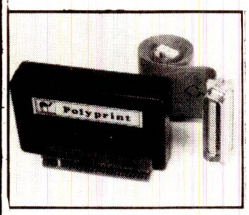

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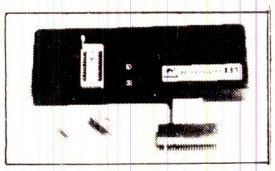

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EPROM ST ADDR — 0000
JOB LENGTH — 4000
TASK — CHECK

WHICH TASK DO YOU WISH TO DO
W) CHECK THAT EPROM IS CLEAN
X) READ THE CONTENTS OF EPROM INTO RAM
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Z) VERIFY THAT EPROM DATA IS THE SAME AS IN RAM
Q TO QUIT R TO RESTART

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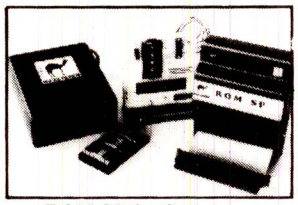

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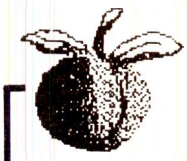

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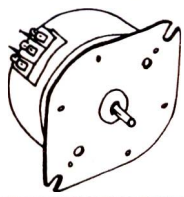

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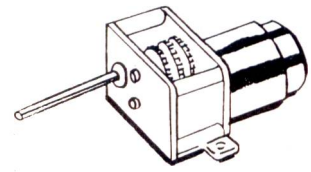

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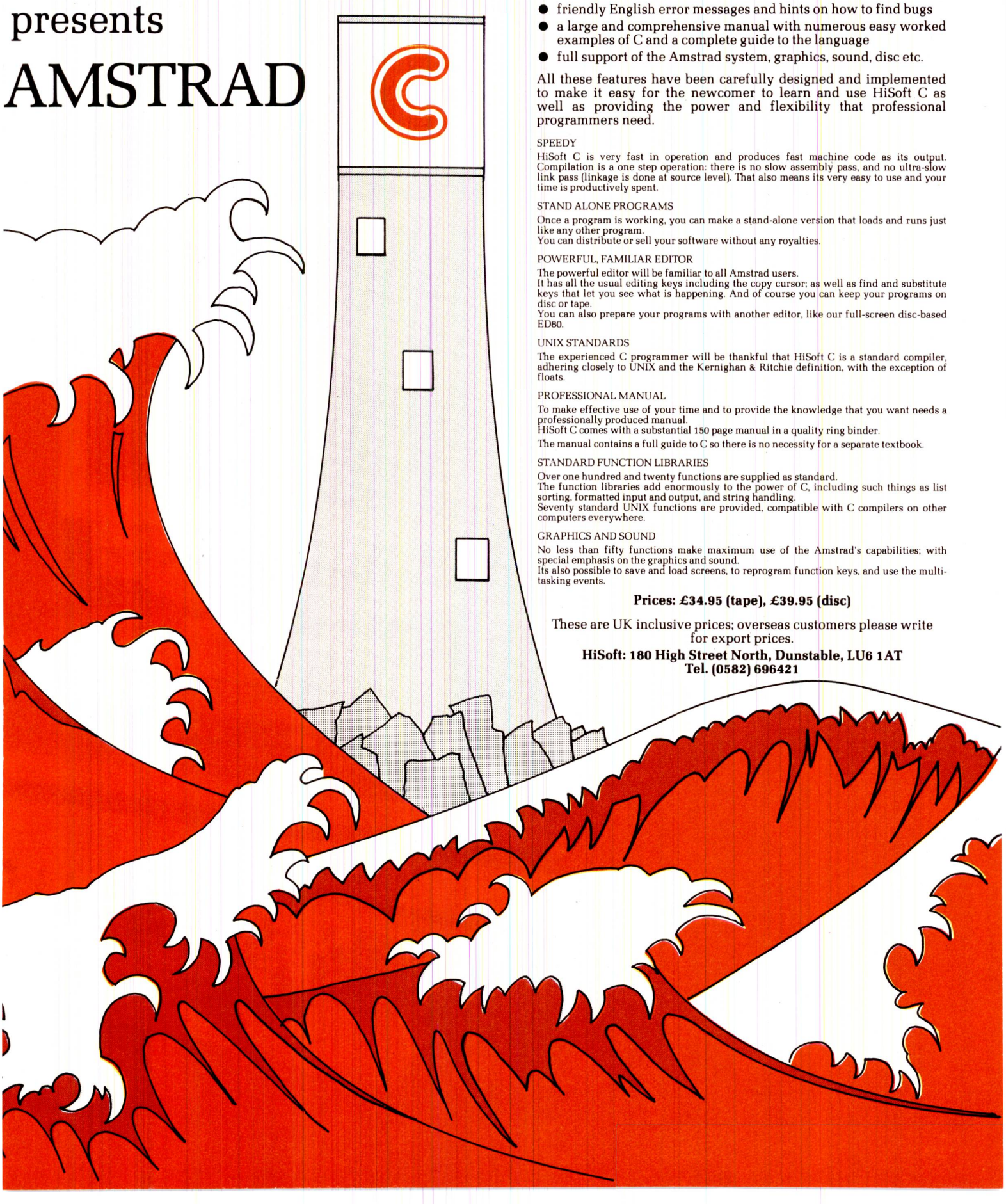

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- a built-in editor using the copy cursor just as BASIC
- a conversion guide making available in C all the functions familiar to a BASIC programmer
- a unique "direct-mode" allowing you to test out programs exactly like BASIC
- friendly English error messages and hints on how to find bugs
- a large and comprehensive manual with numerous easy worked examples of C and a complete guide to the language
- full support of the Amstrad system, graphics, sound, disc etc.

All these features have been carefully designed and implemented to make it easy for the newcomer to learn and use HiSoft C as well as providing the power and flexibility that professional programmers need.

SPEEDY

HiSoft C is very fast in operation and produces fast machine code as its output. Compilation is a one step operation: there is no slow assembly pass, and no ultra-slow link pass (linkage is done at source level). That also means its very easy to use and your time is productively spent.

STAND ALONE PROGRAMS

Once a program is working, you can make a stand-alone version that loads and runs just like any other program.
You can distribute or sell your software without any royalties.

POWERFUL, FAMILIAR EDITOR

The powerful editor will be familiar to all Amstrad users.
It has all the usual editing keys including the copy cursor; as well as find and substitute keys that let you see what is happening. And of course you can keep your programs on disc or tape.
You can also prepare your programs with another editor, like our full-screen disc-based ED80.

UNIX STANDARDS

The experienced C programmer will be thankful that HiSoft C is a standard compiler, adhering closely to UNIX and the Kernighan & Ritchie definition, with the exception of floats.

PROFESSIONAL MANUAL

To make effective use of your time and to provide the knowledge that you want needs a professionally produced manual.
HiSoft C comes with a substantial 150 page manual in a quality ring binder.
The manual contains a full guide to C so there is no necessity for a separate textbook.

STANDARD FUNCTION LIBRARIES

Over one hundred and twenty functions are supplied as standard.
The function libraries add enormously to the power of C, including such things as list sorting, formatted input and output, and string handling.
Seventy standard UNIX functions are provided, compatible with C compilers on other computers everywhere.

GRAPHICS AND SOUND

No less than fifty functions make maximum use of the Amstrad's capabilities; with special emphasis on the graphics and sound.
Its also possible to save and load screens, to reprogram function keys, and use the multi-tasking events.

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These are UK inclusive prices; overseas customers please write for export prices.

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The Canon A-200 has already made its mark as one of the best value IBM compatible PC's of 1985. Because so many extras are standard. Like an 8086 processor and a 16-bit data bus to make it quicker thinking. Like built-in Centronics and RS232C interfaces, leaving more free expansion slots for peripherals and local area networking. Like a basic memory of 256K, expandable to 640K, to make it harder working. And as if twin 360K disk drives weren't enough, you now have the option of the

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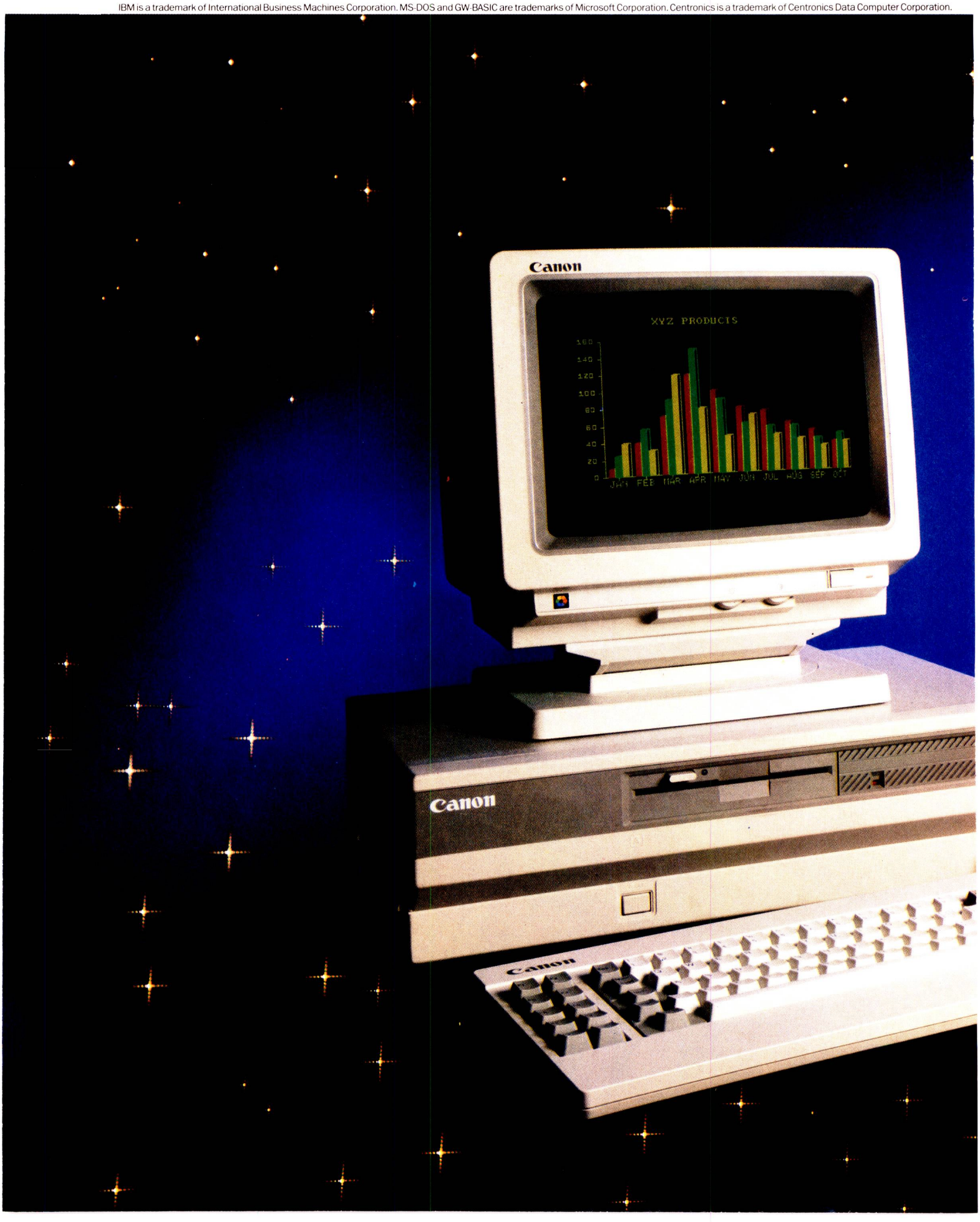

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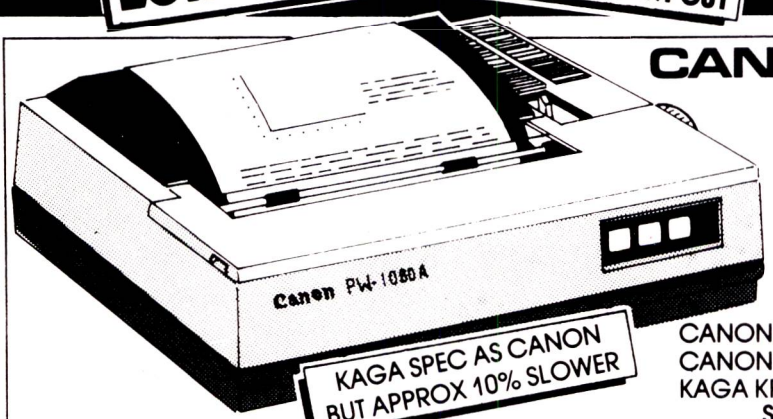

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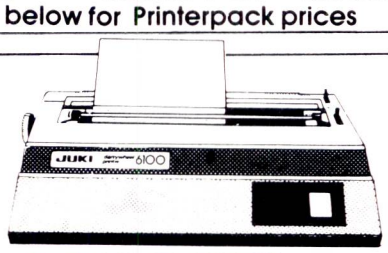

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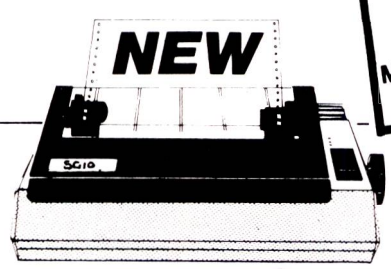

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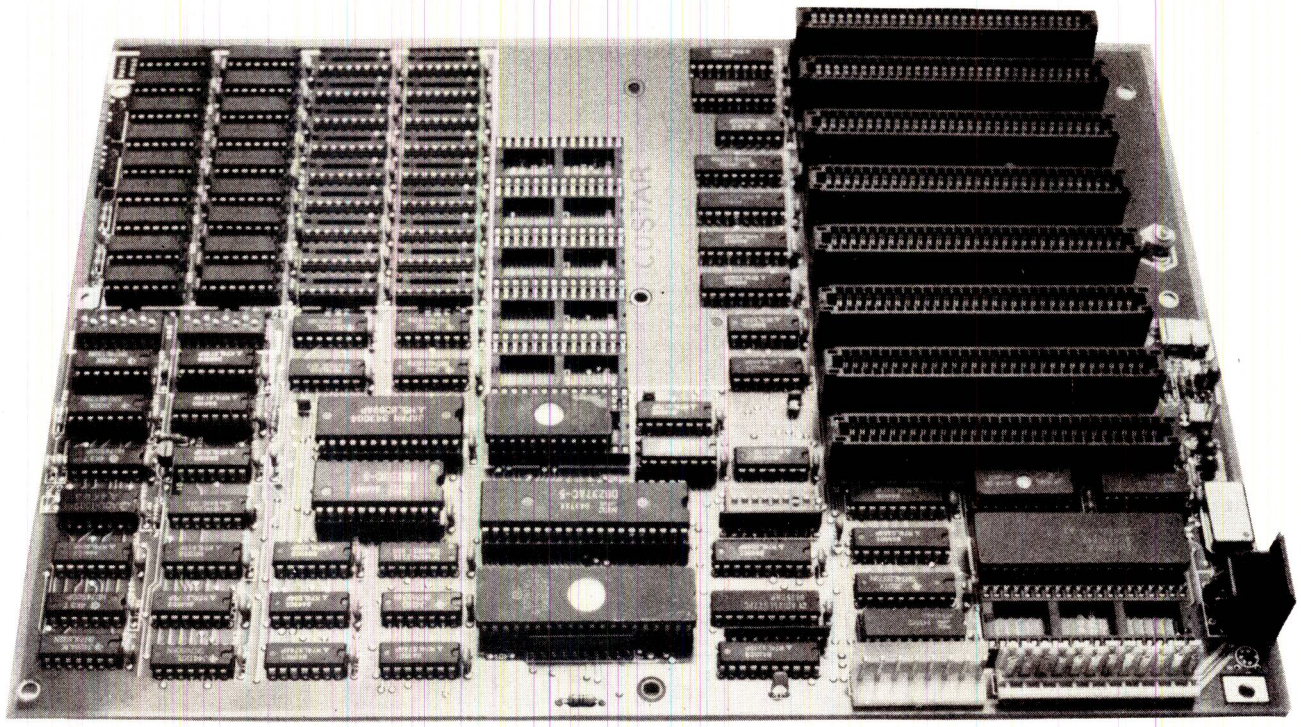

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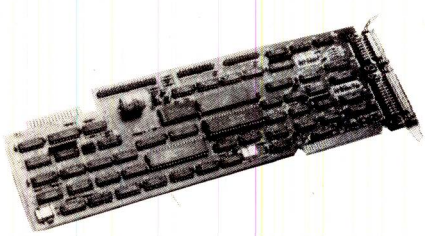

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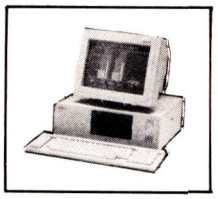

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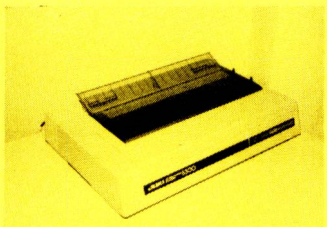

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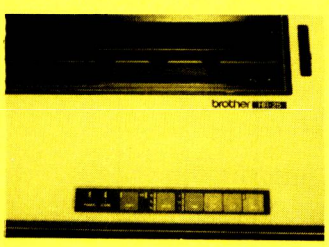

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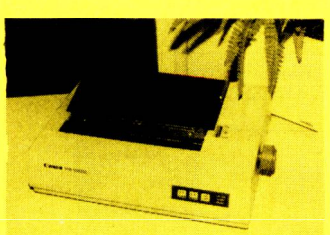

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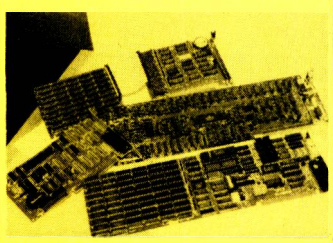

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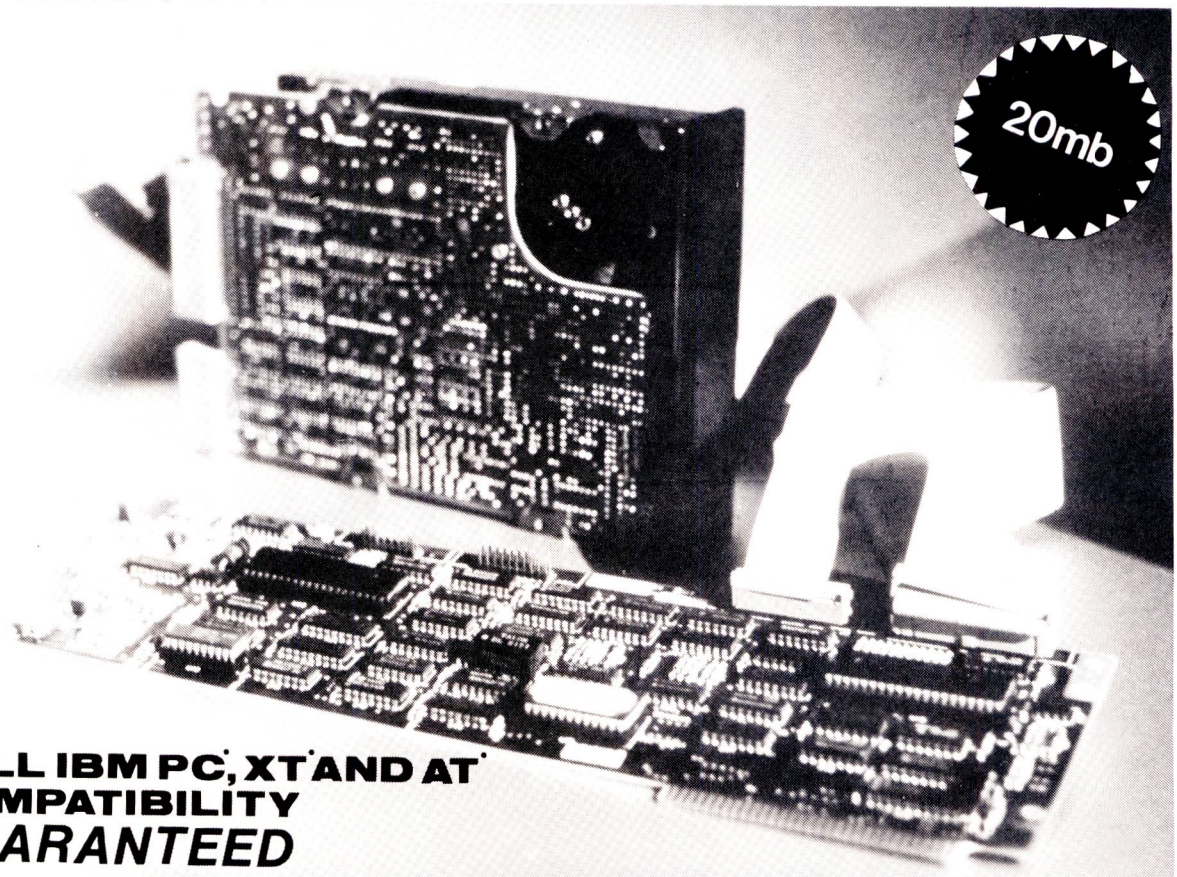

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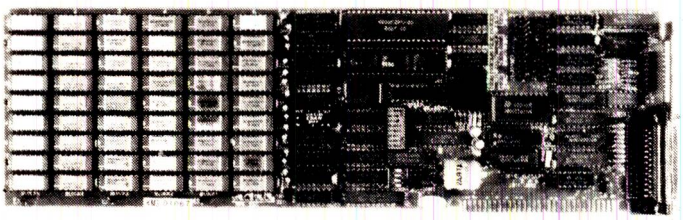

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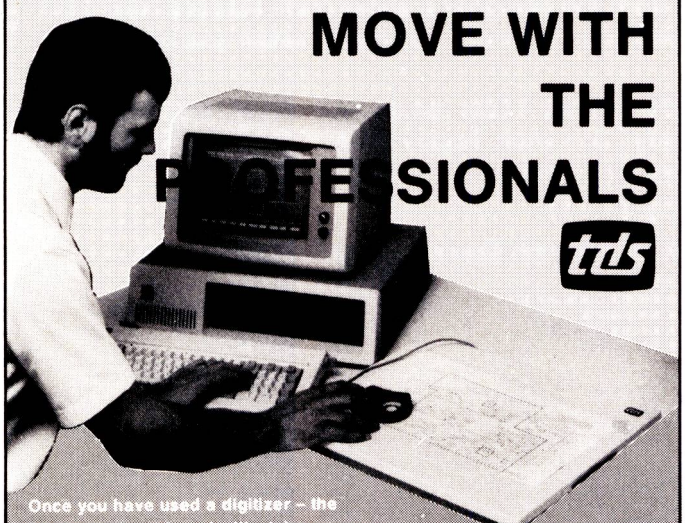

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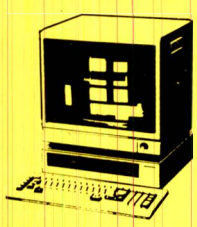

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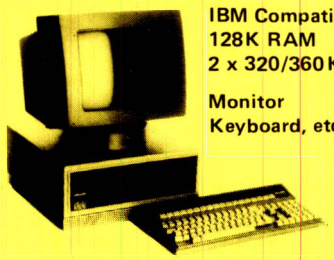

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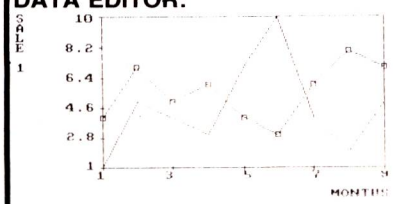

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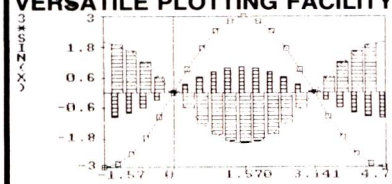

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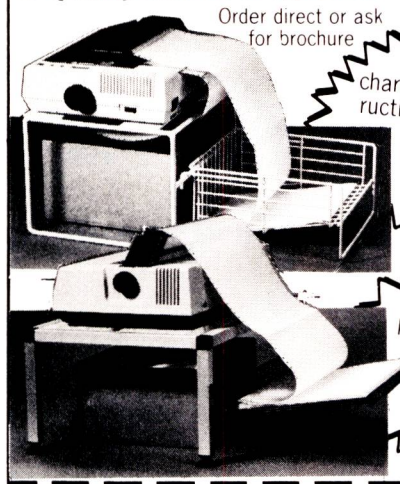

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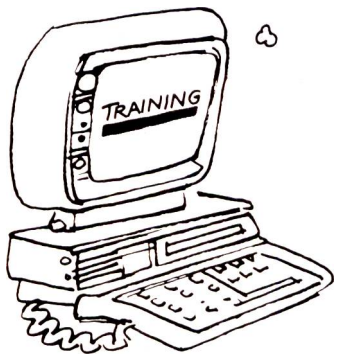

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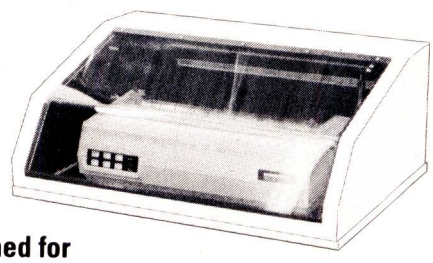

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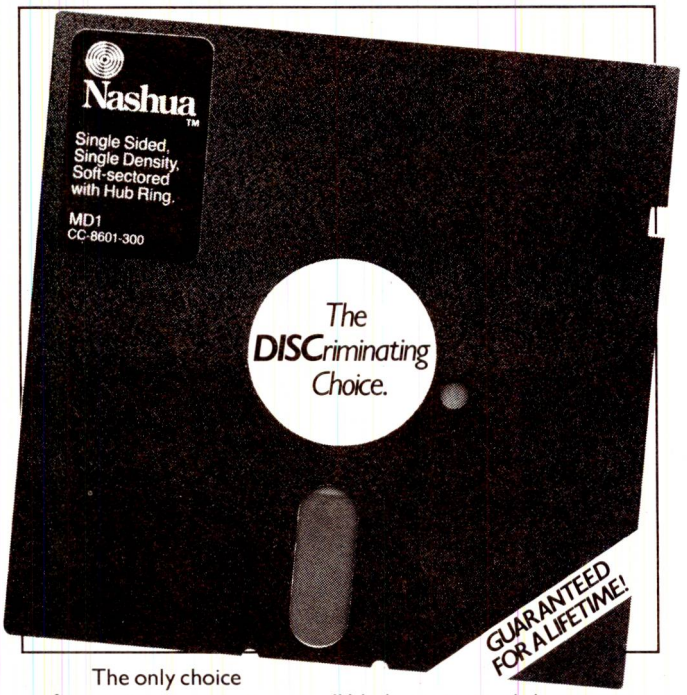

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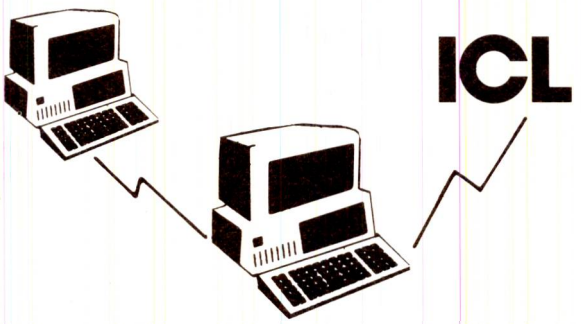

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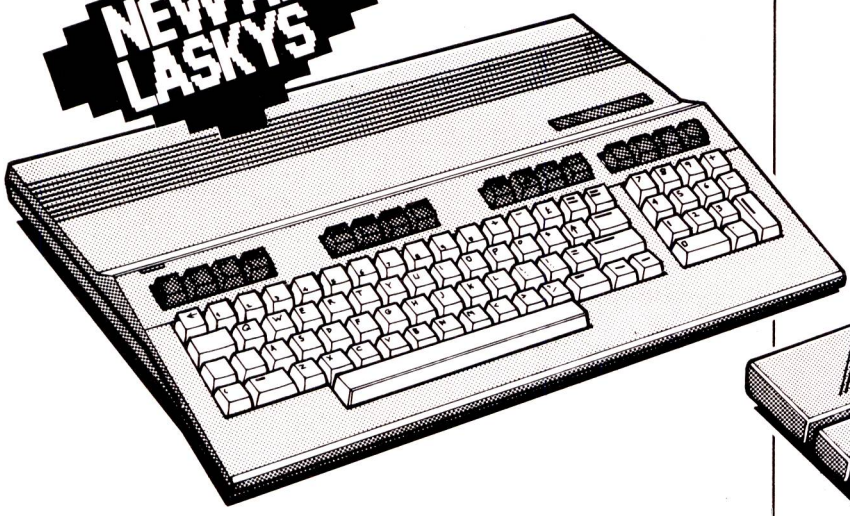

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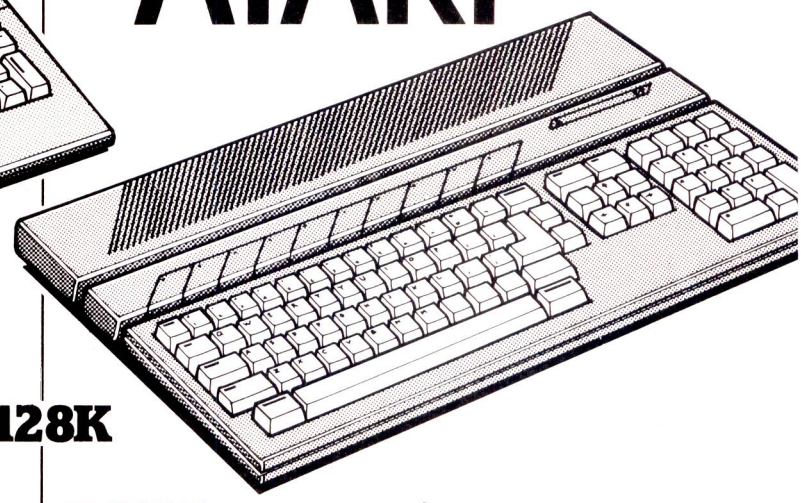

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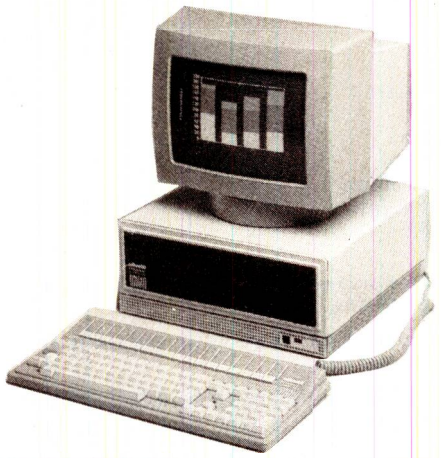

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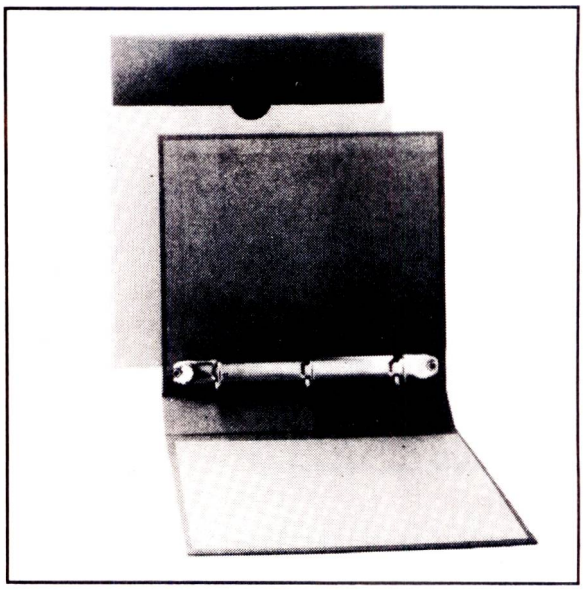

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NEWSPRINT



There's dissatisfaction and unrest in the industry: the information technology 'revolution' is all but abandoned and Acorn undergoes more financial reshuffling. Guy Kewney brings you the news that counts in the industry.

The Cinderella syndrome

Only a year ago, if you knew about computers, you could walk confidently into any cocktail party in the land, your only fear being that you might become a victim of 'doctor syndrome'.

These days, with the collapse of Acorn (twice) and Sinclair (only once at the time of writing) even the Alvey programme, designed to put Britain up there with the US and Japan, is a Cinderella project, almost certain to be abandoned.

Doctor syndrome is what makes doctors pretend to be someone else at parties. If they reveal their medical background, people begin a conversational gambit of talking about the only thing they have in common — their symptoms, in the belief that this will be of interest to the doctor.

In the data nut's case, this involved being asked, earnestly, by anyone he met, whether they should buy an Apricot or an IBM, a Spectrum or a Commodore, and what was Sinclair going to do next?

But now, trying to start a conversation about computers is as popular as complaining about Bill Smith's smelly underwear at Bill Smith's funeral. People may do these things, but you don't talk about it in public. Compact disks, however . . .

This would be merely amusing if it weren't so serious.

Two years ago, everyone 'knew' that computers were vital to our future. Informaton Technology, they said, would be an essential part of Britain's economy in the year 2000.

On the back of this fairly obvious economic prediction came a lot of populist headline grabbers. Sir Clive, a folk hero if ever there was one, spoke plausibly of a 'golden age' where we all had electronic slaves, and endless leisure in which to sell the creative fruits of our brains. Politicians spoke of new, non-polluting industrial bases, with workers based in their comfortable suburban homes, communicating by terminal.

And all this tommy-rot went unopposed by the information technology world because it seemed to be good propaganda.

Well, the rubbish has been exposed as rubbish. As a result, the world now assumes that the information technology revolution was rubbish, too.

Alvey, for example, was one of the nastiest, most cynical swindles ever perpetrated by a bunch of conmen on each other. The people involved in research reasoned that if the Alvey project were started, then it would be unstoppable, so they agreed on a program which, they all knew, was largely a hotchpotch of existing research.

The Government, equally cynical, approved the Alvey Research program — but, not deceived, devoted almost no money to it. What! you cry, no money? Hundreds of millions of pounds have been spent!

Well, yes, but that was all in existing budgets. Almost no new money was put up. And now that Alvey has allocated its budget, it is clear that information technology is no longer something the Government feels it has to do, so it isn't going to do part two.

The result is simple: what little research we were planning to do into the future, we have abandoned.

Companies such as GEC, Acorn, Plessey and all the other household names in this field have been dragged into cul-de-sac projects which were never, ever, going to lead to the establishment of new industries.

Brian Oakley, head of the Alvey directorate, calls this a 'pseudo-problem' because it isn't his problem. 'The Alvey programme was designed to prime the pump of research and development,' he says, 'and so it isn't a valid criticism to say that there is no "pull-through."'

Pull-through, it seems, is what Japan is good at, with hundreds of big industrial manufacturers eagerly snapping up the results of advanced research and turning them into cheap products which swamp Western markets.

Critics say that there is quite enough pure research already done in the UK, and that pull-through is what is desperately needed. Oakley says perhaps so, but that isn't his job (and he's right) and anyway, the simple research side is critically under threat.

But what hope is there of 'pull-through'?

Acorn was supposed to be proof of the fact that British ideas, given a go-ahead, live company to push them could turn into a rival to Apple. Acorn turned out to be proof of the fact that British ideas, backed up by a complacent Establishment (BBC, Department of Industry, Department of Education) would quickly get stuck in a backwater.

This isn't something that only the British can do. Apple in the States is blaming its troubles, as is Acorn, on 'the collapse of the market', which is, of course, true. It would be equally true to say that the market 'collapsed' when too great a load was placed on it — it was expected to magically transform old, out-of-date equipment into something which would fulfil the dreams of every schoolchild.

In the States, however, there is a thing called the Strategic Defense Initiative (SDI) or 'Star Wars'. This may or may not bring about the end of America, strategy, space and all human initiative, and it almost certainly is a ridiculous dream.

Before it is exposed for the fraud most serious scientists believe it to be, though, the many science and information technology companies who are being given money to look into the ways and means of using lasers to shoot down missiles, will have advanced their technology enormously — and profitably.

In 10 years, I confidently predict, we will have to watch parliamentary lobbyists and ministers parading their new-won reputations as Information Technologists — recommending this and that for the Good of the Country — and these experts will be the same type of conmen who do the job today.

That is to say, they will have made a couple of million pounds selling fascinating



Announced just a week too late for inclusion in my Benchtest of new lap-held portables (page 144) this new version of Hewlett-Packard's Portable 110 has more memory, a bigger (25 lines) LCD screen, but no diskette.

The diskette is in the lower of the two accessory boxes shown. I print this picture to show, rather sadly, how well-engineered HP products are in one sense, and yet how misdirected some of that engineering is. The 3½in Sony drive can be squeezed into a box small enough to fit in your pocket, so as an accessory for a portable, HP puts it in a box bigger than the micro itself.

The price of this model, by the way, is £2395.

hardware to British enthusiasts, which they were clever enough to import from the States.

The stuff will all be dazzlingly innovative, and useful. And everyone who gets one can guarantee their friends will turn green with envy, because it is so much more clever than the toy robots that the rest of us will be playing with.

And it will all be supplied by those American electronics firms who will owe their existence, and the technology behind their existence, to Star Wars.

Mind you, by then, we will probably only have a couple of hundred people in the country rich enough to afford the stuff.

Acorn lifeline — survival plans

Acorn aims to sell more machines abroad and more software for machines other than its own. That's putting it rather bluntly, but those are its short-term plans for survival. There's also the Acorn Cambridge Workstation, based on National Semiconductor's 32016 and bundled with a wide range of languages.

Longer term, there's the promise that Hermann Hauser's and Chris Curry's pet projects will reach fruition, but neither of the company's original founders were saying much about these at the time of going to press.

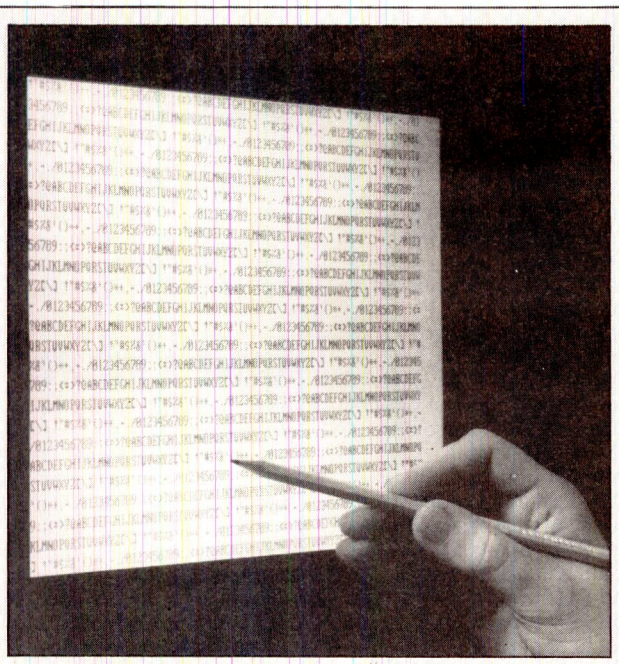
Their combined holdings in Acorn went down to 14.5 per cent from 37 per cent in the July bout of financial reshuffling, while Olivetti's went up from just under 50 per cent to well over 79.8 per cent.

The threat that the company would otherwise go into receivership meant that better terms were also struck with its creditors — and with the BBC which has agreed to reduce the royalty it receives on each machine sold. But there's still no plans to drop the price of the BBC or BBC+, although don't be surprised to see the former disappearing and being replaced by the latter.

Mine not to reason why, perhaps. That's the problem of the new group managing director Brian Long. He joins Acorn from the Canada Development Investment Corporation, and before that the tractor people Massey Ferguson. Along the way he's acquired a midatlantic twang which at least serves as a reminder that it's Acorn's Paolo Alto site on which Hermann Hauser is pinning some of his hopes.

There is still, they say, hope for the UK, too. While staff levels here have been cut from 450 in February to 275 in July, central research is meant to be continuing undisturbed.

There's still the immediate problem, though, that led to this year's second crisis. And that's that turnover fell in the first three months — and then fell some more in the second three months.



The impressive LCD screen shown here is better than the LCD on any computer you've seen. It has a contrast of seven-to-one, say the designers, and I'd give a lot to see one next to the portable LCD screens I've had the 'pleasure' of viewing recently (see my Benchtest in this issue).

The difference between this display and most conventional types of LCD is simple: instead of flickering, it's a constant.

Standard Telephone Laboratories has developed this one (called 'smectic A' type) because it seemed likely, back in 1977, that it might be faster than the alternative being considered in most laboratories at the time.

When they put it together, however, the engineers found that it was a 'storage display' — any pixel switched on, stayed on until switched off.

What you don't realise when watching a normal screen (both CRT and LCD are the same) is that it is flickering.

The electronics that drive the display can only turn on one pixel at a time, and hope that it stays dark long enough to be visible when it finishes scanning all the other pixels and comes back round to the first one again.

The bigger the display, the more pixels. And the longer it takes to get back to the first one makes it fade a bit more.

STL engineers reckon that if you have 620 by 100 pixels on a screen (not specially high-res, by computer standards) then you can expect contrast at a 'barely readable three-to-one'.

The result of this kind of technology is simple: the progress made in LCD has been so fast as to make the advances in microchip design look retrograde.

A computer based on the display technology of two years ago (which is what we have on the market today) is almost unsellable to a buying public which is aware of what LCDs like this one can do.

Criminally inclined — a report

Alistair Kelman tells me that he has become 'more criminally inclined' in the last couple of years, and is focussing his attention more on the micro business.

Kelman is a barrister with some skill in acquiring public attention, and his latest focus is micro crime, particularly the ease of using micro accounting software.

His most positive contribution in a long report on Computer Fraud in Small Businesses (from The Economist Intelligence Unit) is a questionnaire. You hand this to your accountant, and use it to assess whether he is competent in the use of computers. His report also reviews some security devices available to micro users.

The report does cost £60, but anyone with any doubts about legal requirements in relation to accounting software would do well to see a copy.

Video training

With the announcement of the Commodore Amiga's ability to read video images in, as well as pump them out, many people will be getting excited about training.

They will want to emulate Sage Productions, which links micros to video disks, and use the combination to train personnel, for example in the British Steel Corporation.

Sage Productions specialises in this 'interactive video' field, with the computer asking questions about the video recording, and playing (and replaying) marked sections of the disk until the pupil gets it right.

Sage dosn't use the Amiga (yet) but you can find out what micros it can link VHD disks to, on (01) 935 1423.

Advanced graphics

The first sign that IBM's Enhanced Graphics Adaptor card might be of real use has come with the introduction of a new word processor, which can display 43 lines onscreen instead of the usual 25.

The reason this word processor should be taken seriously is that it is not really new, just a new version of the very popular Volkswriter Deluxe version 2.2.

The price of the new version remains the same, but as well as having the big screen option, it will now work under TopView (IBM's multi-tasking 'window' environment) which means you can run three copies of Deluxe at one time on a 640k system.

It's also supposed to run faster — from 20 per cent to 80 per cent faster, depending on what you're doing.

In the States, dealers are

being encouraged to offer free upgrades to anyone who bought version 2.1, so encourage your own dealer to offer you this if you buy the earlier version.

Free Gold

After several people have offered very cheap membership of electronic mail systems to encourage people to join, Olivetti has announced a similar deal — free Telecom Gold subscriptions. They go to anyone who buys Olitalk, a communications program for the M21 and M24 micros. From that (and from the fact that they haven't announced the price) you can deduce that the software is not cheap.

Details on (01) 785 6666.

QL Doctor

Anyone who snorted with surprise when Sir Clive announced that his microdrives were 'the most-used storage media' in the computer business recently, will be very glad to hear of a little program which you can use to fix cartridges when they go wrong.

The program is called Cartridge Doctor, and is designed to recover information from corrupted microdrives.

Of course, this hardly ever happens (!) so you probably won't need me to say that Talent Comptuer Systems is in Curran Building, 101 St James Road, Glasgow, G4 0NS, tel: (041) 552 2128, or that Doctor costs only £21.95.

Rude word search

The news that bulletin board managers are trying to eliminate a rising tide of obscene graffiti (mentioned in a recent edition of *Telelink*) reminds me of an object lesson in the hazards of such a drive experienced at the Science Museum some years ago.

The solution to private bulletin boards with disks cluttered up with explicit references to private parts is to incorporate a 'rude words editor' which looks for all the rude words you know, and flags the message containing them for the operator.

It still means work, and there is the problem of (for example) finding innocent references to American layabouts censored by a mindless program which considers that this is a mention of the *gluteus maximus*.

At the Science Museum, once, there was a demonstration of the wonders of Information Technology, which was a display terminal that would tell you how to get to any part of London on the Underground.

It would chattily ask you for your name and ask where you wanted to go, and from that would calculate a good Underground route, with the stations at which it would be best to change lines listed.

Schoolkids immediately began to identify themselves as 'Jesus Christ' or other less entertaining names, leaving the terminal displaying a message such as: 'Where would you like to travel to, Jesus Christ?' for the astonishment of the next visitor.

Complaints led to the compilation of a dictionary of rude words.

Apart from the ingenuity of kids who prefaced their anatomical references with the letter 'A', this too turned out to be a disaster.

The problem was that an unavoidable feature of the mainframe on which this system was held was its habit of 'dumping' files to terminals when things went wrong. The rude words file was dumped into the Science Museum.

Yes, I know I told this story about five years ago, but I thought you'd forgotten.

Apple's future

Plans to launch a new version of the Apple II — and make it look very like a Macintosh — may not be the retrograde step that many thought it was when leaked last month.

The new Apple is supposed to appear this autumn, with mouse, icon display and 3½in disk built in, making it virtually a new machine.

A report from the very highly respected market research company, Future Computing, in Texas, makes this drive look vital to the survival of the company — providing it will still run Apple II software, that is.

Future Computing reckons that American consumers planning to buy a home micro next year all speak of the Apple II as their first choice.

After that, oddly enough, IBM features as the highest choice — something like 32 per cent plan to buy the Apple, 26 per cent an IBM model. There are still a good number of PC Juniors on shelves, at shrinking price levels, and some of those appear to have someone's name on them.

It's unfortunate, isn't it, that at the time of the survey, no-one in the States knew what the Amiga was going to be like. I suspect that may change people's buying intentions — Future Computing specifically quotes people as wanting 'the power and memory capabilities of Apple and IBM'. The Amiga certainly would attract that kind of home buyer.



The Apple modem, sold with the Macintosh in the States, is a Hayes-standard device which will dial numbers if given instructions that would make the Hayes Smartmodem dial numbers.

The UK version, however, will be a different beast, and although it will obey Hayes dialling and log-on instructions, it won't always work with software that expects a Hayes modem.

The reason is simple: Hayes modems work either at 1200/1200 or 300/300 baud. In the UK, however, modems that access Prestel-style systems have to transmit slowly at 75 bits per second, but receive fast at 1200. Software such as MacTerminal won't do this.

If you buy the Apple modem at £295 plus VAT, you'll have to buy two communications programs: one like Vicom for Prestel standard V23 comms, and one like MacTerminal for ordinary 300 baud duplex work.

More travel, no portables

For rather more than the price of several cheap portable computers, you can now buy a report to tell you why you didn't buy one.

It's aimed, of course, at the manufacturers, who are missing out on this market, but it includes some useful insights into what people actually want from a computer.

The report comes from System Concepts (at £975 for the first copy) and suggests that, as 75 per cent of business journeys are made by car, there's less demand for an 'on-the-move' product than you might think.

What people really want (according to report author Ian Perring) is something with a new type of software.

'Business on the move is largely meeting and dealing with people,' he says, 'and travelling workers want a computer to improve the way they work, not just help with form-filling and memos.'

Perring reports that total sales of portables in the UK in 1984 barely made 30,000, with all of Europe only taking 85,000. With 12 million people travelling and working, that isn't good penetration.

His report covers market potential from 1985 to 1990, and details are available on (01) 636 5912.

The real thing?

Compaq truly believes that the IBM PC standard isn't of IBM's design but of Compaq's, and judging by the prices on the new machines, the company now expects to move into the AT market with the same modest philosophy.

The new AT-compatible machines, first revealed to the world in April and Benchtested in August's *PCW*,

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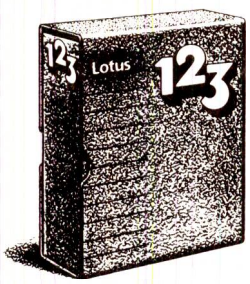
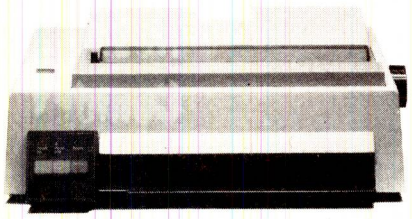
IBM XT, 10Mb Hard disk, 360K disk, 256K, mono display, async. comms. port, keyboard, DOS 2.1, (£3625): **£2895**
Compaq Plus, the portable with a 10Mb hard disk. 360K disk, 256K, dual mode display, DOS 2.12, (£3595): **£2895**





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include a simple floppy disk based version, selling in the UK for £3695 (that's either portable or desk-top versions).

Neither is much use as it stands, with only 256k of memory, a 1.2Mbyte floppy, and displays (plus keyboard, of course).

To use these machines, you either need a network or a hard disk. A hard disk version comes at £5195, including a more sensible 640k of memory. The portable has 20Mbytes for that price, the desk-top DeskPro giving 30Mbytes.

These machines are somewhat cheaper than the IBM equivalents, but not so much cheaper that you'd reel back, stunned by the disparity. Instead, the prices reflect Compaq's self-satisfaction with its establishment as a genuine alternative to IBM as a supplier of hardware — or, perhaps bravely, they reflect Compaq's intention to convince the world that the world does regard Compaq as The Real Thing, not just a cheap imitation.

Official growth

It's official, apparently: the home computer market — in the States anyway — is going to carry on growing.

According to very well-respected Frost and Sullivan (market research) the demand for consumer electronics is to remain strong 'over the coming years'. Part of this, the company says, will be a 30 per cent growth rate in home computers.

I agree, but I wish I thought it was quite as simple as F & S seems to.

The home computer market, it says, shows a trend to growth created by falling prices, with software being the most cheerful side.

'Dramatically declining prices remain the driving force. Market expansion, however, is contingent upon revolutionary, breakthrough software packages which will aid the hardware market.'

What actually will happen, I suspect, is that a new generation of (paradoxically, more expensive) hardware will drive this 'revolutionary, breakthrough' software.

I think that people will fork out more, not less, for a home computer which is useful.

This isn't a fashionable view, however. Every 'expert' today worth his five minutes of TV time will assure you that there are no home information applications, and it is all a matter of waiting for central heating control.

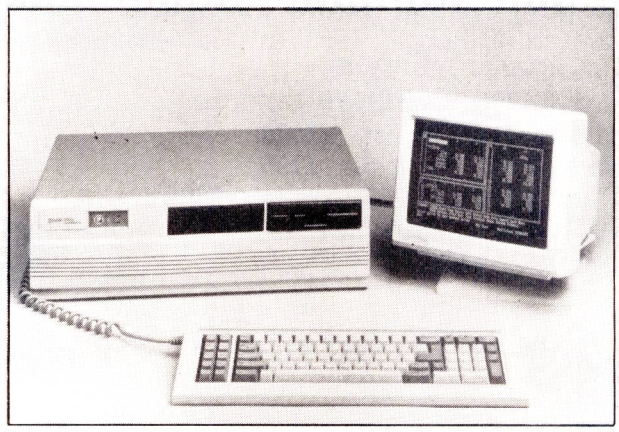
Any expert who tells you that has obviously never tried doing something as low-tech as wiring the house he lives in for electricity. Just putting cables down the walls and under the floors of the average house is a job that takes skilled plasterers, carpenters and decorators a couple of days to sort out. Try installing a phone system and you'll see.

People do have genuine home information needs, but no computer currently on the market can make the management of this information possible. Too much time is spent on data entry, too much effort is needed to operate the software, and it all takes too long.

But never imagine people don't need the information. The only reason you don't know what your bank balance is, is that you have no way of finding out. The only reason people pay too much tax is that the effort of working out what it ought to be is more costly than the possible saving. The only excuse for people showing up on the wrong night for a dinner party is that they have two unconnected diaries, and you can bet that people would write more often if they could find names and addresses without a half-hour search.

Stop thinking about 'programs that you can load to tackle these problems', and start wondering how these information sources can be automatically held and updated on a home computer, and you'll see any number of information tasks in the average home.

But not, I'm afraid, on the Spectrum/BBC/Commodore 64/MSX toy box of yesterday, nor even the QL, Atari ST, or equivalent of today. Think in terms of 20Mbytes of disk, several megabytes of RAM, automatic online access to information sources, and some type of expert system for household management in the background.



It now seems that the original versions of Zenith's imitation IBM PC won't, after all, cope with the Hyperram due to the Zenith provision of 320k instead of the more standard 25k.

The new models, released at the* PC User *Show, will apparently overcome this problem because they'll have 25k.

I hope to bring full confirmation in the next issue.

Realism strikes Comdex

After three futile years of brave words, the US's biggest conference, Comdex, has recognised the fact that it isn't going to be the biggest European exhibition — not, that is, if it coincides with established fairs such as Compec.

The organisers have therefore very cannily shifted the date to 12-14 May, which puts it neatly in competition with the Hanover fair.

Ah well, no doubt all the American companies who have faded away over the past three years (they've finally come to accept that Comdex Europe isn't Comdex Fall) will instantly return to the fold, now that they can move their stands from Comdex Europe over to Atlanta for Comdex Spring.

Those who want stands at next year's show should contact Comdex in Needham, Massachusetts, on (617) 449 6600.

Those who want to go to Compec, be warned that it's even bigger this year. According to the organisers, it has grown by 25 per cent.

It will run from 12-15 November at Olympia (not Olympia 2, but the main halls) and you probably have to be there if you are interested in business computing.

Details on (01) 640 8040.

Is DOS 4.0 worth the wait?

With an ominously familiar enthusiasm, suppliers of imitation IBM PCs are talking excitedly about a new version of MS-DOS, 'Version 4.0, which will extend the memory map of the 8088 up to the kind of capacity you can get on the PC/AT', due out some time in 1986.

It was around the time when the IBM PC and MS-DOS machines of that type were appearing on the market, that Digital Research started talking about a 'new version of CP/M which frees the Z80 from the memory restrictions by introducing paging of 64k pages'. That was CP/M Plus, which companies such as Commodore, Amstrad and the like are turning into a serious business operating system five years later.

There's a lot of enthusiasm (I produced a little, myself) for the new Intel/Lotus design of memory expansion, which does much the same thing.

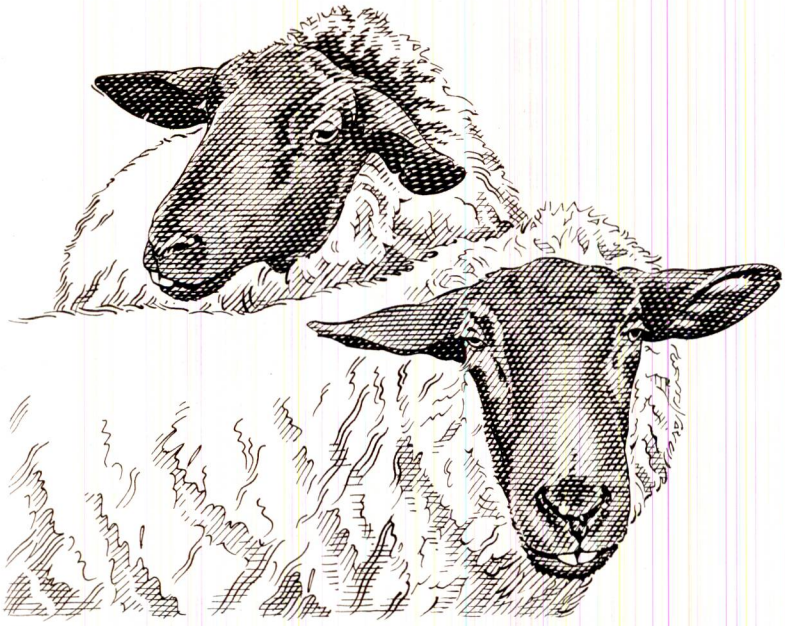
Fundamentally, this is likely to be a futile exercise.

If you want a powerful PC-DOS or MS-DOS machine, there are two ways of doing it. Firstly, you can buy one based on the 80286, which runs three times faster than the 8088 and which addresses up to 16Mbytes. Today, of course, that's a bit more costly because the 80286 chip is costly.

Alternatively, you can take your 8088 or 8086 and build the Lotus/Intel, plus the forthcoming DOS 4.0, operating system into an expanded memory system. It won't run any faster, of course, as it's the same chip.

DOS 4.0, I confidently predict, will not be delivered ahead of time. Software to use it, I equally confidently expect, will not be written before many thousands of users have bought it.

So why will anyone buy it?



"It must be IBM compatible."
"It must be IBM compatible."



"It must be exactly right for my needs but no more."

A small businessman stays in business by being smart.

So how come the thinking of so many becomes decidedly woolly when buying a micro computer?

"It must be IBM compatible" goes up the cry, when in truth, for small businesses, it needn't be IBM compatible at all.

Sanyo's MBC 550/555 range will handle the needs of a growing business superbly well. Cost accounting, stock control, payroll, forecasting, even the dreaded VAT. No problem.

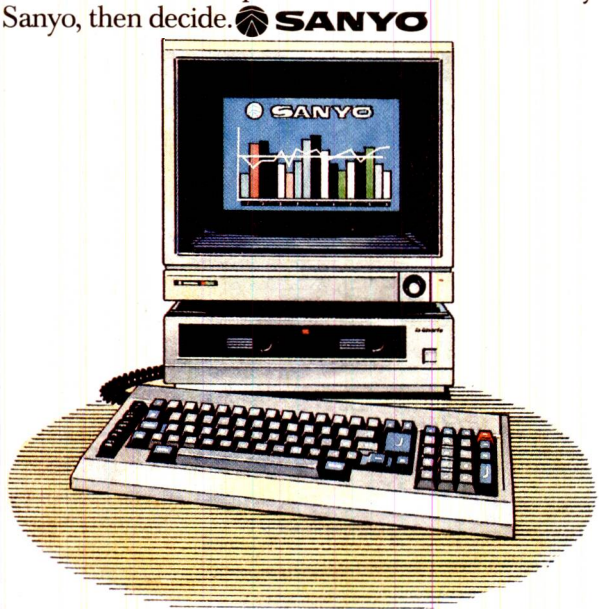
And because they don't carry a superfluous function, they offer real savings.

The single 360K disk drive 550-2 is just £999 plus VAT, and that includes £300 of free software.*

The twin 360K disk drive 555-2 is just £1,390 plus VAT, and that includes £1,000 of free software.*

Both come with a 3 hour training tape and an opportunity to join the Sanyo Micro-Users Association.

So remember, when you're in the shops, don't be waffled off onto more expensive machines. Insist that you see Sanyo, then decide. SANYO



FOR FULL DETAILS OF THE ENTIRE SANYO COMPUTER RANGE WRITE TO SANYO BUSINESS SYSTEMS, SANYO HOUSE, OTTERSPOOL WAY, WATFORD, HERTS. OR PHONE (0923) 57231/57245.

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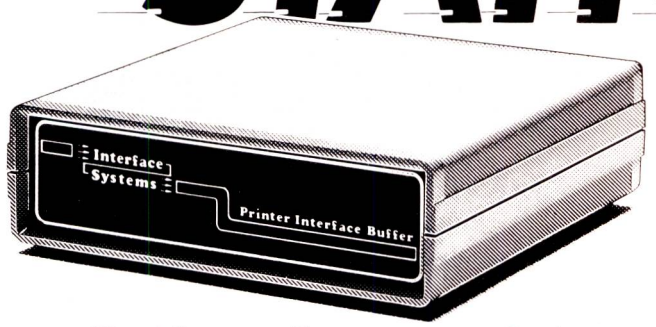

The Microway Express range of printer buffers and interface adaptors from Interface Systems by-pass all the old printer problems.

Like red signals in front of your workload when the printer's working. Or the fact that your micro can only go to one type of printer destination.

With one of our adaptors, though Centronics, RS232 and IEEE can all be stops on your line. If you need to make use of different printers or upgrade your present one, you don't have to spend a fortune in new equipment or hardware modifications.

And Microway Express buffers make better use of your time – taking text from your micro when it's ready to print. From 16K to a massive 272K they're ideal for mailing lists or long reports – you won't have to wait any more for printing to finish before you carry on working. And we even have buffered units which allow more than one computer to talk to the same printer – without any waiting!

Microway Express equipment is astonishingly low in price.

Adaptors start from just £78, buffers from as little as £140 (the basic 16K version) – and combined adaptor/buffers cost no more.

Naturally, we back up every buffer and adaptor with a full warranty – and advice on the best unit for your system.

Whatever your printer hold-up, Interface Systems have a Microway solution for it. Call us today.

Interface Systems

Interface House, 17 Eversley Rd, Bexhill-on Sea, Sussex TN40 1HA. Tel: (0424) 225683.

Northern Dealer, Interface Systems (Derby), Norman House, Heritage Gate, Derby DE1 1DD. Tel: (0332) 364303.

Share Your IBM PC...

...Add up to 31 Low-cost Work Stations!

The scene at the left is typical of many companies today. Employees standing around idly awaiting their turn on those expensive PC's. Computer **congestion** multiplying by the minute. Computer **confusion** in sharing disks and files.

Eliminate that congestion and confusion. Free-up those unnecessary employee "waiting lines." Share a common data base without loss of speed or efficiency . . . and valuable work time.

The choice is yours!

1 **Install a Network.** **(LAN)** Several software driven systems are available. But beware of the headaches – slow speed due to cable limitations and heavy costs. It may pay to heed the opinion of Tom Hogan, Editor-in-Chief, Business Software, "our experience has not been entirely positive." Call for reprints (Editors Page, June, 1985) and read for yourself the many pitfalls this publication has experienced.

OR

2 **Install an Advanced Digital PC-Slave** work station. Low cost. Faster speed (8 MHz) and no headaches!

The choice is obvious. Advanced Digital's PC-Slave concept allows you to add up to 31 low-cost "dumb" work stations to your IBM, PC, AT, XT, and the compatibles. Just plug Advanced Digital's PC Slave board into your PC expansion slot, a connecting cable, a low-cost dumb terminal and you're in business. Orderly work stations are readily apparent without employee congestion and confusion. Speed and performance are uninterrupted since only disk access is shared. Best of all, 2 to 3 work stations may be added for the price of an additional PC.

The next time you're standing around idly may be the best time to put the advanced technology from Advanced Digital to work for you. Start sharing your IBM PC today!

Advanced Digital Corporation also manufactures a complete line of S-100 single board computers and multi-user systems.

For more information and the name of the nearest dealer, call or write:

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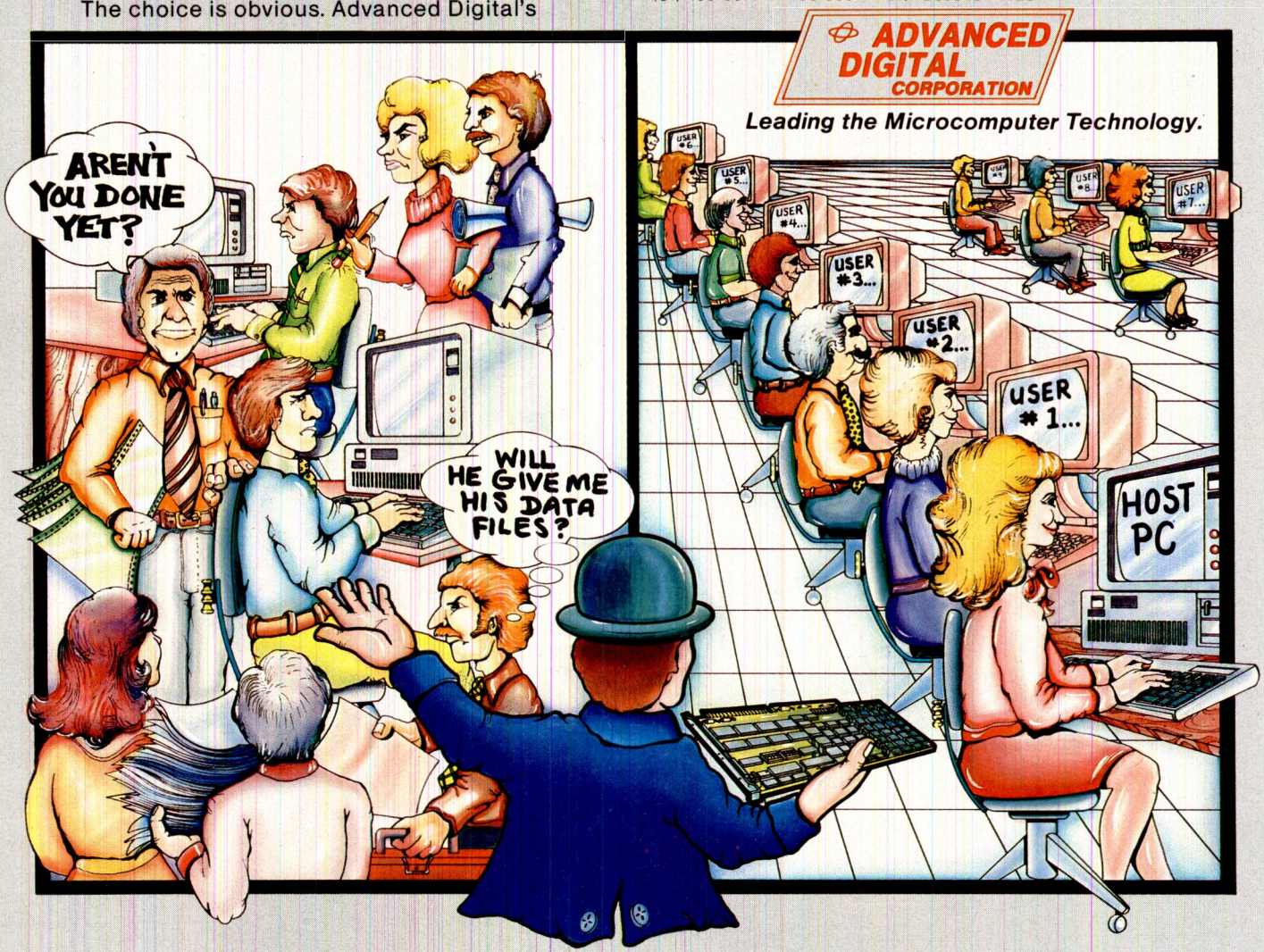

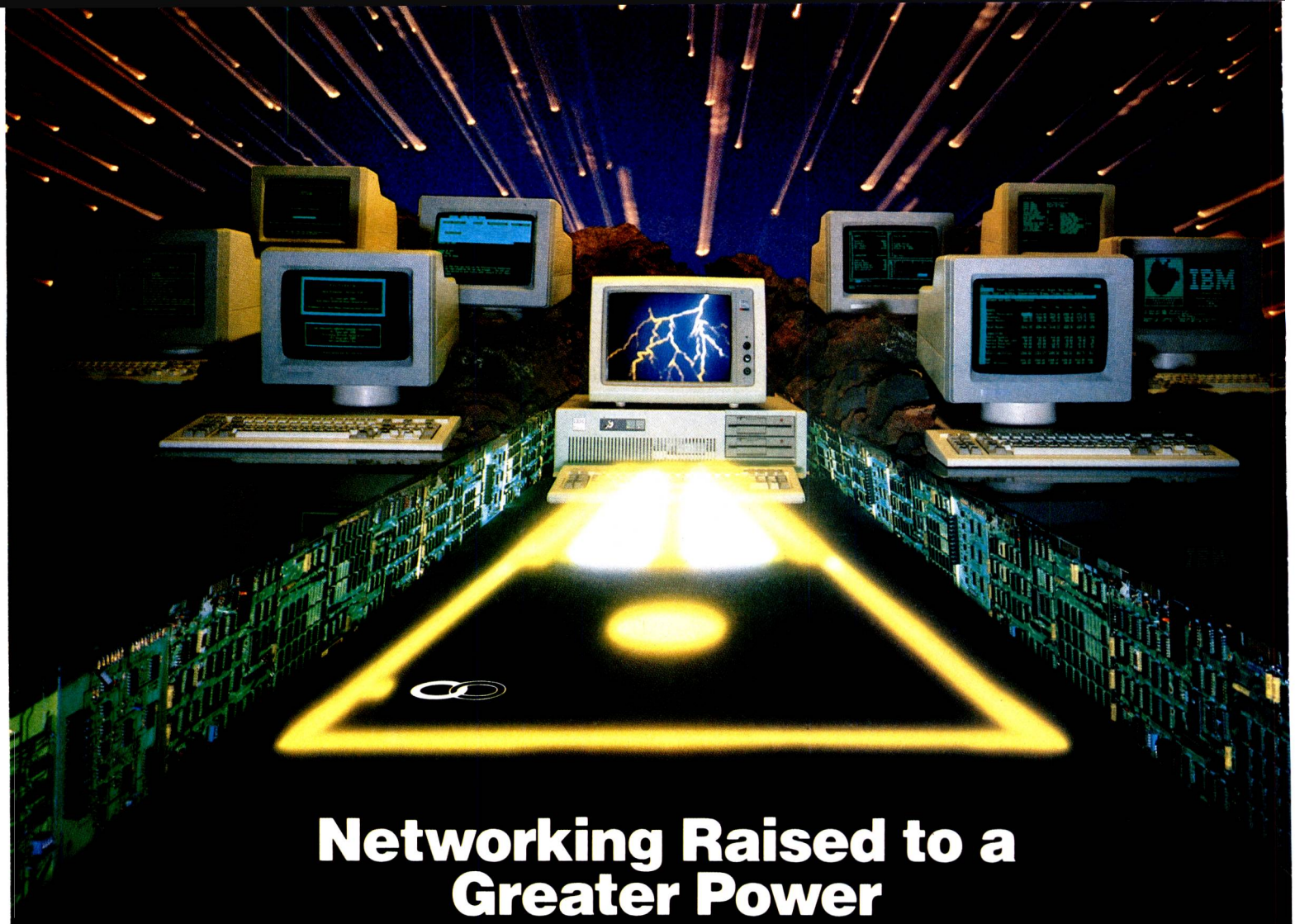

Networking Raised to a Greater Power

Advanced Technology. With it, IBM tripled the speed of the PC and increased its memory capacity five-fold. Nowhere is this increase in computing power more important than in networking situations. If the AT's technological advances have prompted you to look into a multi-user network, you owe it to yourself to take a closer look at MultiLink Advanced™ . . . a unique multi-tasking, multi-user networking system that runs programs under PC-DOS 3.0.

Eight Workstations for the Price of an AT. MultiLink Advanced™ represents the next generation in networking systems for IBM microcomputers. The system enables terminals, connected to a single AT, to emulate IBM-PC's having up to 448K of RAM (The PC-Shadow™ terminal, shown above, even has a PC look-alike, as well as work-alike keyboard and display).

This means that instead of spending £3,900 per workstation for a PC with a Megabuck "Network Interface Board," you can use inexpensive terminals . . . eight of which cost less than an IBM AT. Even if you need only one workstation connected to your AT, you'll realize significant savings.

MultiLink Advanced™ . . . Instant Access to All of Your Resources. Central to most multi-user situations is the need to coordinate a variety of printers. With what's been described by *PC-Tech Journal* as ". . . by far, the best print spooler for the IBM PC," MultiLink Advanced™ gives users the option to print either at their workstations, or at a central location. In addition, programs and files can be shared by multiple users locally or through use of a modem. Just think of it . . . having remote access to an AT with a lightweight terminal/modem.

Although designed to take advantage of the AT, MultiLink Advanced™ runs on all versions of PC-DOS, except 1.0, and certain implementations of MS-DOS. A wide range of leading programs are supported which include WordStar, dBASE III, Multimate, and Lotus 1-2-3.

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When, by the time it's on the market, the 80286 chip will be cheap, memory will come free with organic muesli, and 40Mbyte hard disks will be used as the basic system box?

One possible reason might be speed. It might be faster to keep all your data in a huge memory map, than to get it off disk (like a big spreadsheet) whenever you need more.

This theory, I suspect, is bunk.

Talking to software engineers who are trying to use the Intel/Lotus design, I hear horrible stories about how long it takes to load a spreadsheet from disk into a megabyte of memory.

In any case, the discussion is likely to be superseded by events in the next three years.

Fundamental to the design of the Intel 8086 family is the assumption that memory can only be accessed in 64k chunks.

Fundamental to the design of the next decade's software will be the assumption that data comes in variable length segments, up to four megabytes, in contiguous chunks.

In the meantime, by all means ask Emulex for details of its new, bank-switching memory board 'which supports the new bank-switching capabilities in Lotus 1-2-3 version 2.0, Symphony version 1.1, and Framework 1.1'.

I feel I ought to warn you that I haven't, as yet, seen a copy of Lotus 1-2-3 version 2.0, or of version 1.1 of Framework or Symphony.

Emulex is on (0344) 484234.

School viewing

There probably isn't any substitute for a regular visit, by parents, to the school where their children study, and regular conversations with the teacher.

However, for the parent with less time, or the parent who just doesn't like going to school (sounds silly, but some don't) the idea of dialling up the school computer and getting information might be helpful.

All of which is probably irrelevant to why Garth Hill, near Bracknell, has decided to put up a private viewdata system.

The school has spent a lot of time and effort getting computer technology working, and even more getting it publicised around the country — quite obviously, they enjoy working with computers.

The database on their private system includes information such as 'What's on at school?', including sports fixtures as well as opportunities for parents and teachers to meet. The school prospectus will also be on offer.

C is for Commodore

The language C which is now making such an impact in the 16-bit world is normally out of the reach of home micro users, so its appearance at £120 for the Commodore 64 is really quite exciting.

The C compiler for the 64 is one from a Canadian software house and imported by Dynamite Software; and (without having had time to test it) appears to be rather better than many more ambitious offerings for much larger sums.

For a start, this compiler not only compiles code, but provides an editor — 'a professional full-screen editor' — to create programs. There's a syntax checker which allows you to spot silly, unintentional errors from within the editor. For the perverse there's a text formatter, so you could, if you liked, use the editor for word processor work and format it for printing . . . and, of course, there's a linker and a list of library routines.

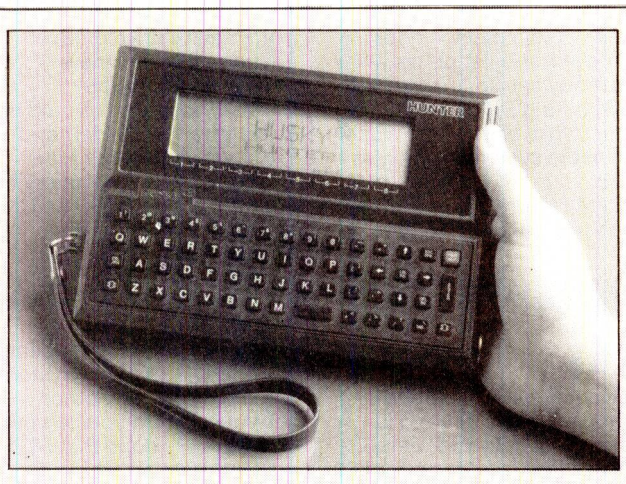
Some obvious limitations appear from the spec: the suppliers recommend having two disks, which few 64 owners will. And as the 64 doesn't have a disk operating system, this compiler has to provide one — what they call a Shell Program Manager 'which provides a proper operating system, similar to the Unix operating system used on larger business systems'.

Well, I know what the company is trying to say. It is suggesting that some of the commands used are the same as Unix commands — things such as CC for c compiler, ED for editor, LINK, SORT, and so on.

But Unix requires a 10Mbyte disk to hold all its routines, and on a machine with 64k of memory and a 100k disk, 'similar' is obviously not the right word.

On the other hand, as this compiler just produces native 6502 machine code, there is no 'library overhead' — it just produces code to run, without having to pull it in off disk.

Details from Dynamite on BCM 8713, London WC1N 3XX.



Out of a misguided sense of helpfulness, I've printed far more than I ought to of the interminable press releases sent to me by Husky Computers.

Every time they sell a few machines to a brewer who counts foam, or a gas man who walks along measuring pipe, or some rugged outdoor type who uses a Husky portable micro, I try to print (at least) a photo showing the thing — with the warning that this CP/M machine is quite expensive, even by lap-held standards.

Why did I bother?

'We are becoming very concerned about the way in which Husky Computers are being misrepresented in certain areas of the media,' whines a letter from the company's publicity agents.

'The particular aspect that concerns us is the emphasis on those applications such as military/offshore/sewer data collection, where the machine's rugged qualities are most obviously relevant.'

Tell you what, Husky, we'll do a deal. You stop sending the announcements and the pictures to go with the things, and I'll stop printing them. Better still, I'll stop printing them anyway.

Meet the family

I'm still waiting for ACT to produce an Apricot with the Intel 80286 chip inside it, but the range is obviously getting ready for a big brother machine to the existing models, and ACT has really set the scenery on the stage ready for this by announcing new 'marketing groupings' of the old machines.

We now have families of Apricots. There is the 'Gateway' family, which is the F1E (educational) and F1, starting at a very attractive £595 with a single disk and 256k.

Then there's the 'Collection' family, all 512k machines, one with a hard disk at £2295 (Benchtested in this issue), all with GEM bundled (plus Gem Write and Gem Paint).

The 'Professional' family is the old transportable Apricot (the one with the finger-severing handle), starting at £1595 for the original PC with two 630k floppies and rising to £4295 for the 20Mbyte Xi with 960k of RAM.

And finally, there are the 'Networks' — the Point 32, by another name, using MS-Net and starting at £5 short of £3000.

What is missing? Microsoft Windows. That's due out in August, say all internal sources, and really if Microsoft can't do it by then, it has lost its virtue for good.

It's a safe bet that ACT is saving its 80286 chip for the Windows announcement, and until Windows appears in software press releases as 'we support MS Windows', I'm afraid I shall adopt a wait-and-see attitude to the date of both new products.

Commercial Sabotage

On the IBM PC, I've discovered a little fact about GEM which no-one seems to know — that is, that Digital Research has sabotaged it.

Not seriously, just commercially.

What it has done is to produce GEM in specially tailored packages, so that the IBM PC version won't run on the Olivetti M24, or the Zenith 150, or the Eagle, or any other lookalike. Conversely, you can't take the Zenith version and run it on an IBM.

Try it, and it says, haughtily: 'This version of GEM will not run on this computer' and dumps you back into C>.

Digital Research, a little sheepishly, explained that it had done this on purpose. 'It allows our OEM customers,' it said unconvincingly, 'to sell a specially configured product.' It also, I suppose, cuts down piracy.

What makes it funny is that some reviewers seem to have been given specially 'patched' GEM disks which run on any computer at all. They were therefore unaware of the problem, which I wouldn't have discovered myself had I been a little less careless in describing my Zenith as an IBM XT.

It's the first program not to run, so I was curious. Zenith didn't know about it so I phoned Digital Research, which promised to send me a patched version.

'We include calls to the specific BIOS chips of each machine, which all differ slightly,' said an official. It isn't necessary at all: it's just done to make sure the program won't run.

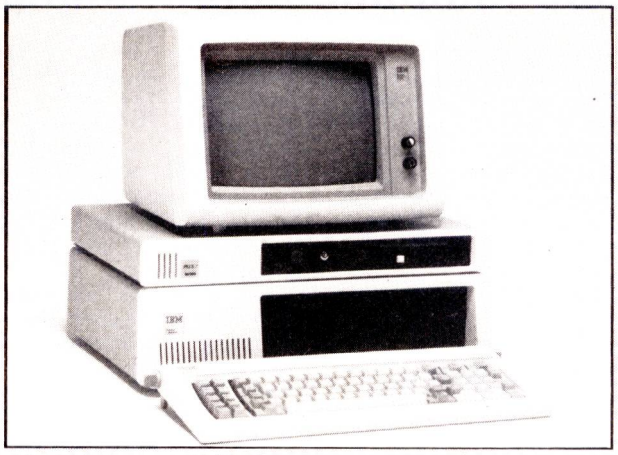
Of course, there is one possible other factor. Apart from a few programming languages, this is the first Digital Research program which doesn't require a version of CP/M to run. It runs under PC-DOS.

Digital Research has been warning us for years that PC-DOS is 'not related to MS-DOS,' and that true compatibility is provided only by Concurrent DOS . . . but that's probably quite irrelevant, I'm just being mischievous. Aren't I?

Switching knowledge

An unusual comms product — one to give *PC* users access to X25 networks — has been announced by Software Forge of Reading.

This package, the company says, 'is already approved for most of the world' and there is 'an extensive user base'.



The only obvious drawback to these neat, slimline Plus 5 hard disks is the fact that they are ideally tailored to the IBM PC. If you have any of the neater boxes that lookalikes come in, it'll look rather less fetching. Prices start (for a 10Mbyte add-on) at £1295, with hundreds of different options: for example, a 40Mbyte drive with a removable back-up cartridge would fetch £3645.

Details on (08926) 63211.

Most people who use packet switching networks don't want to know they are doing it. This package is for those who do, and who want to take full advantage of X25 networks such as PSS and IPPS to link into several virtual circuits.

As you'd expect, it doesn't come at hobbyist prices, with the ready set-up 'turnkey' PC-X25 costing £1000 (including a hardware board) and a user-definable system coming at £850.

Details from the author, KE Archer, on (0734) 508131.

Expensive price cuts

The cheapest turtle-style robot for use with Logo is Intergalactic Robots' Zero 2, now selling in kit form for £80.

The supplier, Maplin Electronic Suppliers, also sells the more traditionally Asimovian Hero, and this is apparently starting to look a bit pricely (at £1300 kit, £2200 assembled) by comparison, due to Maplin announcing price cuts.

No, those are the new prices, *after* the cut.

Hero's little sibling, Hero Jr, now costs £550 in kit form or £750 assembled, which, says Maplin, 'will make the product even more popular in the marketplace'.

Maplin now has a robot division to handle all this, and it looks a safe bet that people phoning up on (0702) 552911 will be using the name 'Zero 2' more often than 'Hero Jr'. I just hope they get a good, clear line.

It just shows you . . .

A month ago, I foolishly predicted that we'd never hear again from a new networking company, Banyan, because it would be so swamped with demand that it would have to hide.

Wrong! — the company has appointed agents. In the UK it's Future Technology Communications, a new subsidiary of FTS, which is bringing the Banyan network to market.

Banyan's network appears to link every network system in the world to any other network system you can think of, and I only hope that FTC realises what an amazing product it has got its hands on.

Details from Vince Blackall on (01) 669 1235.

Farming data

A brilliant idea has struck Dataday Services, a software company specialising in agricultural data services, which has noticed that there is an awful lot of agricultural software for micros.

It is not going to sell software: instead, it is going to advise its clients on which software to buy for various applications.

Its first review is of dairy herd management programs. 'The reviews are at two levels,' says the company, 'with Level One designed to help the reader draw up a short list of programs, with star ratings.'

Level Two provides a 'comprehensive and detailed examination of one program' which the reader selects from the Level One summary.

As the Level One review costs a mere £15 and the single-program 'in-depth Level Two analysis' is even cheaper at £5, I can hardly do less than recommend this, enthusiastically, to any farmers who are foolish enough to be computer nuts.

Details on (069 171) 3360.

Out of proportion

'Everybody using Logo has faced the problem,' comment Boris Allan and John Cunliffe in a new magazine, *Logos*. 'Which way is the turtle facing?'

The magazine is published by the British Logo User Group, and anyone who has thought of using Logo should get a copy.

The use of the language is starting to look like the type of enthusiasts' corner that micros were four years ago, and really, to have a magazine at all is quite remarkable.

To publish a quality (shiny paper, lots of pages) magazine like *PCW*, you need a rich industry prepared to buy adverts. Logo isn't a rich industry, and its mag is of a quality quite out of proportion to the budget available.

In the issue I received, apart from a very useful article on working out which way a turtle will move, there are things like announcements of local Logo conferences (Seymour Papert was billed as attending the Glasgow BLUG), guidelines for teaching ideas, technical help with unusual machines, book reviews, tips on the use of toilet roll tubes to add arms (or noses) to turtles, and even things a little bit like artificial intelligence.

Contact Richard Olney, London New Technology Network, 86-100 St Pancras Way, London NW1 9ES. END

Guy Kewney can be contacted on electronic mail. His numbers are Source TCK 106, and Telecom Gold 81: JDS018. The Prestel mailbox number is 01-802 2679.

KENDAL COMPUTING

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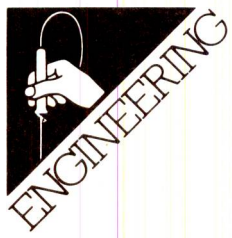





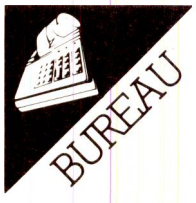

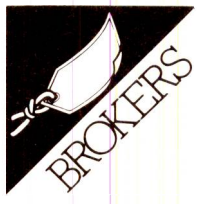



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YANKEE DOODLES



David Ahl rounds up the news from this summer's CES, and concludes that the home micro industry is far from dead.

Not all doom and gloom

From practically zero in 1978, the floor space devoted to computers and electronic games at the Consumer Electronics Show (CES) hit a peak at the 1983 Winter show. It has been downhill ever since and at the Summer 1985 show, one-quarter of the space originally allocated to computer manufacturers was reassigned to pre-recorded video producers.

Although the number of exhibitors was down, there was a feeling of guarded optimism in the air. Jim Levy of Activision felt that the inventory pipeline was finally clearing the enormous number of software packages ordered on the strength of the wildly optimistic forecasts of 1983-84. Although retailers had been burned badly, they are wiser for the experience and are now ordering in realistic quantities. Educational software manufacturers were the most optimistic of all, feeling that both home and school users were willing to buy quality software.

On the hardware front, Japan Inc decided not to show MSX. The only MSX machine commercially available in the US is the Hong Kong-made Spectravideo Express at £595, with 64k and built-in 3½in drive. Without MSX as a major force, the low-end of the market is wide open to the Commodore 64 and 128, Atari XL series, and Tandy Colour Computer. Without the spectre of a price war on the horizon, the second half of 1985 should be profitable for manufacturers and retailers alike.

On the other hand, the recent *Creative Computing* survey indicates that home consumers are moving up-market in their choice of machines. If only Apple would look beyond the business market it could probably sell lots of Apple IIs and Macs into the home market. But if Apple ignores the upper-end home market, it will be left open for the Commodore Amiga and Atari ST series. Following Apple's lead, Atari has been talking about the business market for the ST which is fine from a performance standpoint, but ridiculous for market penetration. Another machine that might have some limited potential in the home market is the Laser 3000 from Video Technology. This machine is now 90 per cent Apple compatible, according to marketing manager David Gish. It has 64k, built-in 32k Microsoft Basic in ROM, an 80-column display, double-density graphics (560 × 192 pixels) with six colours, a parallel printer interface, an RS232 port, RGB and composite video output, and a four-channel sound generator. Bundled with a single disk drive and Artsci's Magic Window II, Magic Memory, and Magicalc, the Laser will sell for about $500, but obtaining widespread distribution will be a problem for the company.

As for peripherals, I was impressed by the many inexpensive printers being shown by companies that had previously eschewed the home market: Epson, C Itoh, NEC, Star and others. Also being shown were several really innovative devices such as the Soniture Space Pen, a 3 D entry device; Kraft's Quick Stick, a joystick for the Macintosh; three computer interfaces to Tomy robots from Computer Magic; and 10 robotic/computing kits from Fischer Technik.

To the home market doomsayers, I can only repeat Mark Twain's retort, 'The reports of my death are greatly exaggerated.'

Improving education

In the mid-70's, educational software for microcomputers usually meant a translation of a program that had been running on a timesharing system with an ASR-33 terminal. By 1980, educational software had split into two branches: programs written by teachers with little or no knowledge of computers, and programs written by programmers with little or no knowledge of pedagogy. Now these two approaches are combining as larger, better financed companies put together teams of researchers, authors, and programmers under managers who have had experience in the education field.

Not all the new educational software from well-known companies is wonderful, but in general the quality is improving.

For example, many of the packages from Discovery Software, a World Book subsidiary, are impressive. Discovery has released 21 packages in three age ranges:pre-school, primary (ages 6-10) and intermediate (ages 10-13).

Random House has released a large selection of packages, mostly featuring licensed characters (the Peanuts gang, Garfield) and Fix It (the only one not based on a character). In this you assemble (or fix) a mechanism designed to get a ball from a chute into a cup using up to 50 elements.

A similar program using far fewer but more colourful animated parts is Creative Contraptions from Bantam. You can use up to 12 parts (pulleys, levers, springs, magnets, and so on) to assemble various contraptions.

Bantam is putting maximum emphasis on its line of interactive fiction. For ages 10 and up, it has released two titles in the Choose Your Own Adventure Series (Escape and The Cave Of Time), and for teens and older, two in the Living Literature Series (*I, Damiano* and Sherlock Holmes in *Another Bow*).

Interactive fiction seems to be the hot category this year. Two years ago these programs were known as adventure games, but that didn't have quite the right ring for the education field.

From Simon & Schuster comes Star Trek: The Kobayashi Alternative and from Mindscape Stephen King's *The Mist*, James Bond: *A View to a Kill*, and one for the Macintosh, Deja Vu.

Another popular concept is 'write your own story'. Woodbury has a series of four such programs: Mystery, Castles and Creatures, Tales of Me, and Adventures in Space, while Scarborough, Random House, and others are augmenting existing lines with new titles.

Random bits

Diversification is the watchword at Broderbund these days. Look out for Fantavision, a special effects/animation generator for the Apple; Science Toolkit, a combination of hardware and software that turns the Apple into a science lab; and Captain Goodnight and the Islands of Fear, a feature-length arcade adventure game . . . MicroProse has added several new simulations to its range: Gunship simulates the AH-64 Apache attack helicopter; Silent Service is a submarine simulation; and Kennedy Approach is an air traffic control simulator with computer-generated speech . . . Okidata has unveiled the Model 120 printer for the Commodore 64. This 80-column dot-addressable unit prints at 120 cps and sells for $269 . . . Smith Corona has introduced an interface for its electric typewriters enabling them to double as computer printers . . . Epson is touting the HS-80, a nifty portable ink jet printer measuring just 13ins × 4.5ins × 3ins . . . Activision is developing a computer game design kit which allows a user to select various actions, backgrounds, characters, sound effects and music for his own game. President Jim Levy has also spoken of the discovery of little human-like beings which are believed to be living inside every computer. The company is trying to lure them into hospitable environments so their habits can be studied further . . . And the silliest product at this summer's CES? The Microtech flea collar for 'small or moderate-sized pets with short hair'. It repels fleas with a high-frequency inaudible sound. END

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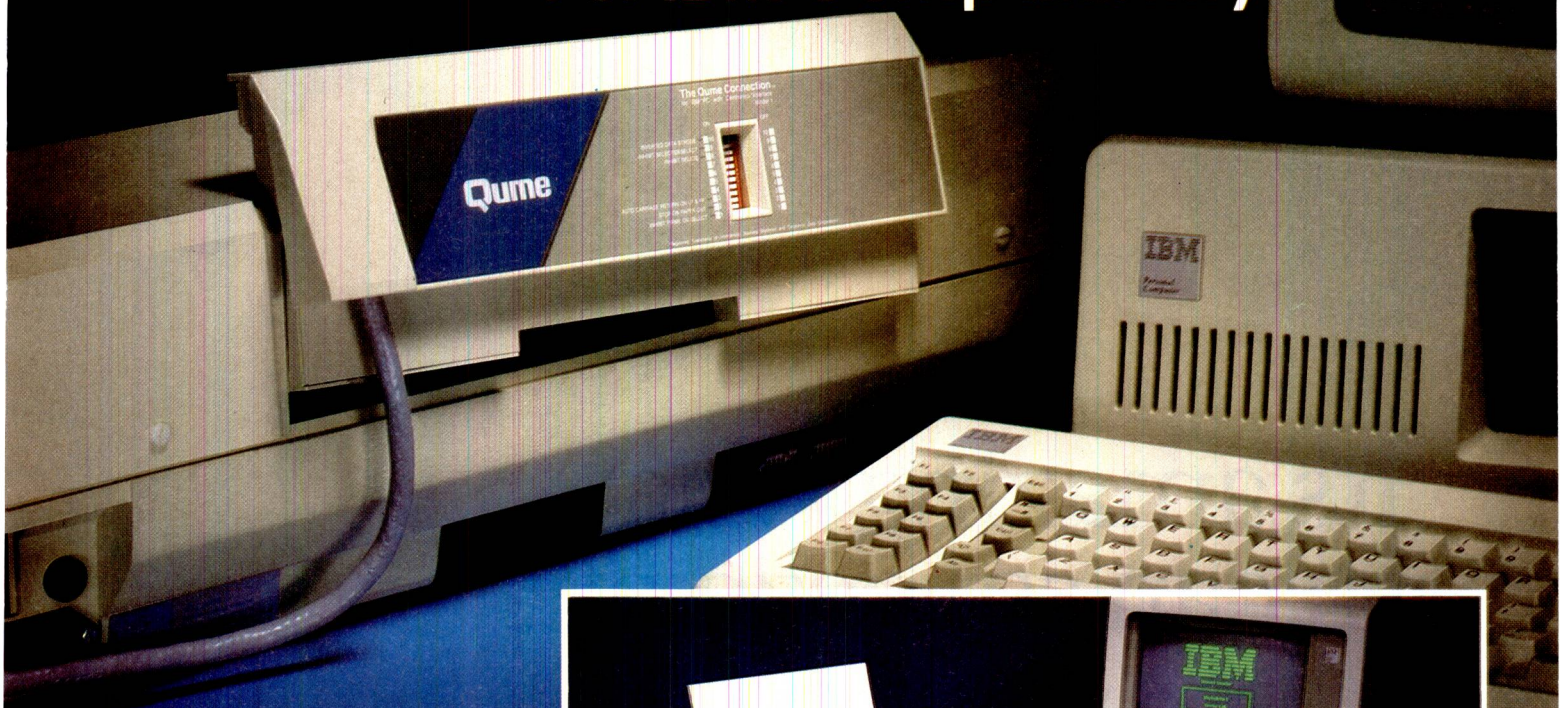



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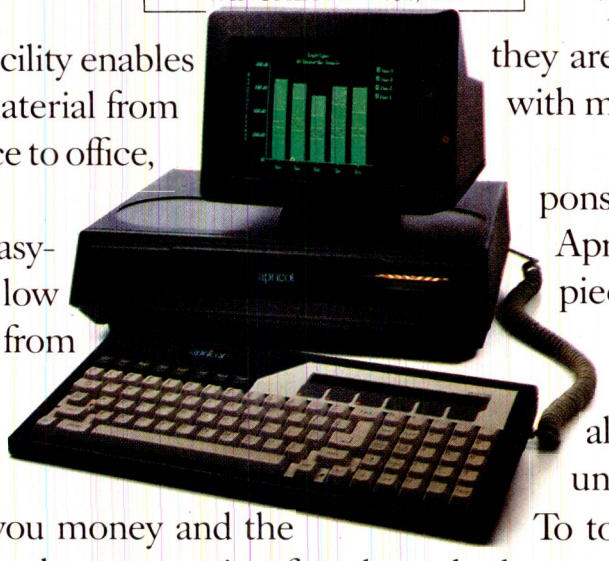

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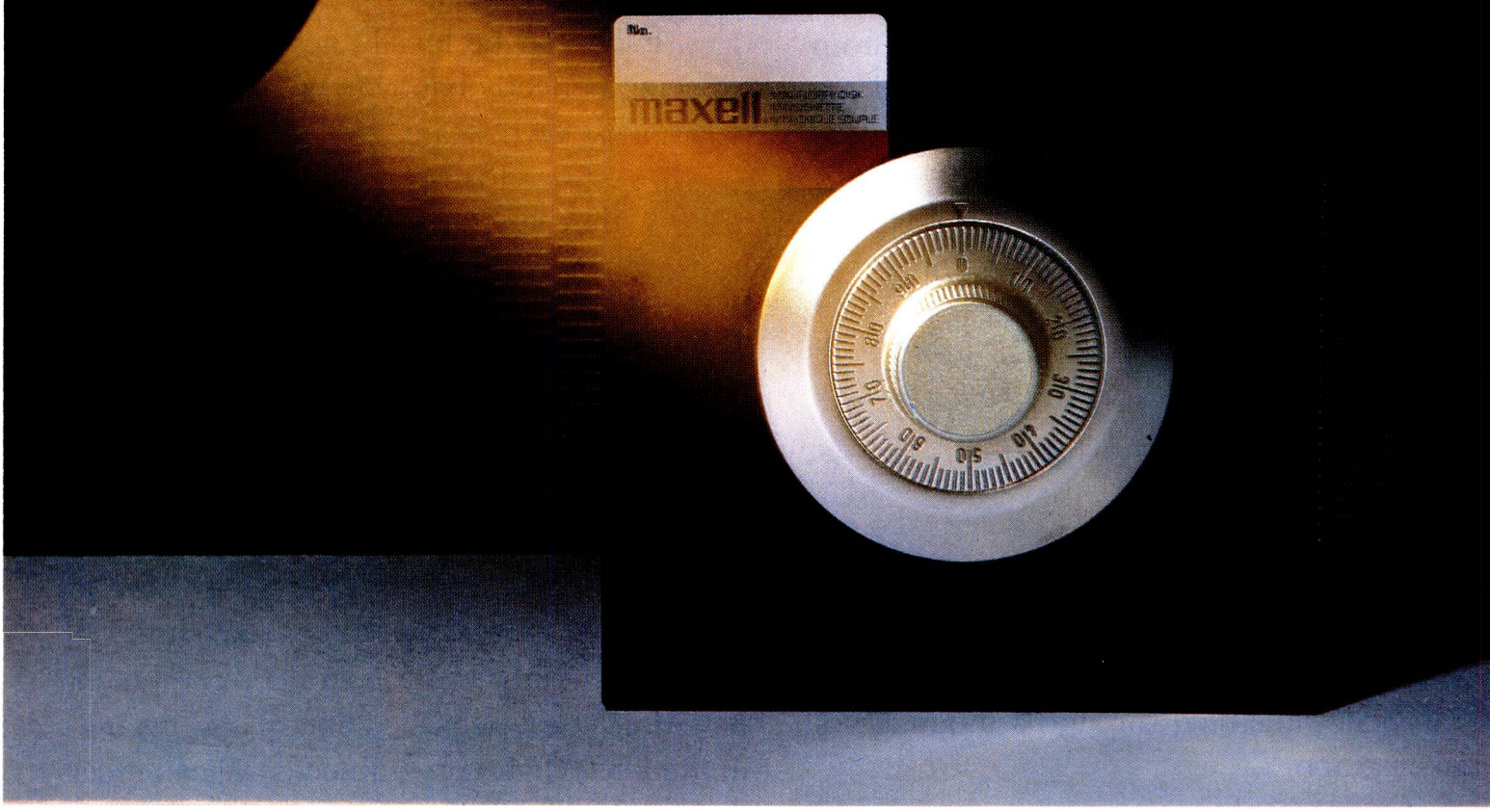

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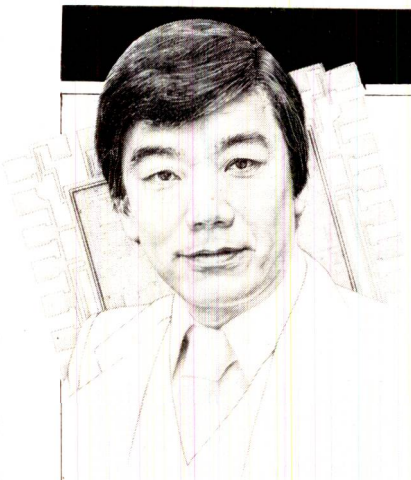

In this month's Far East report, Shinichiro Kakizawa tries baby-talk with cuddly robots and introduces the latest innovation in add-ons, a high-res image scanner.

Playing around

Japanese toy manufacturers are always adventurous with new technology. Particularly in the micro electronics area, they're always keen to try innovative components, even though the technology has not yet matured.

At the Tokyo Toy Fair 85, housed in the large Harumi Exhibition Centre overlooking Tokyo Bay, over 20,000 toys, including video and electronic games, and general toys, were on display.

The general impression at this year's show was of a preponderance of robots. There were lots of traditional cuddly toys, hula hoops, model trains, building blocks and games computers, but even these did not escape the innovative mind of young Japanese toy designers. I spotted an ordinary-looking teddy bear with a voice-recognition synthesising feature built-in. Responding to a child hugging it and talking to it, the bear came back with a cute but unintelligent response, 'ah-ah' or 'boo-boo', as if it were a baby.

The response from the bear is not always the same. The computer circuit is cleverly contrived to react to the tone and volume of the owner's voice, giving slightly different responses accordingly.

Traditionalists sometimes find the introduction of high-tech children's toys hard to accept, but toys should give scope to children's creativity and imagination.

Among hundreds of robots, there was a couple of interesting new models. The first, Science Robo-RK from Bandai, can manage real two-legged walking. Its balance is controlled by a giroscope, which is powered by the built-in direct drive motor. A separate motor is provided for driving the legs and knees.

The direction of movement is radio-controlled, and its gait as it paces about is smooth and fun to watch. This toy robot costs £18, and Bandai claims that Robo-RK is the world's first real, walking robot.

Also featured was a pet robot called SR3 from Tomy Industry. A reactive robot, it swings its arms and moves its neck as it walks. Shouted at loudly from a distance, or scolded, it suddenly stops walking, hangs its head, and mutters an apology. Having put it in its place, you can then smile and feel better. A useful tool for easing stress when everyone else seems to have the upper hand! The price is £16.

Another model, the Omni 2000 robot, is also from Tomy Industry. Omni 2000 is a multi-function, sensor-based, voice-recognition robot. Its function is a little beyond the toy capability — it can carry goods by hand. In addition to doing ordinary work like carrying coffee cups and putting out recorded messages, if you have a hand-carried rechargeable vacuum cleaner at home, you can attach it to the robot and it will clean the room.

The robot's sensor recognises obstacles such as walls and chairs, changing its direction automatically and continuing its work. For home use, it's halfway between a toy and a real robot.

Japanese toy manufacturers appear to have shifted their major development effort from computer/video games to intelligent robots, but this does not mean that the games market has slowed down. In fact, one of the games computers I saw at the show had an interesting new feature, an IC card. IC cards are a memory device in card form (credit card size), and are currently hot news in the Japanese computer industry.

They're slightly thicker (2mm) than normal plastic credit cards, but can store vastly more information than the ordinary magnetic strips. IC cards are used by the Z80A-based Sega SC computers, and can store 256k in an embedded EPROM. Games and educational programs are provided in card form, which is a lot easier to carry and store than the conventional cassette tapes or ROM cartridges.

The SC 1000 with two joysticks costs £50; IC card software costs £16.

Other toys which caught my eye included talking building blocks and a vacuum-cleaning robot. When you put it on a table, it sweeps the surface with a broom as it moves, but there's a hidden vacuum cleaner built in at the bottom.

In addition, budding Patrick Moores may like a digital watch which can display the location and flying route of Halley's Comet.

Hi-res image

A low-cost image scanner is now available from Marcus of Tokyo, priced at only £620. Model RA 408 is an image input device for a micro, and has two levels of resolution in scanning. The high-resolution level provides eight dots per millimetre, and the lower level gives four dots. Colour contrast control is variable. A dots compression feature of up to 1/10 is also provided.

The image scanner has recently become the most popular add-on among the Japanese micro suppliers, but the prices of the device from large manufacturers such as Fujitsu, NEC, Ricoh and Canon are in the range of £1200 to £1500, so are hardly within the budget of the average private user.

However, the Marcus RA 408, at £620, is more affordable, and users can input all kinds of pictures, drawings and photographs, make changes to them, merge them with text data on the screen, and print them together in one sheet. Possession of an image scanner should certainly vastly enhance the scope of applications for micros.

American bid

Nintendo, the Kyoto-based games computer manufacturer, sees the American market as the next target in its bid to achieve a repeat performance of the phenomenal success of its Family Computer.

The company has already sold 2.5 million units during the past two years, and by the end of this year, the number will probably reach five million units.

Yamanouchi-san, the company president, is confident in succeeding in the American games computer market which was once dominated by the Atari 2600, the Commodore Vic-20 and a handful of other powerful suppliers, many of which subsequently collapsed. Yamanouchi-san views this near-vacuum as a God-sent opportunity, and wants to fill the gap with his 'Fami-Com'.

Highlights of his marketing strategies for the American market will be a low-price (£49), high-speed colour graphics, and a completely new concept in games.

The American version of the Fami-Com is codenamed 'Nintendo video system', and will be shipped as from August.

In the States, a part of Atari was bought in February by another Japanese games machine company, Namco. It will be interesting to see how the Japanese games leaders, Nintendo and Namco, can score in the American market.

Perfect printing

Brother, the typewriter and printer manufacturer, is soon to launch a new printer. The unique feature of the new product, called Twinwriter 5, is that it has two printing mechanisms, daisywheel and wire dot-matrix, in one box.

The user can specify daisywheel mode for word processor printing, and the wire dots mode for those printing requirements when a fast result is called for. Switching from one mode to the other can be manual or by software control.

This product is a welcome innovation: the near-letter quality of a 24-pin printer is not as acceptable as type from a typewriter or a daisywheel printer. But low-cost daisywheel machines are slow, so the combination of both types offers the best of both worlds.

This new printer should be available in Japan in August and probably before Christmas in the UK. The price will be around £1000. END

LETTERS



This is the chance to air your views — send your letters to Letters, Personal Computer World, 32-34 Broadwick St, London W1A 2HG. Please be as brief as possible and add 'not for publication' if your letter is to be kept private.

From the horse's mouth

With reference to David Burns' article 'Fatten up your Mac' which appeared in the July issue of *PCW*, I feel that further comment is necessary on the subject of home upgrades, which Apple is naturally unable to endorse. In addition to the all-important fact that opening up the Macintosh automatically voids the warranty, there are other significant problems which may arise from a home upgrade which I feel were not dealt with sufficiently in David Burns' article.

David based his assessment of home upgrade on three attempts. Our own considerable experience in upgrading (in which we exchange boards rather than chips) gives us greater insight into the process. The 15,000 volts inside the machine could give an amateur an extremely nasty shock even when the Macintosh is powered down and left off for a while, a fact that was treated in a rather cursory manner by David Burns. Moreover, while the author is quick to point out the danger of shocks from the mains socket, he ignores the extra-high tension voltage resident on the tube (over 9000 volts) and the danger of implosion. An untrained person removing the logic board can also cause an electro-static discharge.

Added to the personal risks of home upgrading on the Macintosh, there is potential danger to the machine itself. Discharging to the wrong earthing point may blow the logic board, for instance, and as removal of components is difficult even using expensive desoldering equipment, an untrained person using inadequate equipment is very likely to damage the board. Our field engineers do not service the logic board, and damage done in these circumstances would almost certainly render the board unserviceable by Apple's engineers, thereby incurring a cost to the customer of £488 at the time or writing.

If a customer were to 'cut the track' with a Stanley knife, he or she could easily damage the four-layer board. The RAM chips removed would almost certainly be 'suspect' due to the heat needed to remove them, and it would be safer for the board if the legs were cut off the chips and removed separately — something that many people would understandably be reluctant to do.

Taking into account the aforementioned points, I believe I am justified in my view that David Burns' article is potentially, although not intentionally misleading, and possibly dangerous to those attempting a DIY upgrade. In a highly specialised field such as this, a Macintosh user would be strongly advised to place the responsibility for upgrade in the hands of an Apple dealer. As you know, Apple has an excellent reputation for service and support, and its dealers are highly trained to perform such tasks quickly and with minimum risk. As neither Apple nor its dealers can accept responsibility for damage caused by home upgrades undertaken as a result of the article, I feel that it is in our customers' best interests that they are in possession of all the facts before they take action.

Sonja Garsvo, Public Relations Manager, Apple Computer (UK)

If the warnings in the article were insufficiently strong, apologies. The next writer is none-too-impressed by your prices, and the letter after that agrees with you about the warnings but can offer a cheaper service. We'd also like to know what's happened to version 4.5 of MacWrite in this country.

Take a tip

I read with interest your article in the July issue 'Fatten up your Mac'. I have already upgraded my Mac to 512k through the official Apple route, but would like to pass on a few tips to those readers who may still be considering a DIY upgrade.

Firstly, there is talk on the bulletin boards that Apple is about to issue a 128k ROM upgrade. No-one knows for sure what it contains, but guesses are that it will include the Finder. Rumour also has it that Apple will be doing the upgrades with a straight swap of the motherboard (as with its 512k upgrade), and that it will not accept boards that have been tampered with (not surprisingly). Having said that, the ROM chip is socketed, and DIYers *may* be able to buy and install it themselves.

Secondly, readers should be warned that the Mac motherboard is a four-layer board and can be damaged by excessive heat. I understand that you may be able to buy 128k boards from dealers who do the official Apple 512k upgrade. Apparently, Apple buy the old 128k boards back from the dealer, so if you offer the dealer the same or a slightly higher price for it, you may be able to get a board to practise on. The price Apple pays the dealer is about $300, which is much cheaper than ruining a Mac.

Of course, if Apple were to charge a reasonable price for its upgrade, this messing about would not be necessary.

S Wathanasin, Brighton

View from a dealer

I write with reference to the article 'Fatten Up Your Mac' in the July issue of *PCW*.

This company will be one of the Apple dealers that David Burns states will be against DIY, in this particular case hardly surprising. Ridgeway Computer Services has been ofering this same upgrade service for some time now at £345 including VAT, and it will honour any Apple warranty.

I have undertaken several more of the upgrades than David apparently has, and far from taking only a couple of hours, three-four is a more reasonable estimate.

Removing the back with a broad-bladed screwdriver will work in some instances, but either the real tool should be used or a broad paint scraper, otherwise very nasty scratches and dents apear at the case joint.

The main motherboard has static-sensitive devices fitted, and the method of dissipating static mentioned in the article is far from safe. Any metal sheet should be earthed back to mains earth, and before and during any work the operative should touch this sheet to remove personal static.

As the motherboard is multi-layered, pins 8-16 on the 64k RAM chips dissipate so much heat that a standard soldering iron, while it will do the job in the end, will inflict so much damage to the chips they would be rendered useless.

The pads on these integrated circuit stations are very small, and the unwary can very easily lift the lot.

If anyone requires a kit to do the upgrade themselves, I will be pleased to supply one for £250 including VAT or alternatively the job done plus warranty honoured for £345 including VAT.

E Lerpiniere, Director, Ridgeway Computer Services

Under attack . . .

Guy Kewney's July Newsprint was sprinkled with thinly-veiled attacks on Acorn Computers in general and the BBC Micro in particular.

At one point, when comparing it with the new Commodore and Atari machines, he says: '. . . all it has over these systems is availability.' Oh, is that all, Guy? In my book, that is the single most important factor in choosing a micro.

He would do well to remember that in computing (as in anything else) it's horses for courses, and in the educational field the BBC Micro is still a good buy. For not much over £10,000 my department has installed a 20-station level III Econet, running off a 10Mbyte hard disk. Although it is a single logical network, it is split between two physical rooms giving us two computer labs. It might not run Lotus or dBase III, but if it's a choice between two networked labs or half a dozen business machines then there's no choice. Students will learn much more about word processing by spending a morning on View than half an hour on WordStar. This is the bottom line of the above arithmetic.

Fortunately, the buying public are more realistic. The best-selling micro in the States at Christmas was not the IBM PC or the Macintosh, it was the Apple II. I am involved in training and consultancy with local business users, and what do they want to run on their brand new 16-bit micros? Jazz? Word? Framework? No, it's invariably WordStar and dBaseII, the same software we have had running on our Z80-based CP/M network for three years now!

Lastly, two points of information for Mr Kewney. We also have an Apricot F1, and Activity, the 'Macintosh-like interface' he mentions, has been renamed 'Inactivity' due to its complete refusal to perform certain basic functions (like format a disk). This is not to knock the machines — it's new and has the inevitable teething troubles, something computing journalists should bear in mind when comparing the old with the new.

As for his point about the BBC's lid, yes it is screwed on, perhaps due to the environment it was designed to work in — that is, schools, with children with prying fingers possibly attracted to 240-volt power supplies (housed internally).

For the more mature, I've come up with a brainwave if the secure lid is a problem — leave the screws off!

R Elliott, Senior Lecturer, Dept of Business Technology, Clydebank College

Horses for courses perhaps — but we still think the BBC B (let alone the B+) looks off-course as a mainstream machine. However, others disagree, for example . . .

. . . fighting back

I have just been reading Guy Kewney's Newsprint column in the July issue of *PCW*. I feel I must adopt my Mr Hyde cloak and at least savage his ankles over his two columns on the BBC B+, for kicking Acorn while it is down.

I am employed as a Senior Consultant in the R&D department of a large UK software and communications company. I have access to IBM mainframes, DEC minis, Motorola Unix systems, IBM PCs, Apricots and Sages, and so on. Officially I wear my Dr Jekyll hat, and advise how and when it makes commercial sense to make use of these wonderful examples of the latest computer technology. In the privacy of my own office, I don the Mr Hyde wig, turn Mr Kewney's picture to the wall, surreptitiously pull the BBC out from under the desk, and start developing something new.

The fact is, if I need a quick, cheap, working solution I have to take another swig of the potion and power up the trusty Beeb. Chances are, if I choose one of those other machines, my boss will practise his hatchet-swings on my fast-receding hairline after I overrun his precious hardware budget, or promise him the software 'real soon now' — again!

Which machine provided me with a system for under £800 capable of driving a rotating frame display system on UK domestic TV sets in under a week? It wasn't the IBM PC, on which I spent a lot of time and money to *prove* that the PAL standard IBM Videotext card could not match the video output from the BBC. Why is it that it takes me 40 lines of code to set up the serial port in non-procedural MS-Basic on a 16-bit MS-DOS machine, and I can do the same in a seven-line procedure on the BBC Micro or swop to assembler if I need the speed? Which machine can accept a £50 word processing ROM which — in my opinion — knocks the spots off your WordStars, Multimates and Uniplexes for speed and ease of use? Why is it that the BBC Micro is the only machine anyone ever wants to borrow from the department when they (genuinely) have a project to work on?

Because the BBC architecture offers hardware and software flexibility and accessibility unmatched by anything else on the market at the price!

OK, so the BBC B+ wasn't the whizzer that everyone expected, and it doesn't contain all the latest technology. The BBC is a unique micro, and rightly commands a very large user base in education. If Acorn does go out of business, it cannot fail to adversely affect our educational institutions which can ill-afford to reinvest in new computing equipment at the present time.

Mr Kewney's negative reporting can do nothing to help at a critical time for Acorn and those who have invested in its product. He should save his brickbats to throw at those who seek to convince us that the computer industry is built on anything else but sand.

Brian Rich, Studley, Warwicks

Obviously we can't disagree with someone happy with the machine they use, but while we're just as keen for Acorn to survive, it wouldn't make much sense for us to tailor our opinion of a machine's chances in order to encourage this.

Lisp circle

Would any of *PCW*'s Lisp-speaking readers be interested in forming a corresponding circle devoted to that most interesting of all computer languages? I am sure that devotees of all levels of expertise would benefit from an interchange of ideas, and I envisage the production of a newsletter two or three times a year.

Please write to me at the address below.

John Wellsman, 294a Caledonian Road, London N1 1BA

Ug's bugs

Your correspondence on the origin of the word 'bug' seems to be flagging, so I thought I'd offer my contribution.

The word is in fact prehistoric. It can be read in Carlyon's *Prehistory* (vol XIX, p 239):

'Thus Ug, son of Ug, decided to invent the wheel and, after experimenting with various materials, cut a disk of oak and punched a hole through the centre. He then mounted the wheel on his bedroom wall to keep it safe so he could tell his grandchildren how clever he was. As he was hanging it up, a weevil decided that string might be nice for a change, and the wheel fell from its position onto Ug's foot. In the resulting exclamation, Ug invented several words, one of which was 'bug', and this has been used ever since to describe both insects and cock-ups.'

Leo Carlyon, Ross on Wye

END

BLUDNERS

The Microsoft Basic Compressor program in July's Program File has a minor mistake in lines 800, 830, 860 and 950. In these lines, a strange symbol that looks like a slashed 0 appears. This should be a backslash symbol, standing for 'integer division'.

In the same issue, the instructions for the Turboload 64 program for the Commodore 64 with 1541 disk drive should have included the fact that the program will not work with Simon's Basic, nor will it work correctly if another serial device such as a printer is attached and switched on. This is because the program alters the way the computer handles the RS232 interface, and so cannot cope with other peripherals attached to this interface and switched on.

And, finally, solutions to the problems encountered with Visicode. In July we published receive routines for the BBC and Commodore 64. The BBC version worked fine except when it came to saving. Changing lines 1190 and 1200 so there's a space between the inverted commas and the number 3000 should solve the problem: that is, "3000 should read " 3000.

Things get a bit trickier on the 64. Changes in the August issue added a routine to save the transmissions to tape or disk — these still hold good. However, the original listing missed a change made to the signal which ends transmission. Changing the 7F to FF in line 2120 will correct this.

In August we covered the Spectrum and Amstrad (464 only). Everything except the Print Text option worked fine for Amstrad owners. Adding a :GOTO 430 to the end of line 420 solves the printing problem.

There were no problems with the Spectrum receive program.



BANKS' STATEMENT

In the know

Human intelligence created artificial intelligence, but a catalyst is required to reconcile the two. Martin Banks utilises his grey matter.

When I first heard the phrase 'artificial intelligence', I assumed it referred to me. I have therefore deduced that intelligence is just a fly in the eye of the beholder and has little to do with reality.

Later I discovered that the phrase actually refers to something completely different and even more nebulous: the word 'intelligence' is being applied specifically to machines. Now, depending upon how you view things, this is either an absolute and totally true way to see intelligence, or its diametric opposite.

There are no doubt those individuals who would consider it true that, when compared to the vagaries and general stupidities of the human race, it is only machines that can possibly be intelligent. This is an argument which has a lot going for it: a car, for example, very sensibly sits still and watches the world go by until some dumb human climbs inside and drives it at 95mph into a wall. Which, I ask, demonstrates the most intelligence?

The only problem with this line of thought is that all the machines have been developed by humans in the first place, so any flaws in intelligence the humans have will be inevitably transferred to the machine.

It can be safely argued that machines can have no more intelligence, artificial or otherwise, than humans. As has already been pointed out by a simple example, however, humans seem to show a remarkable lack of the stuff anyway, so it might just be possible to argue that it doesn't exist at all.

If that is the case, then a great many companies are spending enormous sums of money trying to produce an artificial version of something that isn't there.

According to one researcher in the AI field, Dr Floyd Hollister of Texas Instruments, the subject should not be called 'artificial' intelligence at all. Rather, he feels that its proper name would be better as 'applied' intelligence. Given the aforementioned doubts about the whole subject, this sounds potentially worse, although it does in practice sum up more succinctly (and less ominously) what the research work is all about.

What everyone is trying to achieve, of course, is a system that can be taught a set of generalised 'rules' which apply to a specific problem area; the idea being that, working within these rules, the system will be able to solve a particular problem just like any good human expert. Dr Hollister does point to the fact that 'intelligence' in this context is a word of dubious connotation, for it can give far greater anthropomorphic qualities to a computer than it warrants.

His point is that a human expert in one particular field can also be expert in, or knowledgeable of, a number of other subjects as well. The computer, once outside its defined set of rules, will simply default back to CP/M-80 level, or whatever else is its native mode. That, he feels, is one measure of human intelligence, especially when compared to a machine.

The real problems with AI lie not with such semantics, however. Rather it is the way in which we humans can sensibly apply it, and how it will be realised in practical terms.

Dr Hollister is a keen promoter of a new generation of individuals who will help the rest of us apply AI systems in everyday life. He is aware of the common feeling that AI systems, when applied in business and industry, will lead to massive loss of jobs. The prospect of AI producing millions of industrial robots that will put everyone out of work is, he feels, a problem that has to be overcome.

He sees there being scope for new types of employment stemming from the application of AI, especially for those with an understanding of computers and of another discipline which, for the sake of argument, I will refer to as the 'target discipline'. The real need is going to be for people who can translate from the target discipline into some form of computerese that the programmers can cope with.

Hollister, like others before him, uses the phrase 'knowledge engineers' to describe such people, and their role in the development of computing applications could be crucial. At best, they will help people apply computing power in a sensible and useful way. At worst, they should prevent a few disasters.

As we move increasingly towards a more comprehensive application of computing power, as opposed to its current, fairly specific application to tightly-defined tasks such as spreadsheeting or word processing, we are going to need more people of the knowledge engineer type. Although, as Dr Hollister points out, such people should have a good knowledge of the target subject area, for example civil law or medicine, the real trick will be in them having enough awareness to be able to see the relationship between their pet subject and the dreaded computer.

At last, there will be a market, within the computer industry, for people with a modicum of common-sense.

As to the question of how such systems are to be realised, the immediate answer is by normal, Boolean logic computer systems. In the long term, however, there could be something that matches the concepts of common-sense and intelligence rather better — fuzzy logic.

This is the new in-thing of AI and expert systems development, although its roots go back 20 years to the theories of Professor Lofti Zadeh. He has defined fuzzy logic as 'the logic which underlies approximate reasoning'. He maintains that most human reasoning is approximate, and that any actual decision-making process is based on a series of successive approximations of what seems to be a reasonable idea.

This approach to logic can overcome the problems caused by the Boolean logic premise that there is only one 'truth'. In Boolean for example, if A is true and B is true, then C must have just one value.

With fuzzy logic, the value of C will depend on the degrees to which A and B are true, which allows all kinds of variables to impinge on the result. This is, approximately, what happens when humans get round to thinking.

It can be deduced from all this that the ideal people to be working with AI and expert systems are those with a fuzzy kind of common-sense. There may be hope for me yet. **END**



Illustration by Tony Randell

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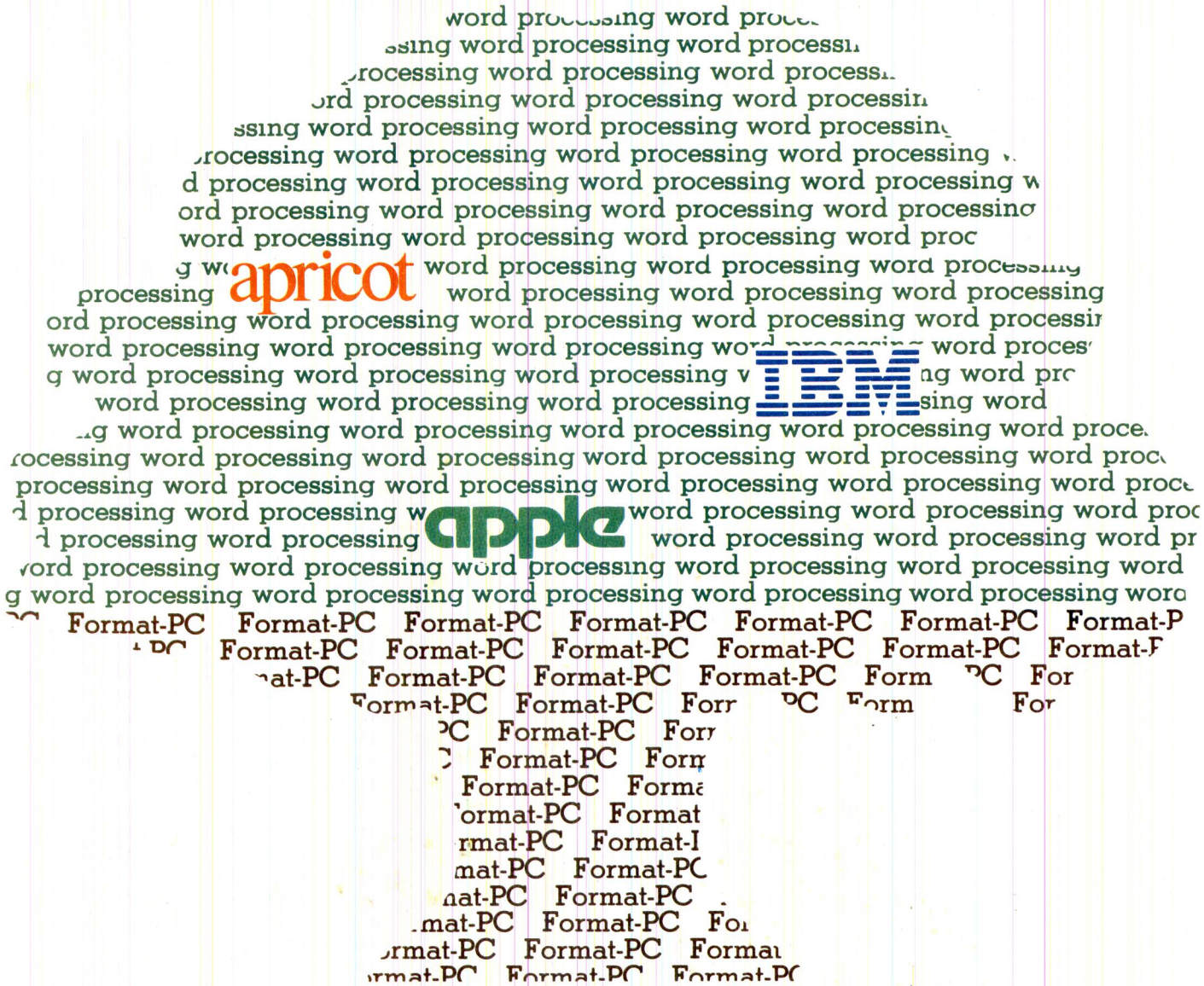

word processing word processing word processing



Amstrad CPC6128

A micro with 128k of RAM, a monochrome monitor, built-in disk drive, CP/M3, DR Logo and priced at £299 sounds too good to be true — Peter Bright looks at the Amstrad CPC6128.



First the bad news: anyone who bought an Amstrad CPC664 is in for a nasty shock. Now the good news: Amstrad now has *the* machine for anyone who wants 128k of RAM, a built-in disk drive, full CP/M and a colour monitor for less than £400.

The Amstrad CPC6128 was intended for sale in the US first, but Amstrad has now changed its mind and decided to give the UK pride of place instead.

Hardware

The 6128 looks quite different from Amstrad's previous machines. Even though the new machine has a disk drive built in, it is significantly narrower than either the 464 or the 664. The 3in disk drive is at the far right-hand side of the unit, and it is a much neater job than the 664 — the casing is only marginally higher than the height of the disk drive.

The back of the machine differs from previous Amstrads due to this system being originally designed for the US market, therefore the connections must conform to FCC (Federal Communications Commission) regulations.

From left to right along the back of the machine there are connectors for a second disk drive, a monitor, 5-volt and 12-volt supplies, an expansion socket and a printer socket. Along the side are a DIN socket for a tape recorder, a joystick socket and a sound output socket. The disk drive, expansion and printer interfaces are all edge connectors onto the main PCB.

Amstrad is hoping that the third-party bolt-on goodies brigade will take to this machine with more enthusiasm than they took to the 464 or the 664. The company will be selling a plug-in RS232 card with built in Viewdata capability to make communications easier. It is also hoping that third-party manufacturers might like to provide external hard disks, 5¼in disk drives, and so on, in order to make the machine into an even more powerful CP/M system.

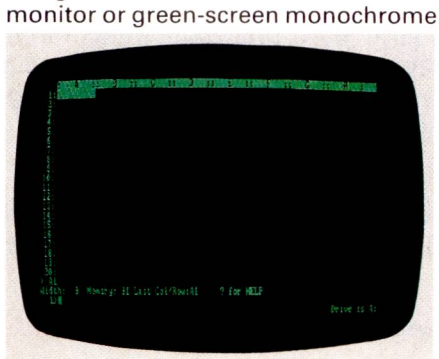
Inside, the 6128 is basically a modified 464. The processor is still the same Z80 and the Basic ROM remains unchanged, with extra Basic commands being loaded from disk; this should keep the new machine largely compatible with software written for the 464. The major change is the extra bank of 64k of RAM, bringing the total up to 128k. Methods of accessing the extra 64k vary according to whether you are using Basic or CP/M.

Due to the 6128 being more narrow than the 464 or the 664, the keyboard has been totally redesigned. Whereas the 464 has a fairly standard qwerty typewriter area with separate cursor keys and numeric keypad, all the keys on the 6128 are bunched together in one block.

The layout of the qwerty typing section has also been altered — there are now very large CONTROL and ENTER keys where you would expect to find the SHIFT keys. I found this layout annoying for a while, but no doubt users would get used to it.

An added bonus is that a keyboard chart is printed on the top of the disk drive housing, showing how the keys are numbered. This can be very useful, as when you are running CP/M on the machine, the keyboard is 'soft'. You can redefine any key apart from the CONTROL key from CP/M, which can be useful for setting up cursor keys and quick functions for specific CP/M programs. Different sets of keyboard definitions can be stored on disk and loaded via a keyboard utility when you run the application.

The display on the 6128 is identical to the 464 or 664. There is the option of using either Amstrad's own colour monitor or green-screen monochrome



SuperCalc on the CPC6128

monitor. The display quality is fine for games, although 80-column displays in CP/M can be hard to read unless you choose the right colour combination. Possibly a better combination for serious users is to buy the monochrome display giving clearer 80-column text, and a colour TV adaptor for games.

Software

Expanding memory on processors that usually address 64k can cause problems, especially concerning the way in which Basic sees the extra memory. The best expansion I've seen is the Enterprise 128, which makes practically all the extra memory available for use as you require, and the worst is probably the Atari 130XE, which has exactly the same amount of memory available for a Basic program as the old 48k and 64k Ataris plus some obscure POKEs to bring the extra memory into play.

Amstrad's approach lies somewhere between the two: no extra memory exists for the Basic program, but extra commands have been added which allow you to use the memory for up to four screen displays, or alternatively as a RAM data file. Adding extra commands to Basic prompts an additional problem — compatibility. The extra commands on the 6128 are stored on disk so the Basic ROM is exactly the same as that in the 664, giving 100 per cent compatibility with 664 software and 99.5 per cent compatibility with the 464.

To add the extra commands, load a file from the system disk and run it. To use the extra 64k as an area to store screens from Basic, the memory is treated as four 16k chunks, each capable of holding one screen. These blocks can then be swapped with block one of the original memory (the screen display area) causing a quick change of display. Obvious uses for this include animation, and quick screen changes in multi-screen arcade and adventure games.

Two commands, :SCREENCOPY and :SCREENSWAP, manipulate screens. :SCREENCOPY copies the information making up one screen into any one of the alternative 16k screen blocks; :SCREENSWAP exchanges the contents of one block with another. To bring a screen onto the display, you would :SCREENSWAP it into block one.

For more serious Basic applications, the commands :BANKOPEN, :BANKWRITE, :BANKREAD and :BANKFIND are important. Using these commands, the extra 64k is treated as a data file. :BANKOPEN sets the record length and initialises the current record number. :BANKWRITE lets you write data to the file, and :BANKREAD retrieves it from the file. Optional parameters specify which record to write to, and return values informing you of the success of the operation. :BANKFIND lets you search through the RAM for a particular data item, and returns the record number where the data is stored or a negative number informing you that no match was found. These bank commands provide a fairly sophisticated and very quick way to manipulate data in database-like applications.

One of the selling points of the disk-based Amstrad machines has always been that they can run CP/M, so can theoretically access a wide range of professional 8-bit business software.

Unfortunately, life is never as straightforward as it seems. Due to limitations in the design of the 464 and the 664, the full 64k of RAM was never available to CP/M programs. This meant that many popular CP/M programs such as WordStar wouldn't run in the standard form on these machines.

All that has changed on the 6128. In order to take advantage of the full 128k of RAM in the machine, the Amstrad 6128 runs CP/M version 3 (or CP/M Plus) instead of CP/M 2.2, which is used by the 464 and 664 disk machines.

CP/M version 3 was released just at the time when 16-bit machines were taking over from 8-bit machines in the business market. Consequently, it never had as much exposure as its more popular, but inferior, predecessor.

One of the main advantages of CP/M 3 is that it can run on bank-switched machines such as the 6128, and can therefore take advantage of the extra memory. It is also upgraded internally, offering features such as naming of disks, date stamping of files, password protection, and the use of hashing algorithms to speed up disk access.

The implementation of CP/M 3 on the Amstrad is very nice indeed. As far as CP/M is concerned, it is divided into three banks which are further subdivided into eight 16k chunks. Bank 0 contains the BDOS and BIOS routines; Bank 1 is the Transient Program Area (TPA); and Bank 2 contains the Console Command Processor (CCP) plus various buffers and hash tables. The TPA is allocated four 16k blocks, one of which is shared with the other two banks so the usual maximum TPA is about 61k. This is quite sufficient for most common CP/M programs and is a vast improvement over the situation on the 464 and the 664.

The majority of 8-bit CP/M programs should now run on the Amstrad. I tried popular applications such as Wordstar, SuperCalc 2 and Multiplan, and they all worked well.

One of the great advantages of having all this memory is that the BIOS, BDOS and CCP routines only have to be loaded off disk once when you boot the system. Thereafter they sit quite happily in RAM until you reset the machine, making it much easier to swap disks without having to worry about the correct system files being available. CP/M 3 doesn't require you to Control C the drive every time you change a disk — you just put it in and CP/M will read it.

Installing 6128 applications programs should be straightforward. Amstrad has arranged the system so that sitting between the program and the physical screen is a DEC VT52 terminal emulator: when you install your program, you use VT52 control codes.

Another advantage of CP/M version 3 is that it handles disk and I/O errors much more elegantly than CP/M version 2.2. When you get a disk error, you generally receive a 'retry, ignore or abort?' message rather than one of the dreaded 'BDOS error on A' error messages. The only trouble with this on the 6128 is that the CP/M messages scroll along the bottom of the screen quite quickly, and it took me two or three rotations to catch what the message actually said.

Although you can add a second disk drive to the system, I suspect that most people will make do, at least in the beginning, with just the internal drive. For this reason, Amstrad has set up CP/M so that two logical drives (A and B) are mapped onto the single physical disk drive. Consequently, disk and file copies can be done from A to B — you can pretend that you've got two drives. CP/M prompts you when to change disks, and also displays the logical name of the current disk in the bottom right-hand corner of the screen.

The manual suppled with the 6128 is up to Amstrad's usual high standard, and covers the extra features of the 6128 comprehensively. Like previous manuals, it takes a quick but understandable tutorial approach, ending with appendices and reference sections. Absolute novices might need a second book to explain Basic, but most users will be satisfied with the manual supplied. A second manual of detailed programmer's information aimed more at software houses is available at extra cost from Amstrad.

Conclusion

From the end of August you can obtain a £299 machine with 126k of RAM, a monochrome monitor, a built-in disk drive, CP/M 3 and DR Logo; £399 will buy you the colour system. This has to be rated as outstanding value for money. Irate 664 users should be sure to bombard Amstrad and this magazine with complaints in order that we can attempt to get them the same value.

As a games machine, it is unlikely that many games houses will initially take advantage of the 6128's disk drive or extra RAM. However, if the machine sells well (which it should) then the software should follow. As a serious home/small business machine it's great. You can either use the disk drive to save your own Basic programs, or you could buy the popular CP/M packages and use them to run your small business or to work on data at home.

Either way, it's the disk drive and the price which make this machine. Amstrad reckons that no other manufacturer will dare to release a machine without a disk drive in the future. It could well be right. **END**

Thinking software?

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TASWORD 464

"There is no better justification for buying a 464 than this program."
POPULAR COMPUTING WEEKLY NOVEMBER 1984

A particularly sophisticated yet easy to use program. Now available on disc. The cassette version is supplied with instructions for transferring to disc.

TASWORD 464* Amstrad CPC 464 & 664 — cassette **£19·95**
disc **£22·95**

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Typical Tasprint output. Please note that different makes of printer produce different sized output

TASPRINT (Spectrum)

Drives all the printer interfaces compatible with TASWORD TWO and can be used to print TASWORD TWO text files as well as output from your own Basic programs.

TASPRINT 48K Spectrum — cassette **£9·90**
microdrive cartridge **£11·40**

TASPRINT EINSTEIN

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Can be used to print AMSWORD/TASWORD 464 text files in addition to output from your own Basic programs. Drives the **Amstrad DMP-1** in addition to the printers listed above.

TASPRINT 464 Amstrad CPC 464 & 664 — cassette **£9·90**
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TASCOPY 464 Amstrad CPC 464 & 664 — cassette **£9·90**
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TASMERGE ZX 48K Spectrum — **£10·90**

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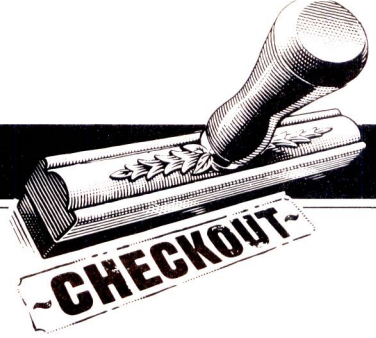


Knowledge Index

Everything you always wanted to know about computers — Peter Tootill uncovers 20,104 entries on computers in Dialog's Knowledge Index.

Most micro users are familiar with database management programs. They enable you to store data and to retrieve it in various ways. The main disadvantages of a database management package running on your micro is that it can only store a limited amount of data and you only get out what you type in yourself.

Some companies run a database on a commercial basis, making the information available (on a subscription basis) to anyone who wants to use it, but these systems can be expensive.

The American Dialog organisation has launched an off-peak service called Knowledge Index (KI) which, at 24 dollars an hour, is still likely to prove too expensive for the casual user, but could be a useful source of information to professionals and small business users. It is available from 6pm to 8am and at weekends (British time). There is a one-off joining fee of £25 which includes a manual/self-teaching guide and two free hours of use. KI is a subset of the massive Dialog system, and currently contains 28 of Dialog's 250-plus databases.

Logging on

Logging on to KI is simple. You dial the number of your local PSS access point appropriate to the type of modem you are using — there are separate phone numbers for 300, 1200/75 and 1200/1200 bits/sec modems (2400 full duplex is coming). This call is at local call rates for over 90 per cent of telephone subscribers. You then go through the normal PSS log-on procedure (send a couple of carriage returns, type D1 or A2) and enter Dialog's identity code as you use its account to access the system. This means that you don't have to pay PSS charges separately, these are all included in the $24 per hour access charge. The PSS computer will then ask you for the address you want to contact, and you enter Dialog's address, your own personal identity code and your password. At this stage you are connected to Knowledge Index. The sign-on procedure is exactly the same as that for Dialog users; the Dialog system knows from your identity whether you are a Dialog or KI subscriber.

The PSS identities and addresses are quite long and it's easy to make a mistake when entering them. If you do make an error, sending control-X will usually give you another chance. The problems with using the unfriendly PSS system should disappear when BT's Multistream service becomes available shortly. Multistream will present callers with a menu after they have identified themselves: all you will have to do is select Dialog. The new system will include error checking right through to your computer or terminal, but you must have special terminal software before you can use it.

Once into KI, it is straightforward to use. Like any computer system, it has a few idiosyncracies that you will soon get to know. The manual is quite good. It has a few introductory chapters designed to teach you how to use the system and a section on each database (called 'database briefs'). All the databases use the same 'query language' — that is, the commands you enter to find things in them.

In use

The first thing you need to do after logging on is to choose the database you want to use. This is simply a matter of entering the command 'Begin' followed by a four-letter abbreviation of the database in question. You are then ready to carry out your search.

Searches can be of several types — by subject, by author, by title, by journal, or by date of publication in some areas. To search for items on a particular subject, for example computers, you type 'find computers'. At this point the system will pause for a few moments. You'll then get a response:

S1 20104 COMPUTERS

This means that KI has found 20,104 items with the keyword 'computers' in the subject area. Unless you feel like looking through all of them, you will want to narrow the choice down a little. The command 'find doctors and computers and personal' will give you:

151 DOCTORS
20104 COMPUTERS
7659 PERSONAL
S2 2 DOCTORS AND COMPUTERS AND PERSONAL

This tells you that KI has found 151 items containing the word 'doctors', 20,104 containing 'computers' and 7,659 containing 'personal', but only two containing all three. It also labels each search as you carry it out — this one is now S2. This is more manageable, and we can now instruct KI to display the items in question by typing 'display S2'. You can control the amount of information displayed by using control words 'short', 'medium' and 'long', so 'display S1/short' will give an abbreviated display, and so on.

The details that you are given depend on the database in question. In 'Books in Print' you get the author, title, publisher and brief details of contents of the book. In the databases that have details of articles and research papers, you will usually get an abstract of the paper as well. If the article is one that interests you, you can order a photocopy which is sent to you by airmail. This service costs around $10 plus 25 cents a page.

Commands can be shortened: f for 'find', d for 'display', and so on. There is a reasonably extensive online 'help' system. There is also an internal electronic mail system to communicate between users and to answer your queries about using KI

It is very useful if your terminal software can send a true break character (an extended null), as in some situations this is the only way of interrupting a display after it has started. KI can be set to fit your screen, and pause and wait for a command when it is full.

Online encyclopaedia

One of the interesting new items to be found in KI is the *Academic American Encyclopaedia*, which contains about 30,000 entries. You look for items in this in the same way as in the other

databases, which can be rather confusing. I tried to look up 'hedgehogs' and was offered 48 references, the first to one of Aesops Fables! The problem with this was that there seemed be no happy medium when displaying the entry. A short mode display gave only the name Aesop, and medium mode gave a few pages, including the text of the fable! Part of my problems with this section were due to the fact that, being a new database, I hadn't received a database brief. However, I doubt browsing in an electronic encylopaedia will ever be as rewarding as in a paper one. The advantage of the KI system is, I suppose, that it's readily available and much cheaper than *Britannica*, for example, and it should also be easier for the publisher to keep up to date.

The main drawback of KI is the fact that it is American. This is not so much a problem in the scientific and technical areas as most of the databases include a good range of UK sources. However, the business and news services are all strongly US biased. KI is seeking to expand the UK contents — *Everymans Encyclopaedia* is due to go online soon, for example, but many British systems are already locked into other hosts.

Conclusion

Using KI is a fascinating experience. It is reasonably easy to use, when you get the hang of it, and could be very useful to technical and professional people who can use it out of office hours. It doesn't have much to offer the businessman nor is it for the hobbyist or casual browser: it is all too easy to run up a bill of several hundred dollars if you are not systematic and disciplined in your searching.

The manual stresses the need to plan your search in advance and to accomplish it as quickly as possible. If you want to sit and think about the next step, log-off first. You can easily come back later. KI charges are quite reasonable — if you were to use PSS to call an American system direct, the PSS charges could be around £12-£15 an hour without the costs of using the system itself.

Databases

There are 15 different sections available in Knowledge Index; each section contains one or more databases. Here is a list of the sections and some details of the information contained in the individual databases. In most cases it is details of articles, and so on, that you will find in the database, not the articles themselves.

Agriculture

AGRICOLA Covers all aspects of agriculture and related fields (human nutrition, pollution, veterinary science).

Books

BOOKS IN PRINT (Copyright by RR Bowker Co) Online version of *US Books in Print* and *Forthcoming Books*. Features 950,000 books from over 12,000 publishers.

Business information

ABI/INFORM (Copyright by Data Courier Inc) All aspects of business, management and administration. 230,000 articles, conference reports, 1971 to present.

TRADE AND INDUSTRY INDEX (Copyright by Information Access Company) Information relating to major industries and trades. Covers 520,000 references from 1500 publications.

Computers and electronics

INSPEC (Copyright by Institution of Electrical Engineers) Covers physics, computers and electronics. 1.2 million references to more than 2300 journals, reports, books, patents from 1977 to present.

INTERNATIONAL SOFTWARE DATABASE (Copyright by Imprint Software) Programs for micro and minicomputers, covers 6500 commercially available programs with prices, availability, and so on.

MICROCOMPUTER INDEX (Copyright by Microcomputer Information Services) Covers 11,000 articles from 40 publications in the microcomputer field from 1981 to present.

THE COMPUTER DATABASE (Copyright by Management Contents) Broad coverage of all aspects of computing, telecommunications and electronics. Includes 45,000 items from over 500 journals, newsletters, books and, so on.

Corporation and company news

STANDARD & POOR'S NEWS (Copyright by Standard & Poor's) Extensive news, including financial reports on 10,000 US companies.

ICC BRITISH COMPANY DIRECTORY (Copyright by Inter Company Comparisons Ltd) Covers all 900,000 registered British companies, giving full name and address of company, usually with date of filing of latest company accounts.

Education

ERIC Covers entire field of education. Details of 530,000 articles and reports from 1966 to present.

Engineering

ENGINEERING LITERATURE INDEX (Copyright by Engineering Information) Aerospace, civil,, electrical, agricultural and mechanical engineering. Covers 750,000 items from 3000 journals from 1975 to present.

Government publications

GPO PUBLICATIONS REFERENCE FILE List of US Government Publications Office publications (29,000).

NTIS (Copyright by National Technical Information Service) Covers over one million US Government reports from 1964 to present.

Legal information

LEGAL RESOURCE INDEX (Copyright by Information Access Company) Access to law-related topics, includes 140,000 items from over 700 law journals.

Magazines

MAGAZINE INDEX (Copyright by Information Access Corp) Lists articles from more than 400 popular magazines published in the US, covering topics such as book and film reviews, sports, current affairs, travel, science. Covers 870,000 articles from 1959 to present.

Mathematics

MATHFILE (Copyright by the American Mathematical Society) Covers literature on pure and applied mathematics. Includes over 380,000 items from 1600 journals.

Medicine

MEDLINE (produced by the US National Library of Medicine)

INTERNATIONAL PHARMACEUTICAL ABSTRACTS (Copyright by American Society of Hospital Pharmacists)

BIOSIS PREVIEWS (Copyright by BioSciences Information Service of Biological Abstracts)

DRUG INFORMATION FULLTEXT (Copyright by American Society of Hospital Pharmacists) The medicine section has three parts and eight databases, covering all aspects of medicine with coverage too extensive to list here. It includes more than eight million items from over 13,000 journals.

Newspapers

NEWSGARCH Indexes news stories, articles and reviews from over 1700 leading magazines and journals, as well as the *New York Times*, the *Wall Street Journal*, and the *Christian Science Monitor*. The database contains references from the current month.

NATIONAL NEWSPAPER INDEX (Copyright by Information Access Corp) Includes front page to back page indexing of the *New York Times*, the *Wall Street Journal*, and the *Christian Science Monitor*, from 1979 to present. Over 720,000 references are included.

Psychology

PSYCINFO (Copyright by American Psychological Association) Covers over 440,000 items from more than 1000 journals, from 1967 to present.

MENTAL HEALTH ABSTRACTS (Copyright by IFI/Plenum Data Company) Covers literature on all aspects of mental health and mental illness. 450,000 items from 1500 sources.

Reference

ACADEMIC AMERICAN ENCYCLOPEDIA (Copyright by Arete Publishing Company) An online electronic encyclopaedia. 30,000 items covering the 'full range of human knowledge'. Each item gives a detailed account of the particular topic.

MARQUIS WHO'S WHO (Copyright by Marquis Who's Who Inc) The complete text of *Who's Who in America* and *Who's Who in Frontier Science and Technology*. Includes 93,000 biographies from 1982 to the present.

IRS TAXINFO Produced by the US Internal Revenue Service and contains the complete text of 71 IRS publications applicable to the current tax year. Over 10,000 citations.

Knowledge Index can be contacted at PO Box 8, Abingdon, Oxford — or phone (0865) 730969.

END



BENCHTEST

Apricot F10

While others flounder and fall, ACT marches on with the Apricot F10, a high-end addition to the F range started by the F1 last year. Is an F1 with a hard disk and more RAM better than the Apricot Xi? Peter Bright takes a look.



ACT is a successful company, and there aren't many volume British micro manufacturers you can still say that about. It seems to have a penchant for old embassies, white Porsches and racing yachts, as well as value-for-money business micros.

The latest additions to the increasingly wide range of ACT micros are two new re-designed versions of the F range — the F2 and the F10. The F2 comes complete with twin 720k microfloppy disks, while the F10 has an integral 10Mbyte hard disk.

Here we take a look at the F10.

Hardware

Externally, the Apricot F10's system box looks just like the Apricot F1 it is based on and quite unlike any other micro you are likely to see. Although it conforms to the standard micro three-box design, it is much smaller than comparable micros.

The main system box is very low and thin, although it is quite deep, and it is higher at the back to accommodate the power supply unit. All the units in the F range are finished in par-for-the-course cream, and all the casings are constructed from moulded plastics which I found to be fragile. None are very thick and they deform easily. This is a point to watch.

Although the front of the system box is physically small, it still manages to house the single 3½in disk drive, LEDs representing power, caps lock, stop and disk access, and the

infra-red receivers for the keyboard and the mouse.

At the back, the F10 comprises composite and RGB video outputs as well as an RS232 serial port and a Centronics parallel printer port. There is also a strange-looking two-pin socket marked '12 volts' which apparently is used to power ACT's monochrome monitor. Finally on the back panel there is a blanking plate for an expansion card, and at the bottom of the right-hand side is a system bus slot for add-on boxes.

Getting inside the unit is straightforward. Remove the two Phillips screws securing the back panel, which you then also remove. Next, you simply lift off the lid.

Inside, everything is extremely tightly packed. The layout is broadly the same as on the F1. The main PCB is along the bottom of the system box with everything else on top. The power supply occupies most of the available space at the back of the box, and the single disk drive takes most of the space at the front. Inbetween, ACT has somehow managed to squeeze a 3½in 10Mbyte Rodime hard disk. It is such a tight squeeze that the only way to make it fit was to put it sideways across the middle of the box.

The upshot of all this squeezing is that you can hardly see the main PCB for all the add-on bits and pieces. The only thing which I thought was missing was the metal strengthening shield which usually supports the weight of the monitor on the lid of the system box. Without it, the lid bowed quite alarmingly under the weight of the colour monitor which made the monitor rock about alarmingly if the table was rocked.

The main PCB has been extensively rehashed over the original F1, which *PCW* Benchtested last October. The main processor is the same 4.7MHz Intel 8086 as used in the F1, but the system RAM has been increased from 256k in the F1 to 512k in the F10. This is achieved by the simple expedient of substituting 245kbit RAM chips for the 64kbit units in the F1.

The other major change made to the PCB on the F10 is the addition of an extra expansion slot. This is necessary due to one of the expansion slots on the F10's motherboard being taken up by a very compact hard disk controller card. The extra slot means that you can still plug in your ACT modem card or Point 32 network card.

As the main PCB is obscured by all the bits and pieces above it, actually removing the unit is now harder than on the F1.

While in theory it still slides out, you now need to remove the hard disk controller card and seven cables, one of which you can't extract without removing the hard disk itself.

One thing which did annoy me during the test is that the noise levels of the F10 are significantly higher than the F1. Part of this is due to the hard disk, but the main reason is the fan which seems much louder than I remember on the Apricot F1.

As already mentioned, ACT has launched not one but two additions to the Apricot F range. As well as the F10 on test here, it has also released the F2. This is basically an F1 with twin half-height 720k 3½in disk drives on top of each other at the front of the machine.

I chose the F10 over the new twin-floppy F2 for this Benchtest primarily because I was concerned about how well a hard disk would perform in this machine. The basic F1 circuitry does not contain a DMA controller, and I was interested to see if hard disk access times would suffer as a result. In order to find out, I ran Eric Bagshaw's disk Benchmarks (see *PCW*, November 1984) and was surprised to find that hard disk access on the F10 is actually faster than on the Apricot Xi or the IBM PC/XT. In fact, its disk access times are the fastest I have figures for.

As far as the display is concerned, the story is much the same as the Apricot F1 (that is, 640 × 200 pixels in four colours). You can either plug in ACT's RGB colour monitor or a cheap composite monochrome monitor.

The review machine was supplied with one of ACT's colour units. I believe that these have been hard to obtain in the shops, but ACT assures me that there is now no problem. These units really are very nice. Considering they are colour monitors they are very compact, and are quite in proportion with the rest of the system. The power and brightness controls are on the right-hand side of the monitor box. The only minor problem is that the monitor needs its own 240-volt power supply, so you will need two plugs to get the colour system going.

The screen is a Sony Trinitron unit. I have always liked these units in televisions, and the results in the monitor were also generally good, although in black and white mode the lettering on the screen is slightly fuzzy. The tube is anti-glare coated — I even used it sitting in the sun in my garden.

The F10 keyboard uses the same infra-red system as the F1. Instead of being connected to the main unit by a wire, the F10 uses an infra-red light beam to transmit the keyboard data to the main unit. The data is encoded in such a way that there is little likelihood of it being corrupted — it will either get there or it won't.

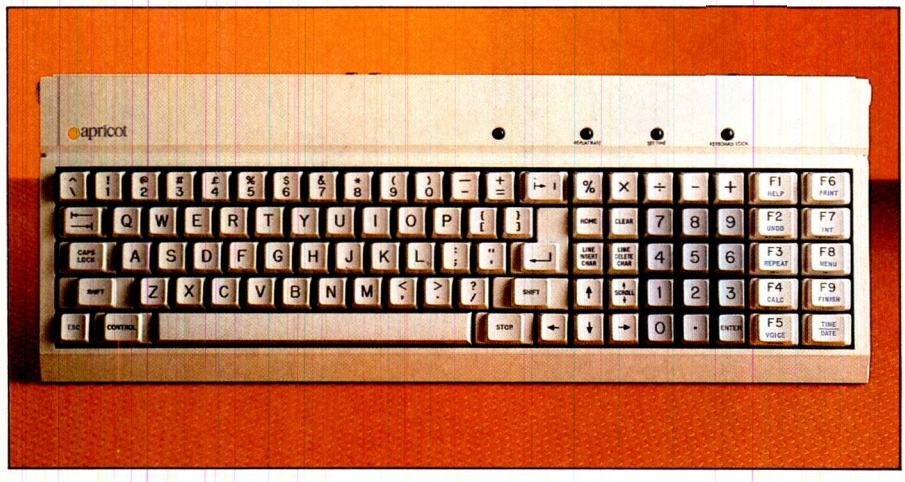
The main advantage of this approach is that you don't become tangled up with a keyboard cable; the main problem is that the only useful place for the keyboard is on the desk next to the main unit. If you try to use it on your lap, the light beam will probably be broken by the edge of the table and the keyboard won't work. To avoid this, ACT supplies fibre optic cable which you can use to connect the keyboard and the main unit.

As well as containing the keys, the keyboard also holds a battery-operated clock. Each time you boot up the system, you are asked to press the DATE/TIME key. This transmits the date and the time from the keyboard to the system unit to update the date and time held by DOS.

The keyboard unit is rather small, and although it is quite wide it isn't too deep. The front of the casing has a kind of abbreviated palm rest, and the back houses two buttons which make two legs spring down with alarming ferocity to alter the typing angle of the unit. Underneath is a hatch which covers the battery compartment holding four penlight batteries for the clock and the infra-red unit. When the unit arrived in the office, I just couldn't make it work. I was just about to return it as faulty when I discovered that ACT hadn't fitted any batteries!

When I Benchtested the original Apricot F1, I wasn't at all happy with the keyboard. It uses a membrane rather than individual key switches, and I didn't like its feel. The problem was exacerbated by the keys themselves, which reminded me of Scrabble tiles rather than computer keys.

I am glad to say that ACT has now gone some way to rectifying the problem. Although it is still a membrane keyboard, the keys have been re-



The F10's membrane keyboard looks and feels like a traditional unit



The back features a two-pin monochrome monitor socket

designed so that it now looks and feels much more like a traditional keyboard.

The keys are laid out in the same order as the F1; the main qwerty typing area takes up most of the left-hand side of the unit. To its right are the editing keys, then the numeric keypad, and then the 10 function keys arranged in two vertical banks of five.

This makes a total of 92 keys — it is hard to see how ACT could have fitted a single extra key in the available space. This is the most crowded keyboard I have ever seen. It's a bit like the IBM keyboard: no room for a space between the functional areas — just cram them in together.

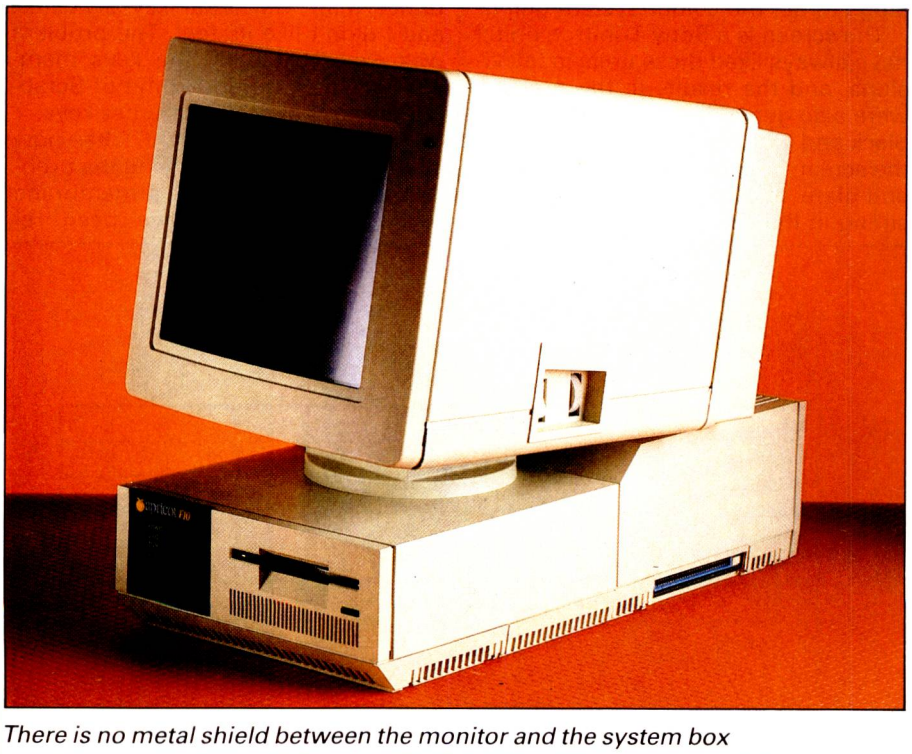
In addition to the normal typing keys, there are four extra buttons which run along the top of the keyboard casing above the typing keys. From left to right these are marked RESET, REPEAT RATE, SET TIME and KEYBOARD LOCK.

Not surprisingly, the RESET button soft-resets the machine. The REPEAT RATE key varies the speed at which the keys auto-repeat. The SET TIME button allows you to reset the clock using a display on the 25th line of the display, and the KEYBOARD LOCK button disables the keyboard.

In common with the rest of the Apricot range, the function keys double as a calculator. If you press the calc button (SHIFT F4), you can do calculations on the 25th line of the screen using the numeric keypad. You can then send the result to the cursor position by using the send button (F5).

All in all, the F10 keyboard is a vast improvement over the F1 unit. The keys feel and sound nicer, the only trouble being that you can hear the springs inside the keys as you hit them. The only disappointment is that this unit is just being supplied with the F2 and the F10: the F1 and the Apricot Portable have to make do with the old keyboard. I can't see any logical reason why this should be.

As well as the keyboard, the Apricot F10 also has the ACT mouse included in the price. When I Benchtested the F1, I wasn't very happy with the mouse either. At the time, it had the excuse of being a pre-production unit so no firm conclusions could be reached. This time the F10 was supplied with a production mouse, and I was hoping it would be better. It wasn't.



There is no metal shield between the monitor and the system box

The first problem with the ACT mouse is that it is designed either to be rolled around the desk like a normal mouse, or held in one hand while the other hand moves the trackball. If you try to use it like a normal mouse, the light pipe is a must as the angle of the light beam is wrong (the ACT mouse uses the same infra-red system as the keyboard). If you use it as a trackball in your hand, you will probably still need the light pipe because your hand isn't aligned with the light beam.

As if this isn't enough, I had terrible trouble controlling the cursor with the ACT mouse. Sometimes I could move the trackball, but the cursor wouldn't move.

This has happened on every ACT mouse I have tried — I can only conclude that the rollers inside the unit slip on the main ball and so don't register the movement.

Generally, if I want to use a mouse with an ACT machine, I plug a Microsoft mouse into the serial port. I had to put up with it on this occasion because someone has stolen my Microsoft mouse.

System software

Like the other Apricots, the F10 runs MS-DOS version 2.11 as standard. The main irrelation concerns the different versions of the BIOS which different machines run. Here, ACT seems to be in something of a mess.

Not long ago, I tried to install Lotus Symphony on the office Apricot Xi. It transpired that although the version of the operating system was OK, I had the wrong version of the BIOS. The only way out was to format the hard disk and install the new BIOS.

This is an example of a problem with a product which was specifically designed for the Apricot Xi; things can get really hairy when you try to work out which software will work on which machine. As far as the BIOS is concerned, ACT says it is working on a generic BIOS for the entire range. It's a bit late.

Another point which is causing extreme confusion is ACT's choice of friendly front ends for its machines. Here's the story . . .

Long, long ago when the Apricot PC was first launched, ACT decided that it would be a nice idea if it had a friendly front end to the operating system to make it easier to use. The company invented a system called The Manager which was quite basic and purely textual, and used a system of 'ladders' to allow you to select an option and

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carry it out. The Manager worked in its own limited fashion, although most people just deleted it.

ACT then decided that what it really needed was a graphics-based friendly system with colour, pictures, mice and icons, so it sank an awful lot of time, effort and money into producing a package called Activity. This was launched with the Apricot F1 and was bundled with the F1 and the Portable, although not with the Apricot PC. Activity was a good package. It worked within the limitations of the F1 and the Portable, and provided a nice, friendly, colourful environment in which to work. Then Digital Research released GEM . . .

GEM is designed to make a wide range of machines, from Ataris to IBM PCs to Apricots, look and behave like the Apple Macintosh. I can see why a few people at ACT were more than a little upset with GEM. ACT had just put a great deal of effort into creating a friendly interface, just to have one of its systems software suppliers release an even friendlier interface. But in spite of this, ACT included GEM with some of its machines. Then Microsoft released Windows . . .

Windows has been around, in theory, for so long now that most people can't remember when it started. Now, finally, Microsoft has released a positively-the-last-version of Windows. Windows isn't as friendly as GEM, but is more useful in that it allows multi-tasking on standard MS-DOS systems. Well, ACT just had to have that . . .

The outcome of all this is that the review F10 was supplied with Digital Research's GEM. GEM stands for 'Graphics Environment Manager.' It sits between the nasty, unfriendly operating system and the user, and provides what is hopefully a nice, friendly, easy-to-understand user interface. One of the great advantages of GEM is that it runs on a wide range of micros. To date, I've seen it on IBM PCs and compatibles, an Atari 520ST, various Apricots and a Philips. It will soon be out on ICL machines and other kit.

When you first boot the Apricot F10, it boots the operating system, loads all the bits and pieces needed by GEM, then loads GEM itself. GEM on the F10 looks very much like GEM on any other system. The first thing loaded is the GEM desk-top, which has a pull-down menu bar running along the top with commands headed DESK, FILE, VIEW and OPTIONS.

Down the right-hand side of the screen are three icons, marked Hard Disk, Floppy Disk and Trash. Most of the remainder of the screen is occupied by a large window which displays the contents of the current directory. Files are represented by icons according to their type. If a program has been installed in GEM, a picture is displayed in the icon to represent the type of program it is.

Windows in GEM can be moved and sized in exactly the same way as on the Macintosh. You can use the mouse to drag windows around, size them and scroll information inside them.

The main difference between GEM on the Apricot F10 and, say, the IBM PC is that GEM runs in colour on the F10. Four colours are used — blue, yellow, red and black. The overall effect is very pretty, but I'm not sure about some of the colour combinations when an application is opened, for example.

My main criticism of GEM on the F10 is that the F10 doesn't have quite enough raw power to run GEM properly. Graphics user interfaces such as GEM take a lot of calculation speed to produce a display that can size and update graphics windows fast enough not to be noticeable.

It is not without reason that the Apple Macintosh uses an 8MHz Motorola 68000 processor just to drive a monochrome screen. The Apricot F10 only has a 4.7MHz Intel 8086 to look after a full-colour screen, so GEM on the F10 can be very slow when it has to resize or update multiple windows.

This was especially noticeable when comparing the speeds of GEM on a Compaq Portable with a monochrome screen, and an Apricot. Both machines have similar processors working at similar speeds, but the GEM display on the Compaq was much faster simply because it didn't have to update all the colour graphics planes.

In terms of usability, ACT would have been better off retaining Activity for the whole F range — at least that worked fast. This of course ignores the other advantage of GEM, which is that friendly applications programs can be written for the GEM environment.

Applications software

Apart from having GEM bundled with it, the F10 also includes two applications programs specifically designed to run in the GEM environment: these are GEM Draw and GEM Write. The review machine was supplied with pre-production versions of both, as well as an early version of GEM Paint.

GEM Write is in fact a GEM-ised version of Lifetree's popular Volkswriter Deluxe word processor, and it looks very nice indeed. All the commands are contained in a pull-down menu which run along the top of the screen. The document is displayed in a window which can be sized, moved or scrolled at will, using the mouse. Different text styles can be displayed onscreen, although the pre-production review version didn't allow different fonts or point sizes.

One interesting feature of GEM Write is that you can include GEM Draw pictures in the document. This is done by specifying the filename of the drawing at the point in the document where it is to be placed; the drawing is then displayed onscreen in the text. The only drawback is that when you scroll through the text, it can take some time to re-draw the picture. Consequently, GEM Write contains an option to turn off the graphics, in which case only the filename is displayed.

Volkswriter Deluxe is a well-liked word processor for the IBM PC, and in its GEM guise looks to be a very good word processor indeed — definitely better than what is usually bundled with a machine.

GEM Draw was written by Digital Research and is usually included as part of the GEM package. In this guise, it can take advantage of the four colours available on the F10. I must admit that I've always found GEM Draw rather difficult to use. It is more like MacDraw than MacPaint, and stores its pictures as a series of drawing commands rather than a bit image, which makes it better for design work than free-hand drawing.

Having said that, the colour implementation on the Apricot is very nice. The window outline is in blue, with the main drawing areas in black and the grid lines in yellow. Very pretty.

GEM Paint is more like MacPaint, and is much better for doodling and free-hand drawings. GEM Paint won't be bundled with the F10, you'll have to go out and buy it.

One of the good things about ACT's Activity package is that you can play with system fonts and keyboards via the utilities included in the package. ACT is currently rewriting these utilities to work in the GEM environment, but unfortunately they weren't ready in time for this review.

With GEM, you aren't restricted to applications programs specially written for the environment. Any program that will run on the basic system will run

Benchmarks

BM1	1.8
BM2	5.7
BM3	11.8
BM4	12.3
BM5	13.7
BM6	25.4
BM7	39.5
BM8	38.3
Average	18.56

All timings in seconds. For a full listing of the Benchmark programs, see page 185, January issue.

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under GEM, so what software will run on the F10 with or without GEM? As is common with ACT these days, the answer isn't simple. Theoretically all the Apricots, whether PCs, Fs or Portables are compatible, but this is only true to a certain extent.

'Well-behaved' programs which use operating systems calls properly should run across the range: I tried a generic copy of SuperCalc and it ran quite happily. However, some programs (usually the popular ones) aren't well-behaved. Instead of using MS-DOS calls, they access the hardware directly, and this is where problems occur. The only real way to check if an Apricot program will run on the F10 is to reference the software price list, then try the program.

Some popular programs have device drivers which can be slotted into the main program to make it work with different screen configurations, and so on. Certain popular Apricot programs do this, so making them run on the F10 should simply be a question of altering the drivers to suit the F10's colour screen and keyboard. But here we run into an ACT marketing problem.

ACT already has programs such as Lotus 1-2-3 and Open Access running on the F10. I tried running my Apricot Xi version of Lotus Symphony. Not surprisingly, it didn't run because I didn't have an F10 colour screen driver.

When I asked ACT if it intended to produce an F10 version of Symphony, it said no. The reason is not technical — in order to run, Symphony needs 512k of RAM and a hard disk, both of which the F10 has. The reason is one of market differentiation. Symphony currently runs on the high-end Apricot Xi models, which cost more. ACT is trying to position the 512k and 1Mbyte Apricot Xis as high-performance machines, and the F10 as a cheaper high-memory machine. Symphony and Windows are seen as high-performance products which will only be sold on the high-performance machines.

In reality, there is no difference in processing power between the Xi and the F10, and as I stated earlier, the F10 probably has higher disk access performance than the Xis. ACT is adopting a standard marketing ploy — we all know there is no difference between Kellog's corn flakes and the supermarket's own brand, yet we continue to pay the extra.

Disk Benchmarks

	Apricot F10	Apricot Xi	IBM PC/XT
0) Program load	1	16	19
1) Sequential write	6	6	5
2) Sequential read	8	7	19
3) Random write	13	11	15
4) Random read	9	7	3
5) Sequential multi-open and write	16	26	22
6) Sequential multi-open and read	2	1	8
7) Random multi-open and write	8	27	27
8) Random multi-open and read	3	2	8
9) Random read in random file	3	4	3
10) Random write in random file	6	9	3
11) Random front-end swap	47	50	76
12) Close up holed file	20	20	31
13) Multi-kill	6	6	15
Total	148	192	254

Technical specifications

Processor:	4.7MHz Intel 8086
ROM:	32k
RAM:	512k
Keyboard:	92-key membrane
Display:	Composite and RGB, 640 x 200 pixels, four colours
Size:	16.6ins x 8.7ins x 8.3ins
I/O:	RS232, Centronics, one expansion slot
O/S:	MS-DOS version 2.11, GEM
Bundled software:	GEM Write, GEM Draw, GW-Basic, IBM emulator

In perspective

Trying to work out what ACT is up to these days is becoming increasingly difficult. In software terms, the only thing the machines in ACT's range have in common at the moment is the operating system, and that is open to question. Applications software is not completely compatible across the range, and the choice of at least three friendly front ends requires some thought.

Popular IBM wisdom (although not always practice) has it that the one thing you do is try to keep software and hardware compatible across the range. ACT seems to be going for a policy of market differentiation for its machines, which has little technical basis and sometimes occurs at the cost of software compatibility.

Therefore, the F1 and F1e are meant to be seen as the entry-level units, the F2 and F10 as the mainstay units, the Xi machines at the top, and the twin-floppy Apricot PC out in the cold. The idea is to achieve upward software compatibility through the range, but this can't happen at anything other than the generic level while GEM is in volume and Windows is at the top.

While I think I can see the logic of ACT's manoeuvrings in theory, I also think that the proliferation of different hardware and software combinations in the Apricot range places a heavy burden on the dealer, and could lead to consumer confusion. I'm certainly confused.

ACT either needs to get its positioning act together, or explain its current position more clearly.

Documentation

As is so often the case with Benchtests, ACT had the machine ready before the documentation so none was supplied. I'm sure it will be up to the company's usual standard.

Prices

The Apricot F10 will sell for £2295. This includes one 720k microfloppy, a 10Mbyte hard disk, 512k of RAM, a keyboard, a mouse, GEM, GEM Write and GEM Draw, but not the monitor. The mono monitor costs £200, the colour monitor costs £395.

Conclusion

The Apricot F10 is a better machine than it looks. It does everything the old Apricot Xi10 does and more, and yet the sleek black Xi10 still looks much more purposeful than the F10 could ever hope to. This may seem a trifling point, but it's a fact.

In hardware terms the F10 certainly wins — it has the same hard disk, the same 512k of RAM, the advantage of a friendly full-colour display, and it's cheaper. The keyboard is a vast improvement over the unit on the F1.

Judging by the way the current Xi10 is being discounted, I wouldn't be surprised to see the F10 advertised for less than £2000. Even at £2295, it is still exceptionally good value. END

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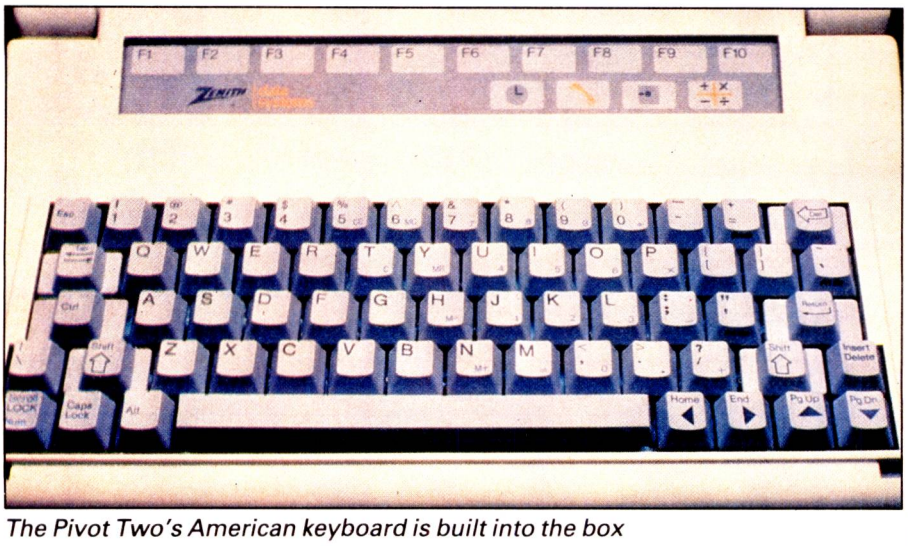
PC portables

The plethora of 'portable' micros has so far failed to produce a reasonably priced, suitably manoeuvrable machine, but three disk-based, IBM-compatible portables might fit the bill — the Morrow Pivot Two, the Quadram Datavue and the Ericsson Portable PC. Guy Kewney tested each one to see if he'd be carried away.



The Morrow Pivot Two: an Osborne Encore upgrade with impressive changes



The Pivot Two's American keyboard is built into the box

There are lots of 'portable micros' on the market, and normally they range between genuinely lightweight but pricey machines, or genuinely low-cost great lumps. But at last, there are genuinely portable (under 20lb) machines which have at least one disk, can be used in an open field, and can run IBM software.

Three arrivals are worth comparing: the Morrow Pivot Two; the Datavue 25 from Quadram; and the Ericsson Portable PC.

Morrow Pivot Two

At the time of writing, most people seem to be more concerned about the financial health of Morrow than about the technical specifications of the Morrow Pivot Two. The company's problems aren't new — it has been common gossip in the US since November last year that it wasn't making the money it had hoped for from old products, and new products had been slow to reach completion.

Morrow, short of development funds, turned to Zenith, which had evaluated the Pivot One, and licenced Zenith to build the new design. The arrangement has been greeted with astonishment at Vadem, where the original machine was designed. Vadem isn't a large company and Zenith is, so any lawsuit threatened by Vadem is likely to be taken less than seriously by the giant electronics manufacturer.

Zenith is selling the Morrow Pivot Two, with trivial modifications, as the Zenith 171. For nearly all points in this review, therefore, where there is a known difference between the two machines, it will be noted. Otherwise, the choice between Zenith or Morrow will be a simple one: which supplier is most likely to be in business this time next year?

To further confuse matters, the new machine is an upgrade of the Osborne Encore, reviewed in *PCW's* October

1984 issue.

The changes begin with a much better LCD display, which gives a full 25 lines, and there's ingenious backlighting so that it can be read in awkward places. This doesn't just mean dark rooms, but also places with excessive fluorescent ceiling lights.

It has two disk drives, both one inch in height, which take up very little space but weigh a little more, and it now has both internal battery power (rechargeable) and an external power socket (not mains, but mains derived).

For the man in the street, the difference between the Morrow and the Zenith versions is simple. The Zenith has a green display and will almost certainly be cheaper; the Morrow will have a grey display, a black box, and will be packaged with a premium software package, justifying a higher price.

Hardware

The Morrow screen isn't quite the same as an ordinary video screen due to the pixels being shorter. For text, this hardly matters — it's all legible. For graphics, which are IBM-compatible, it means that any circles will appear to be horizontal elipses — eggs, if you like. Users might refer to 'egg charts' instead of pie charts, because that's what they'll get.

The fascinating surprise feature of the new display unit is that it is 'soft', and I don't mean programmable — it is squishy. Instead of the polarising gel being squeezed between two plates of glass, the new LCD technology 'peels' off the front glass and puts a strong plastic film there. Touch it, and the display shows the kind of distortion you can see in plastic when viewed through polarising spectacles.

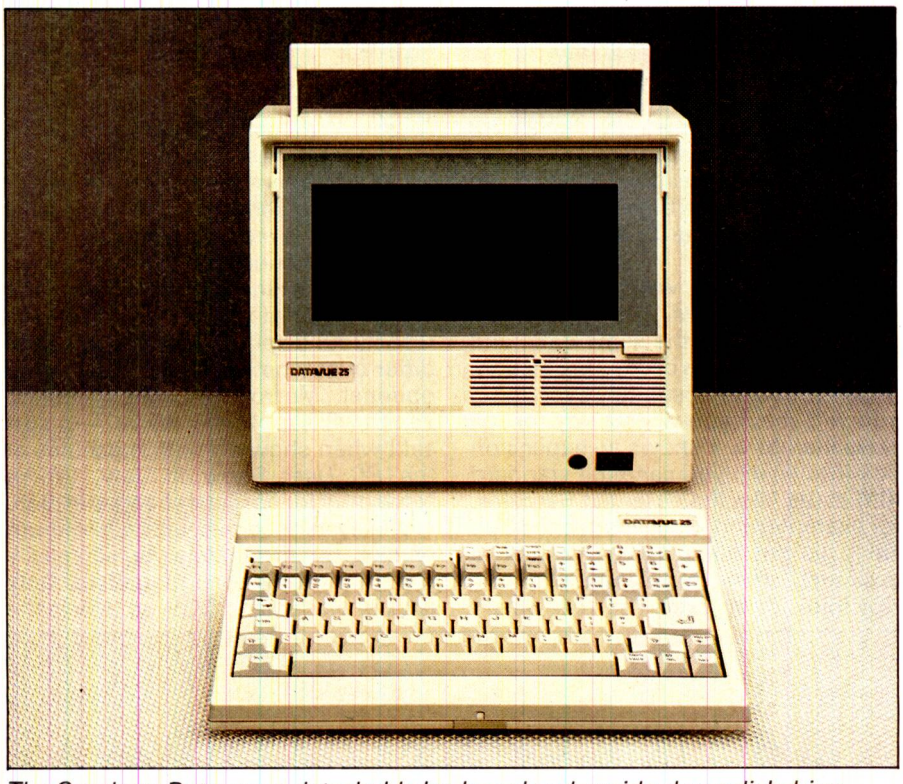
'What happens if you scratch it with a knife?' I asked the supplier. 'You destroy it,' he retorted. Fair enough. If you hit an ordinary LCD with a stone, you destroy it, and if you hit a video display with a brick, it explodes. Don't scratch the soft screen with a knife.

The Morrow screen, darker than the Zenith, has a viewing angle control to point the polarisation towards the viewer. It has a softer backlight. The Zenith, by contrast, is greener and less distinctively separated. It doesn't have a viewing angle control but it is brighter, and can be viewed from a wider choice of angle so it's more suitable for use by two viewers at once.

The pixels are either on or off — there is no grey-scaling.

The keyboard is an American keyboard, and as it is built into the box, changing it for an English keyboard might be a problem. The hash symbol prints as a £ sign on the number 3 key and the quotation marks, double and single, are next to the RETURN key.

On a portable, you can't stretch the keyboard sideways and put extra keys at the side, so IBM's layout (function keys on the left and a numeric keypad on the right) disappears. Morrow tucks the function keys up along the top, under their screen labels.



The Quadram Datavue: a detachable keyboard and upside-down disk drive



The Datavue's keyboard attempts to provide full IBM PC compatibility

The numeric keypad is easily dealt with: it isn't there. Instead it is overlaid on the main keyboard so when you switch to numbers you don't lose your cursor keys, but you do lose the main keyboard. Rather than qwertyuiop, the top line of keys gives qwerty456p; similarly, the next line has 123 instead of jkl. This is all very well, but there are many programs which don't understand this and it can cause problems. The cursor keys, however, are always there, even in numlock mode.

Along the top of the keyboard, hinged down from the display unit, are special function keys which perform particular functions. There's a calculator key, which turns the micro into a £5 pocket calculator without interrupting whatever you're doing; this could save you the price of Sidekick or Spotlight. And there's a phone key, which turns on the communications option.

The Pivot Two has a nice, simple shoulder strap for carrying it around, but the box itself is something which has caused disagreement between myself and the designers. They call it a 'lap-held' machine, and I call it a portable. The difference is that if you put this machine on your lap, it will fall over. The Data General One (Benchtested in December, 1984) is a lap-held machine, and I've seen people using it to prepare Lotus spreadsheets, even in flight over the Atlantic. The Pivot Two weighs about 15 lbs.

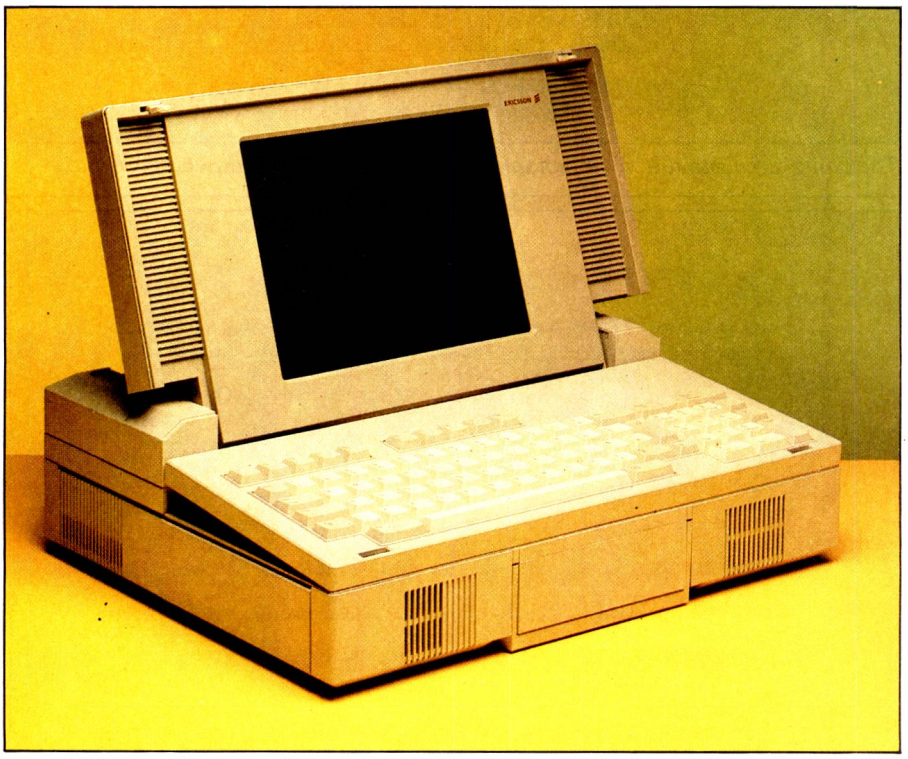
The disks are on the right-hand side, as you face the box, and you can read the labels when you pull them out. You might think this is obvious, but the Datavue doesn't have this feature.

They are, in all ways except their thinness, IBM disks. They run at the same speed, hold the same data, and obey the same laws of copy protection.

Do not believe absolutely everything you will see if you write away for the sales literature. It shows an expansion box into which you can plug standard IBM cards (like the essential Hercules, for example) and which is attached by a cable to the main unit. This box is essential, I think, but Zenith and Morrow think it's an extra. Morrow wasn't didactic about it, just saying that it wasn't ready. Zenith said it was 'an expensive bell and whistle'.

There is a serial port and a parallel port. There is also, and this is a major feature, a monochrome 'monitor' output for an ordinary video screen, and colour RGB output to drive a standard IBM colour display. Morrow and Zenith differ over whether this is standard or optional. Morrow will charge extra, Zenith will supply it inclusive — or so it said when showing both machines at the *PC User* Show in July. Watch Newsprint for possible changes in plan.

The system comes with a minimum of 256k, but fortunately you can easily plug in a total of one megabyte. Only 640k is available to DOS, so why is the extra 360 there? Firstly, there will soon be a new version (version 4.0) of DOS. That will extend the capability of the normal IBM XT to the full megabyte, and, I gather unofficially, may go further. Secondly, the system can use the extra as a RAM disk, loading and unloading data and programs at lighting speed. I don't know exactly how fast because the test machine didn't have one megabyte, but suspicion suggests that it will be slightly slower than normal RAM disk software as it will be switching memory pages. On the Intel/Lotus expansion system of PC memory, this translation takes quite a while.



The Ericsson Portable: 'unique among PCs generally'



The Ericsson's IBM-style keyboard is light, detachable and easy to use

System software

MS-DOS version 2.11, which is essentially PC-DOS without Basic built in, comes with the machine.

An IBM PC without Basic is a machine which requires another £100 spent on it, as any number of free utility programs are written in GW-Basic. For example, EasyWriter can convert its text files to WordStar format with a neat little program — in Basic. No Basic, no conversion. (On this machine, as on the other two reviewed here, there was no deviation from standard Microsoft Basic speeds on the *PCW* Benchmarks.)

A battery-powered clock/calendar is built in. On power-up, a map of the world (Mercator projection) with various time zones is displayed.

A set-up utility is invoked by pressing one of the function keys. This lets you change the system settings, including whether or not you're using the external monochrome adaptor or colour adaptor, or whether the display will turn itself off after 15 minutes to save the battery, or what time it is, or where in the world you're using it.

A telephone manager program is provided with the Morrow Pivot, but not with the Zenith. This isn't, on its own, enough to justify any higher price asked for the Morrow, but it comes close. The reason it isn't available on the Zenith is simple: it uses an American (Bell standard) modem which Morrow will supply unchanged.

Applications software

The plan is to bundle the 'ideas processor', ThinkTank version 2.00, with the Pivot Two. I've raved about this program in Newsprint (see August's issue) and it does work, bugs and all (several, I'm afraid) on the Pivot/Zenith. But it does cost less than £200 and it is available in this country, so having it bundled isn't really such a crucial advantage for the Pivot.

NewWord is also supposed to be bundled with the Morrow, according to the manual. It wasn't bundled with the test machine, but if it is, you can pretend you are working with WordStar. They're very similar.

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Documentation

On the Pivot Two, most of the essential information to run the machine comes in a small, square, disk-sized booklet with 200-odd pages.

As these books go, this is quite good. It starts out in a rambling, discursive way, showing how to open the box, what all the plugs and sockets are for, and so on. Then it gets down to turning the thing on and using it, so it is good as guidance for a beginner who is working through as per instructions.

A nice touch is the integration of the utility software with the documentation. For example, the phone manager keeps track of all your phone numbers and names, in RAM. The program which controls this information can save it all to disk, load it from disk, and make sure that information isn't lost when the machine is serviced.

Prices

The Morrow Pivot Two with 256k and one disk but without a modem video board will cost approximately £2363. The version with two disk drives will cost £2719. Other prices are: NiCad battery, £80; 300/1200 modem, £400; video board, £302; carry case, £70.

As an introductory offer, the company is offering the dual-drive version at the same price as the single-drive version.

The Zenith dual-disk, 256k version will cost £2295. For the price of a one-megabyte system, just add the cost of chips. The modem will be basic, with no external connections or line drivers. The video board is user-fittable, but under £300.

Quadram Datavue

At first sight, the Quadram Datavue looks enough like the Morrow Pivot Two to make the suspicious believe it is the same machine in a different box. It isn't. It was designed by an American, Michel Burton, living in Japan, whereas the Pivot Two started life in the Osborne stable when a bunch of engineers left Osborne, just before that company crashed, to set up on their own.

The Datavue is white and has a detachable keyboard. It uses infra-red to talk to the main system, and there is the option of an optical cable to link them if necessary. It is designed to be expandable, with space for a modem and a place for an extra (external) floppy disk, and an expansion bus, to drive a large IBM-compatible crate.

Hardware

The Datavue is portable, weighing 12lbs without the 2lb battery, and with a built-in, tiltable LCD screen. Almost inevitably, given the pricing policy, people will buy it with 640k of memory (it costs £186 more than the virtually useless 128k version), which means that it comes as standard with a RAM disk, drive B.

There is a single floppy disk, half-height (compared with a third-height drive on the Ericsson and Morrow machines), mounted, irritatingly, upside-down. If there is a disk in the drive, you have to take it out and turn it over to see what the label says.

An extra floppy disk costs £396, but can't be built into the system case.

The detachable keyboard is a brave attempt to provide full IBM compatibility without copying the shape of the PC board. It has a proper IBM-style numeric keypad, with the option of using some of those as cursor keys — which, frankly, I prefer to the Morrow system of having cursor keys in a row. The only non-standard part is the position of this pad, which is above the normal keyboard and not to the right, as on the PC. The function keys are in a row along the top, which means that you can't use Lotus template labels.

Typists will like the keyboard, which is a little heavy for some tastes but clean. It's curved, making the keys easy to reach, and has little marker blips on the f and j keys to help beginners.

The keyboard, being remote, can't be read by machine code routines which expect it to be a piece of dumb hardware. Expect weird and unpredictable consequences if your program is written in such a way.

The display is by far the weakest link in the whole system. Cleverly, it has disguised itself as an IBM colour display with four levels of grey, or so it says in the manual. In fact, the way it has been designed, it isn't always possible to be sure whether the thing is on or off, so faint is the display, and any lower grey level would be invisible.

Liquid crystal works by polarising light. The light is polarised by the organic crystals which are held in one direction or another by electrical charges (controlled by a transparent electrode), and a polarising filter on top makes some look black and others look white.

For some reason, the Datavue designers have put a screen of plastic over the display. This prevents you from touching the real display, or from seeing the wiring at the side, but it also very effectively prevents you from reading what is on the screen unless viewing conditions are absolutely optimal. There is an option planned for output to a standard colour display, but that requires the purchase of the expensive expansion crate, and is obviously of no interest to people who need to use this machine away from the office.

Power plugs in direct from the mains, through a standard adaptor which is normally used by video camera operators. This can be replaced by a rechargeable battery, when it is driven by a battery charger.

The clock-calendar information for DOS time and date stamping is automatically fed into the system clock by a battery-powered unit, and you don't have to type it in each time you start up.

System software

The system is supplied with MS-DOS 2.11, but the Datavue BIOS has to vary quite heavily from the standard in order to cope with improvements such as RAM disk, remote keyboard and dual-purpose display.

On power-up, the system monitor checks the hardware and enquires how much RAM disk space the user needs. Entertainingly, the RAM disk assumes it has 360k, whatever you set it to, but if you tell it that in fact you only want 280k, for example, it will then tell you that there is 82k in 'bad sectors'.

The RAM disk is set up at start-up time, taking 8k of memory at a time from the 640k total, up to a maximum of 360k (the standard IBM disk size). It is set by holding down the left arrow key to take memory away from the main system, and holding down the right arrow key to take it back from the RAM disk.

The Basic supplied with the system is standard GW-Basic, and will run almost all Microsoft Basic utilities.

Applications software

Applications software is bundled with add-ons. For example, the Bell standard modem is bundled with Crosstalk and is Hayes-compatible (which means that, although not approved for use in this country, it will work with standard 1200 baud V22 services).

It is wicked of Quadram to provide this accessory and it isn't advertised, but it is available, and I wish other people were equally as wicked.

Documentation

The operations manual was simple, clear, and not too badly inaccurate. There are other manuals available, but they weren't ready at the time of this review.

Prices

The cheapest system is the 128k option at £1812, which no-one in their right mind will buy. Spend £1998 for the 640k system, and don't risk trying to plug in CMOS memory chips with your fingers. They are the easiest things in the world to pop with static electricity, and holding them in your fingers is a good way to do this.

A rechargeable battery, as used in standard TV cameras (portable) costs £51, and an extra floppy disk is expected in September for just under £400. Other expansion options are planned.

Ericsson Portable

This machine is unique among the three briefcase portables tested — in fact, it's unique among PC clones generally.

For a start, it isn't really a PC clone but a very similar machine with several new features. The obvious new feature is the screen, which is bright orange and folds up. Unlike LCD displays, this one is as deep as the video screen which we're all used to. It's also brighter and easier to read. That's what you get for using plasma — but, of course, the penalty you pay is that there's no hope of running it off batteries.

Technical specifications: Pivot Two

Processor:	80C88
ROM:	32k including calculator, phone function
RAM:	256k min, upgradeable to 640k (up to one megabyte on Zenith)
Storage:	360k, IBM-standard floppy, second drive installable
Keyboard:	American, built into box. Numeric keypad overlaid on main keyboard
Size:	13ins wide, 6ins deep, 9.5ins high. Footprint closed, 13ins by 6ins; open, 13ins by 13.4ins
Weight:	13lbs with single disk. Battery 1.5lbs
I/O:	Serial, parallel phone socket (Bell standard)
Bundled software:	Built-in functions, calculator, phone number storage, MS-DOS 2.11, GW-Basic extra
Options:	Hayes-standard modem, V21/V23 by Morrow Europe

Technical specifications: Datavue

Processor:	80C88, low-power version of the 8088 in the PC, standard clock speed
ROM:	16k of diagnostics and BIOS
RAM:	Upgradeable from 128k to 256k with 64kbit chips; upgradeable from 384k to 640k with 256kbit chips
Storage:	One floppy disk, IBM standard, 360k
Keyboard:	Detachable, non-standard layout, non-standard electrically, with upgrade to imitate IBM electrical performance expected after September. Uses infra-red link to system unit
Size:	12.5ins wide, 10ins tall, conical in cross-section, from 6ins at bottom to 4.5ins at top
Weight:	12lbs without battery, battery 2lbs extra. AC power adaptor not available for weighing
I/O:	One serial, one parallel slot. Expansion bus to be offered after September
Bundled software:	GW-Basic, MS-DOS 2.11
Options:	UK-standard keyboard (after September); second diskette (after September); US-standard auto-dial, auto-answer modem (Hayes, 1200), V22 equivalent; rechargeable battery; connector cable between keyboard and system unit; new displays (available after September); expansion chassis (available after September)

Technical specifications: Ericsson Portable

Processor:	Standard 8088
ROM:	No details available
RAM:	256k expandable to 512k
Mass storage:	One-third height floppy, 360k, optional plug-in drive, 360k RAM disk
Keyboard:	IBM-style, with function keys across the top in two groups of five. Detachable, light and quite easy to use, but flat, not ergonomically rounded
Size:	15.3ins across, 12.1ins deep, 4.5ins tall
Weight:	Nearly 14lbs
I/O:	Standard IBM serial and parallel plugs
Peripherals:	Standard IBM communications ports to drive printer and modem. Optional built-in printer available, uses COM:1 slot

The machine is not battery-powered, and uses as much power as a standard desk-top unit. It is fitted with a cooling fan.

Hardware

The main diskette is the one-inch deep, 5¼in IBM-type drive. A second, external diskette can be plugged into the expansion slot.

More significant, for many users, will be the RAM disk. There is an option called the 'ergo-disk' which plugs into the unit and provides 360k of memory, but this could be better organised.

The ergo-disk is called drive C. It is installed at power-up and immediately disappears. There's a program called CDRIVE which cleverly tells the system that the disk is there, but I haven't found the bit in the manual that tells you to run this program, and the complicated auto-exec doesn't do it for you.

RAM disks ought to be automated, and this one is. You press SHIFT, CONTROL and the letter P, and the applications programs are loaded into the RAM disk. The system then tells you it is having trouble reading drive C (it isn't there, it's waiting for you to address drive B), at which point the RAM disk will become drive A, and the floppy disk will become drive B.

Confused? So was I. The assumption is that programs are loaded from drive A, and then refer to data on drive B. This assumption is wildly inaccurate for a great many programs, and if the program starts referring to drive A, then any data files there are easily lost.

I returned to configuring the disk as drive C rather than using the automated process. I tried loading files onto drive C with the COPY command, which worked fine. Then I loaded programs into the RAM disk. That worked, too. When I ran the program, however, I encountered the old problem of not being able to guarantee that the programs would admit the existence of the drive.

You are advised to buy versions of IBM PC programs specifically configured for the Ericsson PC. I received some odd messages when trying to take standard IBM versions across. In particular, don't try using IBM DOS 3.0 disks on this, which uses DOS 2.11. There are barriers.

The Ericsson screen is red-orange and quite bright. It's possible to change the contrast but not the brightness, which is a shame. I'd never want less contrast, but in sunlight I'd certainly want more brightness. Power to the screen is automatically shut down when the lid is closed.

The lid allows a nice variation on viewing angle, but nowhere near as much as the Pivot Two or the Dataview. On the other hand, its plasma display is much more visible than the Datavue's.

Unlike almost any other PC lookalike, the Ericsson has a built-in printer option. It uses a thermal ribbon which

makes it quiet, quite low-power, and able to take any paper, not just heat-sensitive paper.

At least, that's the theory. In practice, you need thin, smooth paper, preferably thermal paper, and you shouldn't expect too high a quality of output. Nor should you be in a tearing hurry, as it's rather slow.

The printer takes output from the parallel port; a switch redirects this to the real parallel port.

System software

The Ericsson is supplied with MS-DOS 2.11, but there are so many special alternatives in the hardware that this must be regarded as a different operating system. Messages such as 'You cannot SHELL'': to Basic' and 'Wrong version of DOS' will be sent back to you if you try to run IBM software out of the box.

The RAM disk software appears to work, but is so unlike the conventions expected under DOS that it almost becomes a hazard to the unwary user.

Applications software

An ordinary version of GW-Basic has been configured for this machine. The test version came without a Basic manual, so it wasn't possible to test its ability to handle the RAM disk as a peripheral except under the SWAP function, which I found very confusing.

Documentation

The manual is small but is nonetheless tedious, repetititive and hard to pick you way through. After much searching, usually, I found that the information I wanted wasn't there, but it does come in a nice ring binder.

Prices

The basic price for a 256k machine with one floppy disk is £2850 'list'. The printer is £300 extra.

Pricing of add-on memory is hard to calculate, as it depends on whether you have the RAM disk ergo-disk. There seems to be some confusion about whether you can have a 360k ergo-disk or whether you automatically get a 512k one, and what happens to the extra 162k if you do. The system only gives 360k as a RAM disk.

However, a 512k system with ergo-disk costs £4300. You can get a PC/AT for that kind of money, with 20Mbytes of hard disk. An external floppy will cost £600.

Although the side of the machine shows a slot for a hard disk, the company tells me that a 'hard disk is not available, and we have no price information on it'.

Similarly, the expansion chassis is theoretically available, which means memory expansion is possible, but 'no price for that,' says the company. There is no price for connecting a colour monitor at the moment.

Conclusion

It would be nice to say that one of these three machines stands so far above the others that it must be the choice, but too many features are still undecided for this to be possible.

For example, if the Datavue does have backlighting (promised by European agents Interquadram for September), it will be a genuine contender for a battery-powered unit — assuming it's good. Without backlighting, it's virtually unusable under any but ideal conditions.

The Ericsson has more features packed into the box than any other portable, with printer, full-sized display, disk and RAM disk, but to get there, you have to pay an extraordinary price. The RAM disk isn't obvious to the user, nor is it foolproof. I prefer the Datavue option, or a proprietary software package to drive the Pivot Two's full memory map. There is just no way that the Ericsson will ever run off batteries because it runs very hot, and the display chews up power, too.

If Ericsson had any plans to release a hard disk or an expansion box (into which you could plug IBM-compatible cards) it would be recommended as a useful IBM lookalike, without mentioning its portability. But, although the slots are there to take these devices, the company regretfully admits that there are no such plans. The beast is not really compatible enough to compete with desk-top imitations — even Ericsson's own PC (the one advertised with a baby in nappies, falling down) is a closer clone. You cannot be sure of transferring software to this portable.

The Datavue's expansion box is also planned for September. This portable, with the poor quality of its LCD screen, badly needs this expansion box as there is no other way of connecting it to a standard desk-top display.

The Pivot Two, however, has the option of including not only a monochrome CRT output, but also a colour display. There is so much graphics software which makes creative and powerful use of colour (and quite a lot of non-graphics stuff, too) that this must be regarded as important.

The Pivot Two also has the advantage of dual diskettes, which isn't a totally indispensable feature but is indeed a big plus. The extra diskette on the Datavue is not cheap, and the one on the Ericsson comes at a price that made me whistle.

Ultimately, you will probably make a choice on price. I wish I could help you here, but prices look quite unstable. The Datavue was on sale for $1000 for a 128k version (no longer supplied) at its launch in Atlanta. 'There's no point in a promotion like that unless you are trying to give some kind of message to the market,' conceded a senior executive at the time, and the message is clear —the price will come down if it has to, to meet competition.

As Zenith doesn't believe in putting high price tags on machinery, and is prepared to leave off the odd bell and whistle to bring the price down, competition there will be. **END**

In pespective

Ultimately, one can envisage technology providing us with a keyboard and display, weighing around two pounds, and in constant radio contact with the desk-top storage and control unit 'back home'. Today, however, the need to carry at least one floppy disk drive for data storage makes portables too bulky and weighty to truly live up to their name. The need to read IBM 5¼in diskettes doubles the weight and volume penalty.

These machines all prove the point. They are more portable than a desk-top monolith, and even more portable than something like a Compaq, but they really aren't lap-helds. In the case of the Ericsson, as it isn't capable of being battery-powered, one wonders what the point of designing it was.

All three machines are aimed squarely at those who do a lot of work at home and a lot somewhere else — someone's office, for example. They are also aimed squarely at the person who has to share an office, data and programs with people having standard IBM PCs.

My own preference, on technology only, is for the Morrow Pivot Two, followed by the Zenith version (no modem, less clear display), followed by the Datavue (if a backlit display is released), with the Ericsson trailing a long way behind. The Data General One should also be considered by someone who just has to have an IBM-compatible 'lap-held', too.

But anyone thinking of just buying a machine which will run IBM software should go for a good desk-top clone such as the Zenith 150 or the Compaq, or the go-faster Olivetti, or the Commodore (when the power supplyis sorted out), and use a standard lap-held NEC 8201 or Tandy 100 as their data capture device.

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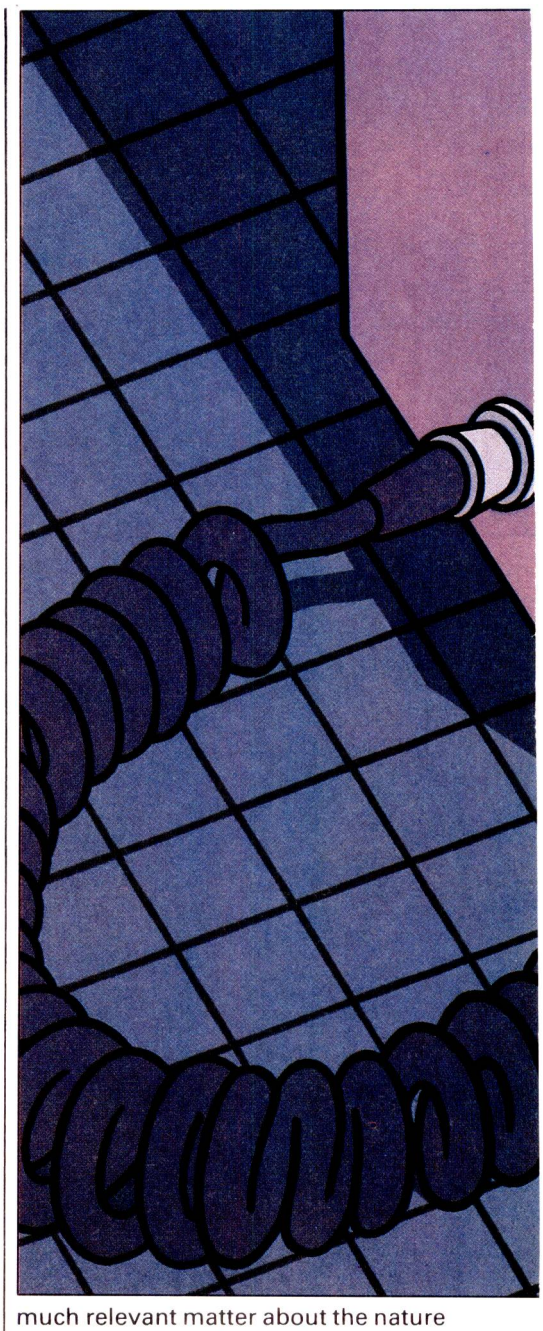
Data dictionaries

There's no need to have badly-structured programs with randomly-scattered data — Jim McCartney explains how to create data dictionaries in MBasic and MS-DOS.



When you are writing applications programs, a lot of space is taken up in defining the data you are using, and specifying its exact relevance to the program. Each field you enter via the keyboard has to be at a definite place onscreen, has to be a particular length, and needs a type definition: for example, whether it is a string, a floating-point number, a logical integer, and so on.

In a badly-structured program, such as it is all too easy to write in Basic, this data about data can end up scattered all over the program and make things very difficult to amend. In a well-structured program, it should at least all be gathered together in one place.

But even if your data about data (I'll call this 'meta-data' for short) is in one place, you still need program space to assign values to the parameters in order that each value takes up space twice, once in the program (for example, under Basic in a data statement) and once in the variable memory location. A second disadvantage is that if you need to change your meta-data, then the program needs changing, too. This is particularly annoying if your programs are compiled.

A simple solution to this problem is to store all the meta-data outside the program in an ordinary text file, where it can be easily accessed with a text editor; your program then reads the meta-data in from the text file. When you have defined your meta-data thoroughly enough, you can use the same program over and over again for different applications, simply by reading in a different text file. For example, you only ever need to write one single file maintenance program and use it for any job. This article will give you basic experience of setting up these text files and what needs to go into them. These files of meta-data are known as 'data dictionaries'.

Most of you who are familiar with data dictionaries will associate them with the more substantial minicomputers, and will not consider it a subject for low-level hackers. But as will be shown here, it is in fact quick and easy to produce and use a data dictionary system with any reasonable text or word processor — ED or EDLIN will do very well — and to use it to configure standard program modules to handle a wide variety of tasks in as many formats as you wish. If you want to use several files in a program, you use one dictionary for each file. If you want to use the same file in different ways in different programs, edit the data dictionary to produce a variant on the original. The dictionary principle can be extended to screen displays, menus and print formatting.

In the implementation I'll describe here, dictionaries are held in simple text files, and read into a series of arrays which may contain data relating to several concurrent files. Text file dictionaries can, of course, be immediately printed out for documentation.

The language in which you implement it is not important, and likewise any DOS will suffice. My examples are for MS-BASIC and MS-DOS, but I want to explain a principle rather than present lots of code. When you understand it thoroughly, you will have taken an important step on the way to your very own applications generator.

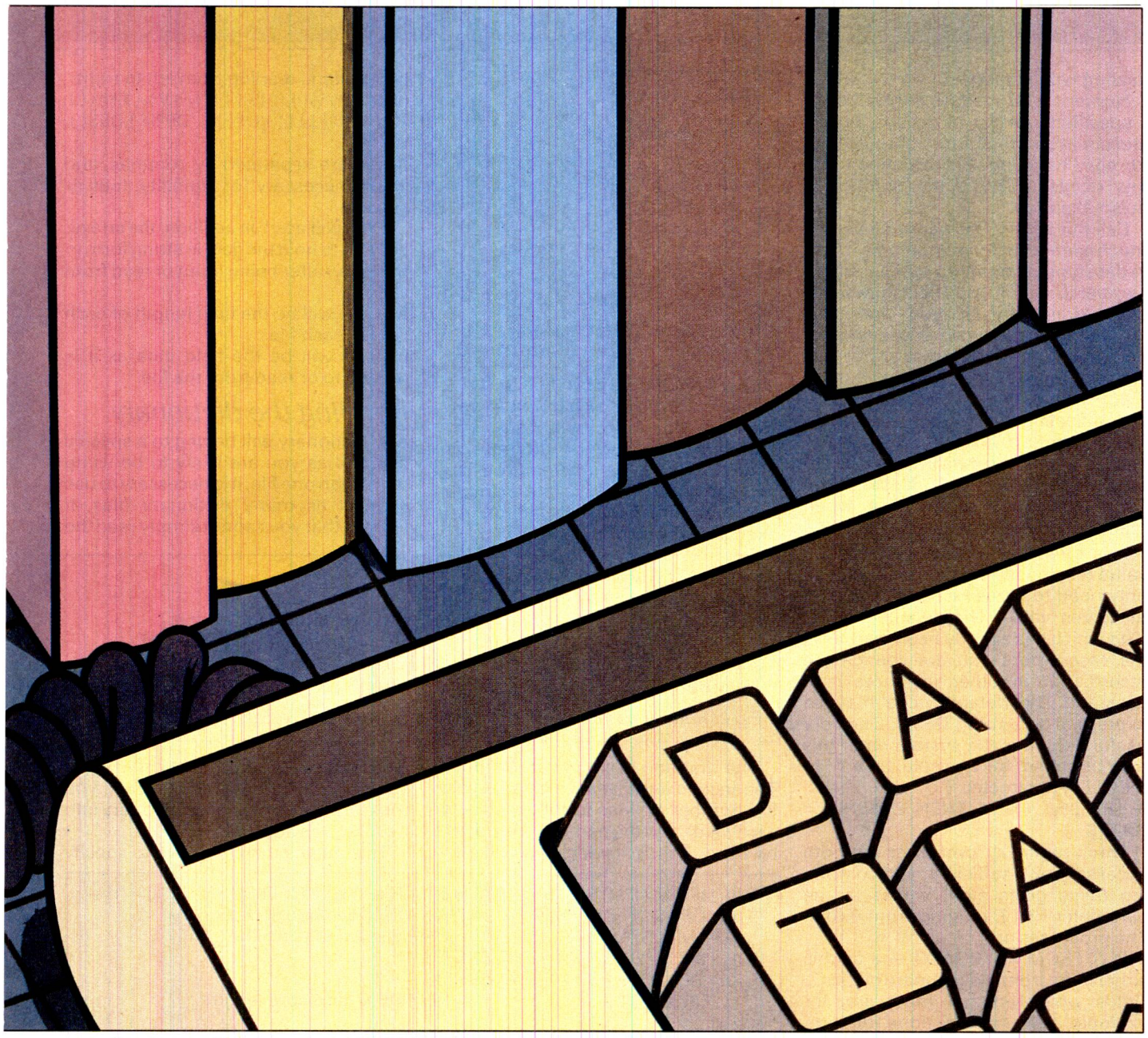
First steps

The first thing you have to do is write a file maintenance program in a sensible and structured fashion, either with or without an indexing system. Readers who have not written such a program should read on regardless — there is much relevant matter about the nature of data to be found in this short article. If you have written a file maintenance program, you should find that the data about the data has accumulated more or less in one place. If it hasn't, work on it till it does.

Each data filed will have a vertical and horizontal coordinate (HOME = 1,1) which are called V%( ) and H%( ) — elements of an integer array. Each field will have a maximum length, L%( ). The screen layout will be associated with prompts which can be expressed as PR$( ), which start at locations PV%( ) and PH%( ).

The data which is held in the arrays is called 'parameters.' A parameter is a variable which is held constant in a particular application, but may be changed for a different application.

Draw all this on screen layout paper and assign a value to everything you want in your file or that is to be displayed at any time. Ignore any standard screen headers or regular message lines — the bottom line is



usually reserved for messages. At this point, you may find that you have fields in your file that you don't want displayed or input, and there may be other input fields that you don't want to file, but I'll deal with these later. In the simplest case, all fields will be input from the keyboard, displayed and filed, so number your fields in sequence accordingly and write down the data from your layout paper in a tidy tabulation.

Your program will deal with different types of data in different ways, according to how it is displayed, validated and filed. Therefore, define a variable T%( ) which will flag each piece of data through the program according to its type. I use the following types regularly:

1) Floating-point number (8-byte)
2) Logical integer (−32766 to 32767)
3) Date
4) 1-byte numbers (0 to 255)
5) Binary fields (Yes = 1, No = 0)
6) Strings
7) Any number filed in string format
8) A key for a record in the file being maintained
9) A key for a record to be read from another file
10) Any field requiring special validation
11) Field to be transferred between files

This covers most needs, but make up your own to suit your program — there's no shortage of numbers.

Validation

Your program will have validation procedures following logically from the keyboard input procedure. The first task of T%( ) is to flag your data to the right validation, but you need more metadata. The most common needs are for a lower and upper numerical limit, and for a warning to appear on the message line if the data is outside the limits. Call these LL( ), UL( ) and WN$( ). For example, for the prompt 'Age of employee' we might expect:

LL( ) = 16, UL( ) = 65, WN$ = "Age 16 to 65 please"

If the operator then enters 120 he will get a beep and a polite message, and the cursor will be stuck on the age field.

Strings only need a lower limit (minimum acceptable length); the upper length limit is already defined by L%( ).

Key fields for an index need special treatment; if you are reading, validation should ascertain whether they exist, and if not, return the next one in key order. If you are adding a record, validation must ensure that the key doesn't exist already.

Dates are usually irritating, but you can boil them down to integers for filing, expressed for example as the years after 1980 multiplied by 1000 plus the number of days into that year. The coding for validation and reduction to integers is a useful exercise for beginners.

Special validations are those which particularly depend on previous input fields: for example, the upper limit of an employee's age might depend on whether the person was M or F. (M/F fields are another useful type if you are

dealing with personnel.)

Numeric data needs to be rounded to a specified number of decimal places and put into string form, right-justified, for easy handling. A subroutine to do this needs to know the number of decimal places.

Call this D%( ). This parameter is not much use except for numbers, so I use it in data types 9 and 11 to specify the file number to read and the field number to use respectively. If you are tidy-minded, you may wish to use another parameter for this purpose, but this only wastes array space. For example, if T%( ) = 1 and D%( ) = 2, you are dealing with a floating-point number expressed to two decimal places. But if T%( ) = 11 and D%( ) = 3, the data in field 3 has to be reproduced in field 11. This is useful for organising a printout, or when preparing for arithmetical functions.

It is often useful to have a default value ready onscreen in order that you only need to press RETURN to accept the given value. The default may be data which has already been read, as in the case where you are changing a record, but in other instances it is constant. The default value may be expressed as a string DE$( ). One very useful default is the system date; this may be called, for example, by a '*' in the DE$( ) parameter:

```
IF DE$(J%) = "*" THEN DE$(J%) = DATE$
```

Three particular processes are both necessary and sufficient, and combining these gives eight values to the parameter P%( ), ranging from 0 to 7. The processes are:

INPUT FROM KEYBOARD — a field is either input from the keyboard or it isn't. Fields which are not input are, for example, calculations done on previously input fields, and fields read from reference files.

DISPLAY ON SCREEN — fields read from reference files need not all be displayed.

FILE ON DISK — you may have input fields whch are not filed as part of the record, for example the record number if you are not using a key.

Another example is when you are producing invoices. You input the customer key, which is displayed and filed with your invoice record. But you want to see the customer name on-screen; this is neither input from the screen nor filed with the invoice record. The customer's balance may need to be read and referred to in the program, but is neither input, displayed nor filed with the invoice. The link to the invoice file from the customer file is neither input nor displayed, but needs to be filed back with the customer, and so on.

A handy scheme is shown in Fig 1. You can now use Boolean flags as follows:

```
If (P%( ) AND 1%) THEN (input)
If (P%( ) AND 2%) THEN (display)
If (P%( ) AND 4%) THEN (file it)
```

File bit 3	Display bit 2	Input bit 1	P%()
0	0	0	0
0	0	1	1
0	1	0	2
0	1	1	3
1	0	0	4
1	0	1	5
1	1	0	6
1	1	1	7

Fig 1 A process for producing invoices

Having decided exactly what you want to do with your data, and (preferably) how your program is going to use the parameters, you can now put the parameters into a simple text file using your text editor. An example is shown in Fig 2.

```
Data Dictionary DEMO.DIC
DEMO.DAT,4,DEMO.IND
KEY,7,30          6,7,43,8,7,3,0,0,          ,At least three letters long
DATE,9,30,        6,9,43,3,7,0,0,0,          *,Invalid date. Use DDMMYY
AMOUNT,11,30,  9,11,43,1,7,0,10000,2,  ,0 to 10000 please
NUMBER,13,30,  3,13,43,2,7,0,500,0,    ,0 to 500 please
```

Fig 2 Putting parameters into a text file using a text editor

The first line is simply an identifier. The second line gives the file to access, the number of lines to follow (one for each field), and the name of the index to be used. The following lines give the parameters, reading from left to right:

PR$( ),PV%( ),PH%( ),L%( ),V%( ),H%( ), T%( ),P%( ),LL( ),UL( ), DP%( ),DE$( ), W N$( ).

These are separated by commas, and where necessary for legibility, tabs or spaces.

You will need, in addition, the arrays:

IN$( ) — to hold the data in string form in memory, after being input or read from a file.

F%( ) — will be the field length of each field in each file.

F$( ) — will be the field data as it is written to or read from the file.

Reading the dictionary

Any dictionary will belong to a specific file, and as you are likely to be using more than one file, it is necessary to use at least as many dictionary files. It follows that you cannot simply read the dictionary data into an array starting at array(1) fo field(1), but instead, you must arrange to read the dictionary into the first free array space.

This means that you have to specify

```
500  IF E%>1% THEN SF%(E%) = EF%(E%-1%)+1% ELSE SF%(E%) = 1%
510  OPEN "I",£12, DIC$            REM DIC$ is name of dictionary
520  LINE INPUT £12, Q$            REM discard the title line
530  INPUT £12, FL$(E%),Q%,IX$(E%)
540  EF%(E%) = SF%(E%)+Q%-1%:
     DR% = 0%                      REM DR% for record length

550  FOR J%=SF%(E%) TO EF(E%):
     INPUT £12,   PR$(J%),    PV%(J%),    PH%(J%),
                  L%(J%),     V%(J%),     H%(J%),
                  T%(J%),     P%(J%),     LL%(J%), UL%(J%),
                  D%(J%),     DE$(J%),    WN$ (J%)
560  IF P%(J%) < 4% THEN F%=0%: GOTO 580
570  T% = T% (J%):
     IF T% > 5 THEN F% = L%(J%)                    ELSE
     IF T% = 5 THEN F% = 1                         ELSE
     IF T% = 4 THEN F% = 2                         ELSE
     IF T% = 3 THEN F% = 2                         ELSE
     IF T% = 2 THEN F% = 4                         ELSE
     IF T% = 1 THEN F% = 8
     REM F% is the field length needed for each data type
580  F%(J%) = F%: DR% = DR% + F%:
     NEXT J%: CLOSE 12
600  OPEN "R", £E%, FL$(E%), DR%
610  DR% = 0:
     FOR J% = SF%(E%) TO EF%(E%):
               F% = F%(J%):
               IF F% = 0 THEN 630
620            FIELD £E%, DR% AS X$, F% AS F$(J%):
               DR% = DR% + F%
630  NEXT J%
     REM Open and field the file according to data types
```

Fig 3 Procedure to read a dictionary

the logical file numbers to be used. The file number is specified by the variable E%. Then you need to know the start and end of each file; make arrays for these called SF%(E%) and EF%(E%). If SF%(2) = 6 and EF%(2) = 12, all meta-data for file 2 will be held in the dictionary array locations 6 to 12. A little thought will show that one of these is redundant if the files are assigned contiguous sequential array space, due to SF%(E%+1) = EF%(E%)+1, supposing that you open your files in the sequence 1,2,3, and so on.

To read the dictionary, write a procedure as shown in Fig 3.

File parameters

I have already mentioned FL$(E%), SF%(E%) and EF%(E%), but other useful file parameters which can be stored in an (E%) array are:

IX$(E%) — index name
NR%(E%) — pointer to the next free record
N%(E%) — number of records in use
FS%(E%) — file size, if this is fixed
DR%(E%) — data record length

Some of these are picked up from the dictionary as shown; others may be stored in the header record, conventionally numbered 1 or 0 according to your DOS. Rather than pick up the data record size from the dictionary by adding up the fields (which is fine until you want another couple of bytes), you can store it in the first line of the dictionary with the name, and so on, and build some spare capacity into your record. When you have opened the file, you can read any file header data into the file parameter arrays for handy reference.

To start your program, you have to write a few application-specific lines. Firstly, DIM your data dictionary arrays large enough to hold all the meta-data you want, then write something like this:

```
1000 DATA "CUSTOMER.DAT","PRO-
     DUCT.DAT","INVOICE.DAT"
1010 FOR E%=1 TO 3: READ DIC$:
     GOSUB 500: NEXT
```

— and for this small effort, all your files are opened and fielded.

The whole exercise is much simplified if you store all numbers, dates, and so on, in string or ASCII format: for example, the number 12.345 stored as the string "12.345". This occupies more disk space, but not significantly so (unless you need to store a great quantity of single-precision numbers or large integers), and it has several important advantages:

1) You don't need to convert data when you read it or write it.
2) You don't need the F%( ) parameter — your field lengths are L%( ). Forget everything in line 570.
3) You don't need to do tiresome number conversions specifically to ensure that 10 doesn't come out as 9.99999999999, or something similar.
4) Your data can be directly read by any comms system.
5) Programmers' file dumps can be read much more easily.

When you read (GET) a record from disk, what you really want is the set of strings IN$(SF%(E%)) to IN$(EF%(E%)). Unless your files are ASCII, this needs quite complex conversion; the opposite applies when you write (PUT) a record. You should write a GET or PUT so that you need only specify the file number and the record as E% and R% (Fig 4).

The GET procedure leaves you with lines like this:

```
IF T% = 4 THEN Q$ = MID$(STR$(CVI
   (F$(J%))),2):        IN$(J%)      =
   SPACE$(L%(J%) — LEN(Q$)) + Q$
```

Contemplation of this method will convince you of the simplicity, not to mention speed, of using the ASCII format. In most versions of Basic, it is impossible to write a decent keyboard input procedure in anything other than string format, so it makes a lot of sense to stick with the same strings unless you are compelled to do some calculation with them. This rarely happens in data processing, so it can't be considered the exception rather than the rule.

Flexibility

When you have written and debugged your procedures (the examples featured here may need modification according to the language or Basic dialect you use), you need never go through the process again. The point about these procedures is that they will deal with *any* data which are specified in the way which you decide to be standard for your dictionary system: they are to application-specific software what algebra is to arithmetic.

To change your data display, slightly edit your dictionary and make a different version for each application of the same file. For example, a customer file might be used in programs for: customer file maintenance, invoicing, statement preparation, sales analysis, credit control, and so on.

In only one of these will you need all the data available for input, display and filing, complete with full prompts. For example, you may want a customer name and address displayed top-left for invoicing, but none of the other customer data. For statement preparation, display nothing, but transfer fields to the printer output (the printer can be treated as just another file in many respects). You create a series of minor variants on the file maintenance dictionary using PIP or Copy, and your text editor, for example, CUSTMAIN.DIC, can give rise to CUSTINV.DIC, CUSTSTAT.DIC, CUSTSALE.DIC, very quickly. Prompts, defaults and warnings will mostly vanish to nulls.

'The dictionaries in any application can be assigned any file number you please, but it is good practice to keep your numbering self-consistent . . .'

The dictionaries in any application can be assigned any file number you please, but it is good practice to keep your numbering self-consistent, and to reserve the lower numbers for data files with the higher numbers allotted to dictionaries, and so on. Furthermore, your file openings, fieldings and read-write statements are already done, no matter what your application. You can take the PUT subroutine a stage further by building in something to locate the next free record, so that you only have to pass the file number to the subroutine.

Further ideas

The same simple technique, that of reading in a short text file as screen display, can be readily adapted to screen displays, help texts and menus, and also to specify print formats. It is easy to read in print formatter strings for PRINT USING. A more sophisticated subroutine can read in page headers, titles, numbers of leading and trailing line feeds, leading spaces, paging instructions, and the array numbers of the output strings to be used. Again, you can minimise the programming needed, although you will need to write lines to extract your data for printing in the required sequence. The technique also saves you considerable program space, otherwise you will hold the necessary meta-data twice — once in the assignment statement, and again in its memory space. END

ASCII version 'put' procedure

```
700  FOR J%=SF%(E%) TO EF%(E%):
               IF P%(J%) < 4 THEN 720
710            LSET F$(J%)=IN$(J%)
720  NEXT:     PUT £E%,R%
```

'Binary' version

```
700  FOR J%=SF%(E%) TO EF%(E%):
               IF F%(E%)=0% THEN 720
710            T% = T%(J%):
               IF T% > 5 THEN LSET F$(J%) = IN$(J%)                    ELSE
               IF T% = 5 THEN LSET F$(J%) = CHR$(VAL(IN$(J%)))         ELSE
               IF T% = 4 THEN LSET F$(J%) = MKI$(VAL(IN$(J%)))         ELSE
               and so on, with special consideration for dates
```

Fig 4 Specifying a file number and a record as E% and R%

Provide and seek

Don't be an information seeker — develop your own videotex service on a BBC Micro and be an information provider. John Harris and various software packages show you how.

Most *PCW* readers will already know of ITV's Oracle and BBC's Ceefax services, but as yet their experience of this type of database is likely to have been limited to the role of information seeker. However, a number of software packages now available for the BBC Micro allow users to adopt the role of information provider. Examples of ways in which these packages can be used are: computerised school, factory or club magazines; information about an organisation or the services it offers; and I used one to create a computerised, multi-page birthday card!

For the sake of those unfamiliar with teletext or Prestel, I'll briefly outline these two types of system before looking at what is available.

Teletext databases

Conceptually, teletext databases ('teletext' is the generic term for broadcast information systems such as Oracle and Ceefax) are very simple. Each screenful of information has a three-figure 'page' number which is keyed in when the page is required. Page numbers are displayed on index pages; the number of pages available is limited to a few hundred per TV channel by the spare capacity of the channel.

Prestel is such a system run by British Telecom, which you dial up via the telephone system. (The generic name for such telephone accessed systems is 'viewdata', while — pause for a breath — 'videotex' covers both teletext and viewdata.) Telephone systems offer two-way communication, and this gives viewdata two important advantages over broadcast teletext systems. Firstly, all teletext pages are continually broadcast in a cycle one after the other, so that adding to the number of available pages increases the cycle time. On the other hand it is possible to tell viewdata systems what page you require, and just this page will be sent. Therefore, the number of pages available on viewdata systems is not limited by the capacity of the communication channel, so hundreds of thousands of pages can be made available.

The second advantage of two-way communication is that the information provider can get responses from the information users. For example, having found out details of flights to New York, the user can go ahead and book a seat.

In order to perform such functions and to cope with the size of the database, Prestel has a more complicated page numbering system than teletext. A screenful is called a 'frame', and a page may consist of one or more frames giving the same type of information. Page numbering is hierarchically arranged by subject or information provider, the frame being indicated by a single letter following the number. However, the information seeker does not need to key in a page number. Information is usually accessed via a hierarchy of menus whose options are selected by one numerical keypress.

'. . . a number of software packages now available for the BBC Micro allow users to adopt the role of information provider.'

The BBC is experimenting with a similar type of digit link for Ceefax. When a page is requested in the normal way, other related pages will also be stored locally in the new teletext receivers (usually TV sets), but these pages will not be displayed unless and until link numbers are keyed on the handset. When this is done, the link will then produce an immediate display of the corresponding, locally stored frame. This will give very fast response times, even compared to Prestel.

A typical use will be to link the news headlines with the full stories on other pages: keying link one will display the full story behind the first headline, and so on. BBC Micro users with Acorn's teletext adaptor attached to their machines can already sample these experimental links, although they are not yet properly implemented in the broadcast signals. As well as the number keys, the arrow keys on the BBC also make use of the links and will allow you to move up, down and across any hierarchy of related pages.

Software

A number of software packages have already appeared that take advantage of display mode 7 on the BBC Micro to produce teletext and viewdata emulators, or full viewdata systems. The British teletext and viewdata standard gives a display of 24 rows of 40 alphanumeric, block graphics or control characters. (Control characters are used to change various parameters, such as colour.) Mode 7 on the BBC Micro conforms to this standard, although an extra twenty-fifth line of 40 characters is available. Each character, whether text, block graphics or control, is coded as a single byte in order that a full screen or 'frame' occupies only 1000 bytes.

This article looks at what can be done with nine such systems, ranging in price and sophistication from Telsoft's group of three programs (Editor, Edmag and Edbase, broadcast free to BBC Micro users owning the Acorn teletext adaptor or similar equipment) to the Rotaview Videotex System, which costs £75 plus VAT with various optional extras available.

In addition, the BBC has commissioned a program called VidiEditor that is apparently based on the systems used to produce Ceefax pages. As my deadline was close, the BBC arranged to broadcast VidiEditor and a sample help file on two unadvertised Ceefax pages, and asked me to ring back when I had successfully downloaded them with my teletext decoder so that they could then be taken off the air!.

Fig 1 sets out the main details of each system looked at here; prices are roughly in line with sophistication. Note that CECCFAX is only available to local education authorities, while an almost indentical system, Eco-fax, was published in *Acorn User* and is therefore available as a listing, bar code or cassette. Be careful not to confuse Edfax with Edmag and Edbase, which are both parts of the Telsoft system.

Some of the systems store each frame or screenful (for consistency, the term 'frame' rather than 'page' is used

throughout to indicate a screenful) as a separate disk file; others store frames in groups. The group files are usually set up by the system software, sometimes with a separate frame directory. Either the user is permitted to specify how many frames' capacity the group file should hold, or the system automatically makes the file as large as the disk can hold. The maximum number of frames storable on a single-sided 80-track disk is given in Fig 1. If common files are used, the maximum is usually between 160 and 200. However, those with individual frame files are limited by the Acorn DFS to 31 frames, but they are designed to work on Econet with about 200 frames available. With Telsoft's system, frames are created as individual files but can be collected into 'magazines' of up to 15 frames. Most Telsoft Edbase databases will have a mixture of individual frames (used as index pages) and magazines (used as automatically rotating frames). VidiEditor also uses magazines, which can contain up to 20 frames.

All the systems have carousel facilities to make a sequence of frames display automatically, one after another, although some call the facility by a different name. The ways these facilities work vary considerably and are covered elsewhere in this article. Some of the videotex systems are provided with a special very fast frame change, usually referred to as 'animation' or 'movie', although it should be noted that other systems use the term 'animation' to refer to using the teletext flash control codes to give the illusion of reciprocating motion, such as the flapping of wings. The use of flash control codes is a part of the British videotex standard and is available on all the systems described here.

The movie facility cannot, of course, change frames as fast as a real cine projector or TV. For example, the fastest I could get out of Rotaview was about 0.7 seconds per frame, but with carefully planned frames it is still possible to convey very strongly the idea of movement. VidiEditor holds a whole magazine in memory at a time, and I understand it can change frames very quickly. As broadcast, a choice of 5 or 30 seconds per frame is offered, but I have not yet discovered how to change these to produce animation speeds.

Fig 1 also shows the type of system (teletext emulator or viewdata). All the versions I used were local databases only, but the table shows that additional host software is available to turn some of them into databases that can be remotely accessed like Prestel itself. For example, Acorn is using CommunITel's system for their dial-up database on (0223) 243642.

Another useful facility is the ability to download frames from Prestel, Ceefax and Oracle (a modem is needed for Prestel and a decoder for teletext). Some of the systems have facilities to include Prestel or teletext frames, although the ISMEC system assumes that the frames are already in separate files on the disk (in a *LOADable form). Rotaview makes use of Acorn's teletext firmware, even allowing the BBC and ITV stations to be tuned while using it. What the copyright position on such downloading is I'm not sure; I expect it depends what use is made of the new database. Schoolfax is brutally frank, calling its teletext download command PINCH!

Frame editors

The central parts of the systems are the frame editors. The facilities offered determine how easily and how fast well-designed frames can be produced. Fig 2 lists the more important facilities and indicates which systems include them. One of the most important facilities is to be able to copy frames, both within a database and between databases (or between disks). Often, groups of frames within a database share the same structure and headings. For example, there may be several frames giving information about products, each showing the product name, price, colours available, dimensions, and so on. It is easiest to create one such frame and then copy it for each of the others, overwriting any differences.

All the editors allow frames to be copied in this way and to copy frames between databases or disks, except that it does not appear possible to transfer frames between VidiEditor magazines (databases).

Another important facility, which to my surprise some of the editors lack, is the ability to insert/delete characters and lines. It can take a great deal of time and effort to design a complicated block graphics display, and it is infuriating if you cannot then move it, say, down a line by inserting a new line above it. Text often needs to be repositioned in the same way.

Eco-fax, CECCFAX and Schoolfax can simulate these facilities with block operations, but this is much more complicated to perform. Schoolfax has rotate right and left facilities, which rotate the characters on a line between the cursor and the end of the line; this is a reasonable substitute for an insert/delete character. Both ISMEC and Micro Viewdata use a combination of the SHIFT and DELETE keys to insert a character, which seems rather incongruous. In the same vein, Micro Viewdata uses SHIFT and the cursor arrows to delete parts of lines. Would it not have been preferable to use DELETE and arrow instead?

Edfax and the Telsoft system seem to be the only ones not to allow text and graphics to be moved around the screen at all. It is amazing that the sample frames supplied with Edfax include by far the best designed frames, including very imaginative and intricate graphics, and yet the designers were presumably unable to make even simple position changes.

As mentioned, teletext characters include not only block graphics and alphanumerics, but also control characters. These are used to control colour (seven foreground and eight background), graphics or text, flashing or steady display, normal or double-height characters, contiguous or sepa-

	Price	Frame storage		Auto-change facilities		Viewdata or Teletext emulator	Host version available	Download frames	
		Format	Number on 200k disc	Carousel	Movie			From Prestel	From Teletext
Acorn User Eco-fax	£3.75 see Table 5	Indiv. files	31 on DFS 200 Eco't	Yes	Yes	Teletext	No	No[4]	No[4]
CECCFAX Teletext emulator	£100 LEA licence	Indiv. files	31 on DFS 200 Eco't	Yes	Yes	Teletext	No*	No[4]	No[4]
CommunITel Viewdata System	£55+VAT +£5 p&p	Common file	195	Yes	No	Viewdata	£375+VAT inc modem	Yes[2]	No
Edfax Teletext Emulator	£34.68inc VAT & p&p	Common file	80	Yes	No	Teletext	No	No	No
ISMEC Local Viewdata System	£19.95inc VAT & p&p	Common file	190	Yes	No	Viewdata	No	Yes[3]	Yes[1]
Micro Viewdata	£32.06inc VAT & p&p	Common file	195	Yes	No	Viewdata	No	Yes	No[4]
Rotaview Videotex System	£75+VAT +p&p	Common file	198	Yes	Yes	Viewdata	£55+VAT	Yes[3]	Yes[1]
Schoolfax Viewdata System	£20-£30	Common file	170	Yes	No	Viewdata	£25	Yes[3]	Yes[1]
Telsoft Editor Edmag/Edbase	Broadcast free	Either or both	31-180	Yes	Yes	Not close to either	No	No[4]	No[4]
VidiEditor	Broadcast free	Common file	160	Yes	Yes?	Not close to either	No	No	No

*Host software for CECCFAX is planned

[1]Using Acorn teletext adapter
[2]Level 2 CommunITel needed
[3]Using other terminal software
[4]Can presumably include a frame once saved to disc as a file

Fig 1 General details

	Copy frame		Insert char-acter	Insert line	Char-acter window	Graphics keypad	Block oper'ns	Provision for vertical structure	Coord-inates shown	No. of lines	Extra fonts
	Within d'base	Between d'bases									
Acorn User Eco-fax	Yes	Yes	No	No	Yes Good	Yes Good	Yes	Yes V. good	No	24	No
CEECFAX Tele-text emulator	Yes	Yes	No	No	Yes Good	Yes Good	Yes	Yes V. good	No	24	No
CommunITel Viewdata System	Yes	Yes	Yes	Yes	Yes Good	Yes Good	No	Only tabs	Yes	22	No
Edfax Teletext Emulator	Yes	Yes	No	No	Yes	Yes Poor	No	No	Yes	24	No
ISMEC Local Viewdata System	Yes	Yes	Yes	Yes	No	Yes Good	No	No	No	23	No
Micro Viewdata	Yes	Yes	Yes	Yes	Yes V. good	Yes Good	Yes Good	No	Yes	22	No
Rotaview Videotex System	Yes	Yes	Yes	Yes	Yes V. good	Yes Good	Yes Good	Tabs and column mode	Yes	22	Triple Height
Schoolfax Viewdata System	Yes	Yes	Rotate right	No	Yes V. good	Yes fair	Yes V. good	No	Yes	23	Gothic & block
Telsoft Editor Edmag/Edbase	Yes	Yes	No	No	No	No	No	Yes, good lines only	No	23	No
VidiEditor	Yes	No	Yes	Yes	Yes	Yes Good	No	No	Yes	23/4	No

Fig 2 Editing facilities

rated graphics (whether adjacent blocks touch), conceal display, and hold or release graphics (this allows a graphics character to appear instead of a blank space on a position occupied by a control character). From the display it is not possible to see where the control characters are, so several of the editors have what I have listed in Fig 2 as a 'character window'. This is an indication, on a title or information line at the top or bottom of the screen, of what character is at the current cursor position.

Some of these windows only operate when the cursor is on a control character, while others show all characters which can be useful. For example, lower-case letters appear as block graphics characters when preceded on the line by a graphics control character. It is difficult to remember which letter to type to get a particular graphics character so, if the required character is already on the screen, it is convenient to use the window to reveal the corresponding letter. Schoolfax and VidiEditor go one better than other systems, providing not only the character but also its ASCII code, Schoolfax in decimal and VidiEditor in hexadecimal.

Micro Viewdata's window offers the choice of either displaying the character (both its alphanumeric and graphics forms), or indicating how an ordinary character typed at the current cursor position would appear. For example, the letters Se Dh F1 RG indicate that the character would be separated, double-height, flashing, red graphics; these alternative forms of window toggle on the TAB key. Unfortunately, VidiEditor's character window, situated with other information on the bottom line, only gives the uninterpreted character and its hexadecimal ASCII code. Control codes thus remain invisible, losing the main benefit of character windows. It is sometimes possible to work out which control code it is by its effect on the rest of the bottom line: for example, the control character for new background colour blots out the rest of the information provided to the right of the window.

On a teletext screen, lower-case letters and some punctuation marks appear as graphics symbols if a graphics control character is to their left on the same line. Another way of building up graphics is to use a graphics keypad. Each graphics character is comprised of six pixels (two horizontal by three vertical), which can be either on or off. A graphics keypad facility uses a group of keys (usually Q, W, A, S, Z and X) to represent the individual pixels, which may be switched on and off individually by pressing the corresponding key. Only the Telsoft system lacks this facility, but the rest of the systems vary considerably in how easy it is to use. In particular, in Edfax you have to enter 'define pixel' mode (control f6) while in this mode the cursor keys do not function, so building up large areas of graphics with this facility inevitably entails much mode switching.

At the other extreme is Rotaview in which no mode switching is required, the six ordinary keys becoming pixel switches when pressed together with the CONTROL key. I found this to be usually excellent, although when creating large areas of graphics it was annoying having to press CONTROL all the time. The CommunITel, Eco-fax, CECCFAX, ISMEC, Micro Viewdata and VidiEditor systems provide this facility with a mode change, but cursor movements can still be made easily.

With block operations the user can define a rectangular block of the display (by marking its top-left and bottom-right corners), and then move, copy or delete the text in the block. Clearly this can be a useful and powerful facility, but is only provided by half the systems here. The markers are typically set by moving the cursor to the required position and pressing a function key.

Of the five editors with this facility, the Eco-fax and CECCFAX block operations are the least sophisticated; you are warned that copying a block to a position overlapping itself does not generally work. Micro Viewdata, Rotaview and Schoolfax use memory buffers to store the block and allow such overlapping, and they also have facilities for moving blocks between frames. I found the Schoolfax block operations easy and pleasant to use. Micro Viewdata's block operations are very similar, but a little more sophisticated and complicated by being combined with a 'window' facility in which the cursor is restricted to the area defined. This area is marked out on the screen at the time it is defined, and also thereafter at the touch of a function key. The Rotaview block operations are even more sophisticated, and the dual functions of the block markers make them a little more complicated to use. An extra block facility on Rotaview allows up to 10 blocks to be saved to the system disk for future use. This is a superb facility for duplicating house logos, standard headings, and so on.

Normally, after a character has been placed on the screen, the cursor moves one position to the right. This is fine for text, but there are situations when other directions, particularly downwards, can be useful: for example, when drawing vertical lines, making a column of single digits in a table of values, and making vertical columns of identical control codes. Eco-fax and CECCFAX provide for this in a very elegant way. It is possible to choose that the cursor moves up, down or to the left, instead of the default movement to the right. The Telsoft system is designed to allow graphics to be built up by drawing lines a single pixel wide. This is done by holding down the space bar and an arrow key (diagonals with a dotted appearance may be drawn using combinations of arrow keys). Drawing speed can be varied, allowing intricate parts to be drawn slowly. Both CommunITel and Rotaview allow tab positions to be set, which can be helpful in producing tables with vertical columns. Rotaview has an additional 'vertical' facility which is invoked by setting one of the markers (also used for block

operations). When this marker is set on a line below the current cursor position, basic editing operations to the current line (typed characters, insertions, deletions, and so on) are copied onto every line below, down to the one on which the marker is set. This is clearly a very powerful facility, but it can also be very destructive if you forget to turn it off!

Six of the frame editors display the coordinates of the cursor position. Normally I did not find this particularly helpful, but it is of use when, for example, the frame or a part of it has been designed on squared paper with a numbered grid. At first I was confused to find the top-left position given as 0 horizontal and 1 vertical; why not both zero or both one? It seems pointless to sacrifice this symmetry in order to count a header line that is not a part of the editable frame. I can only presume the reason is that these systems are displaying the raw number returned by the VPOS function in BBC Basic. Some editors have a special function to allow the cursor to be returned to this top-left position, but this is certainly not an essential feature.

The standard videotex screen consists of 24 lines, of which the top line is a heading, which may show a selection of the following: the name of the information service, page number, date, time, and frame price. The bottom line of Prestel and similar systems is used for displaying the information seeker's responses as they are keyed in and for displaying error messages; this leaves 22 lines for the main part of the frame. The BBC Micro has an additional line, and the teletext emulators do not need a response line. Therefore, the number of lines available to edit varies from 22 on Rotaview, CommunITel and Micro Viewdata to 24 on Edfax, Eco-fax and CECCFAX. VidiEditor has 23 plus an editable title line.

All the systems allow use of the normal mode 7 single and double-height character fonts. It is also possible to build up various types of large letters using the block graphics (some attractive examples are given in Edfax's sample database). However, it is very laborious building up such lettering, and two systems provide alternative large fonts to be directly accessed from the keyboard. Schoolfax provides a neat triple-height font and a five-times-normal height Gothic font. Rotaview also provides a neat triple-height font which, combined with double-height control characters, can also produce very usable six-line characters.

There are facilities not covered in Fig 2 that are provided by only one or other of the systems. It is worth mentioning some provided by Rotaview and Schoolfax, the systems with the most extra facilities. On Rotaview, margins can be set (useful to avoid typing over colour codes); there are global colour changes (for example, all greens in a frame can be changed to reds); lines can be centred (also available on Micro Viewdata); and there's a word processor-style option for moving words on to the next line when they are typed on the end of a line with insufficient space. Schoolfax offers complement (reverses all pixels in a character or block), repeat line, copy line, delete from cursor to any margin, conceal/reveal markers, and conceal/reveal control characters.

Carousel features

As shown in Fig 1, all the systems have carousel facilities that allow a sequence of frames to be automatically displayed, one after another. The ways in which they operate vary considerably, and are set out in Fig 3.

The first column shows how the carousel display is selected. In some systems, the carousel facility is a separate display option unconnected with the normal display method (except it may be selectable from the normal display, for example by requesting page 960 in Micro Viewdata). Unless the starting frame is pre-set, the user just primes the system with an initial frame number and then the subsequent frames all follow, one after another. The ISMEC carousel is a variation of this: at any time when using the database in the normal way, the user can press the ESCAPE key to start the carousel at the current page. Pressing any other key will stop it.

'The timing of automatically displayed frames is important, as the viewer needs long enough to pick up the required information but should not have to wait . . .'

In other systems, frames are of different types; the ordinary display program is used until a frame marked in some way as a carousel frame is selected. The carousel sequence is then automatically displayed until a non-carousel frame is encountered (some systems allow the user to interrupt it). Either or both of the main types of system may suit a particular application so it is not possible to say one is generally preferable, although ISMEC's approach does seem to be more flexible. The Telsoft system has automatic display as its main display option for magazines, as explained near the beginning of this article.

The timing of automatically displayed frames is important, as the viewer needs long enough to pick up the required information but should not have to wait for unnecessarily long periods for the next frame. All the systems allow at least some control over display speed. One group allows fast, medium or slow display to be selected when the carousel display program is entered. A second group tells you which line in the program controls the presentation speed and allows you to change it. Both these groups have the disadvantage that, once a speed is selected, all frames are displayed for the same amount of time. The last group is more flexible, allowing each carousel frame to be displayed for a separately specified amount of time. This possibility of variable timing allows simple title or picture frames to be shown briefly, and frames with a lot of complex text or diagrams to be shown for much longer. On the CommunITel system the time is stored with the frame, and on Rotaview and Micro Viewdata it is stored in the carousel presentation list.

The order in which carousel frames are displayed is stored in different ways. VidiEditor displays the frames of a magazine in the fixed order in which they were originally created and saved. Similarly, the Telsoft system displays the frames of a magazine in the fixed order in which they were originally put together, but if the original single frame files are kept, they can be put together in different orders.

With several of the systems, each carousel frame contains a pointer to the next frame; this pointer is the number of the frame that should follow. The number is stored with the (preceding) frame and can be specified as part of the frame editing procedure. Making radical changes to the display order can, therefore, be somewhat laborious, the user having to load each affected frame into the editor, make the change and re-save the frame.

In contrast, Schoolfax, Micro Viewdata and Rotaview use an ordered list of frames to determine presentation order. Schoolfax uses frame zero to store the list, which can be very easily edited. Rotaview can store up to 10 lists of up to 80 frames each on the system disk. The list also contains the timing information. Although editing the list is not as easy as it could be, it is an enormous advantage having all the carousel information together in one list.

It is a pity that the carousel sequences are stored on the system disk rather than the database disk as only 10 sequences can ever be stored however many databases are produced, and a particular carousel sequence seems to be more a part of the database than of the system software. Micro Viewdata's lists are stored with the database and they have all the benefits of Rotaviews lists, plus having a friendlier editor and, as far as I can make out, only being limited in size and number by the disk space.

Most of the systems allow the carousel viewer to pause or stop the carousel. In Fig 3, 'pause' refers to a facility to prolong display of the current frame by holding down a key; the carousel continues when the key is released. The 'move on' facility allows

the display to be moved on immediately at the press of a key, rather than waiting for the normally allotted time. Some of the carousels can be stopped on the currently displayed frame by pressing a key (without it having to be held down), and some of these are then re-startable by pressing a key or entering a page number.

Documentation

The fullness of the documentation varies considerably among the systems, and some come with sample databases. In some cases documentation is confined to instructions on how to operate the software, in others explanations of teletext and viewdata are given as well as suggestions for different types of database for which the software could be used. The documentation for several systems could benefit from being split into separate introductory guides and reference manuals, as these two functions require different approaches.

CommunITel has made this split very successfully. Some of the manuals lack any type of index and, as these also tend to be the worst organised, I found them frustrating when I turned to them for help.

Two systems aimed at schools illustrate very different approaches. The ISMEC documentation is very short, clear and surprisingly complete. It has no index, but is so concise, well organised and well laid out that I usually found what I wanted without difficulty. Its single text seems to serve adequately as both an introduction to the system and as a reference, but provides little information beyond the essentials. The manual for Micro Viewdata, on the other hand, tries (and mostly succeeds) to be completely comprehensive, and includes ideas for teaching exercises. But despite obvious good intentions, the sheer amount of information has, in places, overwhelmed the organisation. Therefore, terms are sometimes used before they are explained, and the basic editing facilities of inserting a character and inserting and deleting a line are the last frame editing commands to be explained. They are not with the other basic editing facilities but in a chapter entitled 'Advanced Features'!

Sample databases vary from the well designed, colourful and often amusing frames supplied with Edfax, to screens crammed with text copied straight from the instruction manual, sporting spelling mistakes and other errors.

Pros and cons

The packages discussed here contain some howlers, and some less serious but annoying features. The more sophisticated systems often contain more of both, perhaps just because they are bigger and more complex. The problems are annoying rather than rendering any of the systems unusable; they are also fairly typical of what one finds in cheaper software.

One important principle is that users should be able to recover easily from errors. A simple but useful implementation of this is the function key facility of Micro Viewdata's screen editor that undoes the last single edit, thereby restoring the previous screen. One occasion on which I found the principle to be badly violated was when editing a Rotaview carousel frame list. I tried to save the edited list but the system disk has a write-protect label. (The system disk is copy protected to prevent even back-up copies being made, so write-protection is advisable.) The system correctly identified and reported the problem, but when I removed the write-protection and tried again it produced a 'file open' error. Eventually I had to re-boot, losing the painstakingly edited list.

A similar horror awaits the unsuspecting CommunITel user. During the editing of a frame, function key f8 allows you to enter 'search' mode to look at other frames. The tutorial guide states: 'To get back to editing your page, press f0.' I tried it, and to my horror found that I was not returned to editing the original frame (which I had lost forever), but was left editing the frame I was looking at when I attempted to return.

To operate the menus on both CommunITel and Rotaview, use is made of the up and down arrow keys to move a coloured background strip up or down behind the options. When the strip is behind the chosen option the RETURN key is pressed, which is laborious and unnecessary. As long as the user can return to the menu easily if he makes a mistake, a single keypress response to a menu is all that should be required. (On Rotaview, the coloured background can also be moved to the correct place with a single numerical

	How selected	Timing	Order of frames	Pause	Move on now	Stop on current frame	Restart
Acorn User Eco-fax	Frame type	Set at run time	Pointers	Yes	No	Yes	Yes
CECCFAX Teletext emulator	Frame type	Set at run time	Pointers	Yes	No	Yes	Yes
CommunITel Viewdata System	Separate option	Variable by frame	Pointers	No	Yes	No	N/A
Edfax Teletext Emulator	Frame type	Set in program	Pointers	No	No	Yes	Yes
ISMEC Local Viewdata System	Press escape	Set in program	Pointers	No	No	Yes	Yes
Micro Viewdata	Separate option	Variable by frame	List of frames	No	No	Yes	No
Rotaview Videotex System	Separate option	Variable by frame	List of frames	No	Yes	No	N/A
Schoolfax Viewdata System	Separate option	Set at run time	List of frames	No	No	No	N/A
Telsoft Editor Edmag/Edbase	Main option	Set at run time	Fixed	No	No	Yes	Yes
VidiEditor	Separate option	5s or 30s by frame	Fixed	No	No	Yes	Yes

Fig 3 Carousel features

Acorn User Eco-fax	Acorn User, Jan 1985, (Issue No. 30), text on 77-85, listings on 122-126. Back issues, £1.25, & monthly cassette, £3.75, from Acorn User, PHS Mailing Ltd., PO Box 14, Horley, Surrey. Monthly Bar Code Listings, £1 & SAE, from Acorn User, 68 Long Acre, London WC2E 9JH.
CECCFAX Teletext emulator	Available to local education authorities only. LEA licence costs £100. Cleveland Educational Computing Centre, Prissick Base, Marton Road, Middlesborough, Cleveland TS4 3RI. Telephone: 0642 325417.
CommunITel Viewdata System	Total cost £69 from CommunITel Ltd., 189 Preston Road, London W10 6TH. Telephone: 01 960-7998. Sample it with a modem on Prestel compatible 01 968 7402.
Edfax Teletext Emulator	Total cost £34.68 from Tecaedia Ltd., 5 Granby Street, Loughborough LE11 3DU. Telephone: 0509 230248. (UK schools price £23.88)
ISMEC Local Viewdata System	Total cost £19.95 from ISMEC (Independent Schools Microelectronics Centre), Westainster College, North Hinksey, Oxford OX2 9AT. Telephone: 0865 725904.
Micro Viewdata	Total cost £32.06 from Tecaedia Ltd., 5 Granby Street, Loughborough LE11 3DU. Telephone: 0509 230248. A version for Research Machines computers is being produced.
Rotaview Videotex System	Cost £86.25 + P&P from Information Technology and Marketing Ltd., E3, New Enterprises, South West Brunswick Docks, Liverpool L3 4AR. Telephone: 051-708 9066.
Schoolfax Viewdata System	Unit price drops from £30 to £20 for orders of over 29 copies. Schoolfax, 24 Somerset Road, Swindon, Wiltshire SN2 1NF. Telephone: 0793 695296. (Lower prices for LEAs by negotiation)
Telsoft Editor Edmag/Edbase	Broadcast on BBC1 telesoftware pages early 1985 as part of a competition for schools to produce "magazines". They are Brighton Project programs.
Vidieditor	To be broadcast by the BBC as telesoftware sometime during 1985. Available to those with suitable teletext decoders such as that supplied by Acorn.

Fig 4 Addresses and availability



The Seikosha SP Series,

advanced business printers for the growing business

All the advanced technology and craftsmanship of the 'House of Seiko' have now been applied to the needs of the small volume business user.

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A unique combination of high performance and low cost that puts the very best of business printers within easy reach of the smallest business.

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Next in the range is the brilliant little Seikosha SP 800.

It combines most of the features of the SP 1000 with a print speed of 80cps (draft) and 20cps (NLQ). And, like the SP 1000, is the perfect companion to your micro.

At a cost of just £259.00 plus VAT for the SP 1000 and £249.00 plus VAT for the SP 800, these printers represent the best value for money on the market today.

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Distributed exclusively by DDL, the Seikosha SP range is available from all leading computer dealers. For details of your nearest stockist contact:

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5 King's Ride Park,
Ascot, Berks. SL5 8BP
Tel: 0990 28921
Telex: 846303 DD LTD G.

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keypress, but the RETURN key is always needed.)

With Rotaview there was a lack of consistency in how to leave special editing modes (for example, double ESCAPE press for leaving column mode and RETURN for leaving triple-height), in how to summon menus and how to enter choices, such as the colour of triple-height characters.

Choices of keys were sometimes bizarre (some examples from Micro Viewdata and the ISMEC system have already been mentioned). Similarly, Rotaview uses the CONTROL/COPY combination for delete block. Wouldn't CONTROL/DELETE be a more obvious choice? In VidiEditor, the DELETE key inserts a full graphics block rather than having its normal function. I find that I often detect my typing errors as soon as I have made them, and hitting the DELETE key is a very strongly learned habit that is almost impossible to inhibit. I was continually frustrated by VidiEditor's non-standard response of overwriting the character following the one I was trying to delete.

The Telsoft system contains instructions in a help facility. Not only are sentences split between successive screens, but there is no way of turning back a page without starting again. The Schoolfax sample database also splits sentences in this way.

Schoolfax uses a sequence of numbers and brackets to pass data to the PINCH command. Unfortunately, square brackets were chosen, which of course come out as arrows in teletext mode on the BBC Micro.

Despite the generally good standard of the CommunITel documentation, it appeared not to have been proof-read. I found several errors, mostly minor, and 'routing' is consistently spelled 'routeing'! Also, the pages of the reference manual were bound at the wrong edges, leaving the page numbers and headers on the inside against the binding.

When running the display software, several of the systems demand that the date, and sometimes the time as well, be entered so that they can be displayed as part of the header line. While such a display may be desirable as an option, as on VidiEditor, I found the forced entry of this data a bore when all I wanted was to have a quick look at a particular frame. On Schoolfax, this has to be done even when running the editor program.

When you are successfully into a viewdata program and are searching through a database, it is important to be able to retrace your last few steps. For example, on Prestel, keying ★£ takes you backwads, frame by frame, along whatever route you have come. The teletext emulators and Schoolfax have no such facility.

Most of the more notable positive features that make the user's life easier have already been described. An additional one that comes to mind is the way various system parameters can be set up on the CommunITel system. They can either be set temporarily for the current session, or saved to the system disk as future default settings. They include printer, disk drive, and network settings, and the information provider's heading. The video interlace can be switched on or off, an option not normally available in mode 7 on the BBC Micro. Although switching it off distorts the single-height characters, it is more restful for any user who has to spend long periods editing frames.

'Most of the systems are primarily aimed at the education market. The two exceptions are the more commercial systems, Rotaview and CommunLTel. These two, together with Schoolfax, are rather more sophisticated.'

Micro Viewdata has a 'start-up file' which sets the default file names for the database, carousel list and printer driver (an Epson driver is supplied), and default information providers' names.

Conclusion

Most of the systems are primarily aimed at the education market. The two exceptions are the more commercial systems, Rotaview and CommunITel. These two, together with Schoolfax, are rather more sophisticated than the others. They are the only systems for which host software is currently available, the two more commercial ones also allowing transmission and reception of CET standard telesoftware.

Rotaview is clearly the most sophisticated of all in terms of the facilities offered; it is also the most expensive. However, its documentation is not up to the same standard. It would benefit from the addition of an index, and from being split into an introductory guide and a reference manual. CommunITel's documentation is good, with a lot of technical data. The sample databases supplied with both Rotaview and CommunITel have an amateur feel to them. Rotaview is not expensive by the standards of commercial software, and its powerful editing facilities, plus the ability to upload frames to Prestel and other host systems, should make it very attractive to information providers on such systems. Regular users will presumably get used to its inconsistencies and other rough edges.

I understand that CECCFAX is soon to be updated to provide host software as well as major improvements to the frame editor. Existing users (LEAs) will be able to obtain successive upgrades at minimal cost.

If host software is not required, Micro Viewdata has a sophisticated editor that is only out-performed by Rotaview, and in some facilities by Schoolfax. These three also have the best carousel editing facilities, with Micro Viewdata having the edge.

Edfax is the most professionally presented package, with its strong, glossy plastic case, well-printed indexed manual (with useful appendices), screen planner (like special graph paper) and superb sample database. However, its limited frame editing facilities let it down badly. Micro Viewdata has good editing facilities and comes from the same publishers in a similar package, but the sample database, while presentable, is nothing like as good as Edfax's. The CommunITel system is also a professionally presented package (except for the sample database), in a similar type of case and with well-printed and indexed manuals.

The more sophisticated systems have cluttered screens and complicated menu systems; this is particularly true of CommunITel, which also keeps you waiting while different parts of the system load from the system disk. I liked the more simple presentations of Eco-fac, CECCFAX and especially the ISMEC system.

The cheapest, easily available system is Eco-fax from *Acorn User* (£5 for magazine and cassette). This will certainly provide those who are merely curious to sample this type of software with a simple, usable system. Its only serious drawback is the lack of insert/delete facilities in the editor.

The ISMEC Local Viewdata System is also excellent value at £19.95. Its editor is fairly basic but does have the most essential facilities, and its simple and uncluttered design is refreshing and well integrated. It is closely modelled on Prestel, and so provides a good introduction to the basic concepts, page numbering, and so on. It should be quite adequate for producing simple, computerised school magazines and noticeboards, a good example of which is supplied as a sample database.

For more sophisticated educational use, CECCFAX should be good value at £100 for an LEA licence when the upgrades become available. But Schoolfax already has more powerful facilities and the price drops to £20 per copy if 30 or more are bought, and LEAs can negotiate much lower prices for volume use. Educational discounts may also be available on Micro Viewdata when it is published. **END**

The 8th Personal Computer World Show
4-8 SEPTEMBER 1985 OLYMPIA, LONDON

Curtain up...

As the doors open on the eighth PCW *Show, we introduce the many exhibitors and give details of what you can expect to see in the two action-packed main halls.*

This year the *PCW* Show occupies two halls at Olympia. In the National Hall there's the big names such as Sinclair, Commodore, Atari and Amstrad on the ground floor (stand numbers 1000-1999 in the list of exhibitors). On the same floor and in the gallery upstairs (numbers 3000-3999) are a host of smaller companies with software and peripherals for home/small business machines.

Next-door in Olympia 2 is the place to go for business machines and software, with ACT taking pride of place on the ground floor (numbers 2000-2999) and exhibitors such as Psion leading the way upstairs on the first floor (numbers 4000 upwards). Access to this hall is reserved for trade, business and professional visitors.

Check the following list of exhibitors for details of what each company has in store for the Show, although slight changes may have been made between going to press and the actual event. Product Locator Services are available at the Show's main entrances, providing further information on where to find exhibitors. You can ask for a specific exhibitor or for all stands showing a certain type of product. The answers to your query will be printed out on a map.

The *PCW* stand is in the centre of the National Hall's ground floor, selling back issues of the magazine and running a range of Show competitions and special features. The editorial team is on hand to answer your questions and discuss any contributions you might want to make to the magazine.

Olympia itself is easy to reach. There's parking space close to the Show and access from the M1, M4, M40 and North Circular Road, or take the Underground to Earl's Court on the District and Piccadilly lines, and then the Kensington Olympia service.

The Show runs from Wednesday to Sunday, 4-8 September, but the first two days are for trade, business and professional visitors only. Opening hours are 10am to 7pm, except on Sunday when the Show closes at 5pm.

Admission costs £2; tickets are available on the door and in advance from the *PCW* Show Ticket Office, 11 Manchester Square, London W1 (tel: (01) 486 1951). For organised groups of 10 or more, tickets can be obtained in advance from the same address for £1.50 each — valid on any day from Friday to Sunday. Cheques should be made payable to *PCW* 85/Montbuild Limited. Complimentary tickets valid throughout the Show for trade, business and professional visitors are also available in advance from that address. For the complimentary tickets, application should be made on official letterhead or enclosing a business card.

So . . . on with the Show! See you on stand 1411.

OLYMPIA

Olympia 2 offers a glimpse of what's to come in business computing, and advice on what can be done now, provided by the Applications Software Advisory Service, the NCC Microsystems Centre and independent consultants.

Micro Decision is sponsoring the software advisory service, a database containing information on applications software available in the UK. You can ask for information about products either by reference to general areas in which you are interested or specific functions you want the software to perform.

Those of you interested in consultancy should visit the consultancy clinic area for an informal and relaxed chat with a number of independent consultants. Two types of consultant will be available: those with broad business experience and those covering specialist markets.

The National Computing Centre (NCC) is present at the Show in force. Its Microsystems Centre people offer consultancy packages for newcomers to the micro world as well as for more advanced users. Its directories of software and hardware systems are available at the Show on disk. It is also running seminars each day on how to choose a micro system for your business; these cost £25 plus VAT or £12.50 plus VAT in advance. The times of the seminars are: Wednesday 4 September at 10.30am and 2.30pm; Thursday 5 September at 10.30am and 2.30pm; Friday 6 September at 10.30am and 2.30pm; and Saturday 7 September at 2.30pm.

Advance tickets are available from: *PCW* Business Seminars, NCC Microsystems Centre, New Fetter Lane, London EC4. Please specify the required time and date and give the name, address, telephone number and nature of your business. Cheques should be made payable to the NCC Microsystems Centre.

Questions are encouraged at these seminars, and you will be able to talk to a team of NCC consultants.

The Corporate Computing stand is designed to give people a clear idea of how corporate computer systems are set up, connect together and work. All users of corporate computer systems are covered, from the secretary to the manager, as is each aspect of the office environment. The conversion from old to new technology is demonstrated for each of these aspects, and the way these different functions are fitted into workstations is displayed. This is fol-

lowed by a demonstration of how all the parts, from word processing to planning and from manager to secretary, fit together to form a corporate system. Finally, there's an indication of where things are going in the future.

Alongside this stand is a theatre where a continuous display giving an overview of corporate systems is running.

The *London Standard* micro business awards provide another chance to look at the best in business systems. The winners will be announced on the first day of the Show. There are two award categories — the best software for business applications and the best hardware product for business applications. The winners will be selected from a shortlist of four products in each category. The winners and those shortlisted will be on display during the Show at the *PCW* stand in the National Hall.

The magazine *Microscope* is sponsoring two conferences at the *PCW* Show this year. The first is the *Microscope* Keynote Conference from 10.30-12.30 on Wednesday 4 September. This will be chaired by *PCW*'s contributing editor David Tebbutt and will include a senior representative from ACT, Paul Bailey of Digital Research, Nick Bessey of Commodore plus other speakers as members of a panel. The conference will be run in a *Question Time* format and will be covered by the *Database* television programme for transmission next day on Channel 4. Tickets cost £110 each, and include a seat at the *London Standard* Awards lunch and VAT.

The second conference will run three times, at 2.30-5.30 on 4 September, at 10-12.30 on 5 September and at 2.30-5.30 on 5 September. Each session covers selling business solutions, games hardware, games software and peripherals in four sessions. The cost is £22.50 including VAT.

Contact Carol Sharpe, Personal Computer World Show, 11 Manchester Square, London W1 (tel: (01) 486 1951) or see a recent issue of *Microscope* to order tickets.

And then, of course, there's the exhibitors themselves. Treats in store include the first public showing of two new additions to the Apricot range, the F2 and the F10, and the possibility of a cut-price offer on the Datavue portable (both the F10 and the Datavue are Benchtested in this issue).

The F2 is totally compatible with software written for the older F1, and features twin 720k microfloppy disk drives. The F10 comes with 512k of RAM and a 10Mbyte internal hard disk as standard. Both new machines come with Digital Research's GEM friendly interface to make them easy to use.

The Interquadram stand features the new Datavue portable IBM-compatible machine. During the Show, Interquadram is hoping to offer the Datavue 25, which normally retails at £1812, for a special Show price of £999. This offer will be available on a one-per-person basis only.

ACT Stand No 2108
Shenstone House
Dudley Road
Halesowen
West Midlands

The full Apricot range is on display, including the first showing of two new models — the hard-disk F10 (Benchtested in this issue) and the twin-disk F2.

Advance Electronics Stand No 4147
PO Box 230
Wrexham
Clwyd

Advance Electronics is exhibiting a range of computer power conditioners designed to protect machines from the hazards of 'dirty' mains.

Akhter Computer Group Stand No 2018
28/29 Burnt Mill
Harlow
Essex

Established for some six years, Akhter Computer Group offers a range of single and multi-user computer hardware and software. Akhter has recently launched a new integrated software package, Fiscal, which will be available in a number of different formats at a special promotional price for the duration of the Show. Akhter also supplies both 10 and 20Mbyte Winchester upgrades for the IBM, Sanyo and compatibles.

Apricot User
VNU Business Publications
32-34 Broadwick Street
London W1

Apricot User is designed to cater specifically for owners and users of Apricots. It offers its readers advice on new applications, peripherals and add-ons, information on how to get the best from their machine, and the latest news affecting the Apricot market. Issues and registration details will be available on the stand.

British Micro Stand No 4043
Penfold Works
Imperial Way
Watford
Herts

Grafpads I and II are on display, along with the Mimi 805 and PCB software for the Unicad system.

Colt Computer Trading Stand No 4202

Fairfield Works
Hounslow
Middlesex

Colt Computer Trading runs the Colt dealer network, and is showing its full range of business software for single and multi-user micros running under CP/M, MS-DOS and Xenix.

Computer Bookshops Stand No 2204
30 Lincoln Road
Olton
Birmingham

This company is the major UK wholesaler of computer books, and is displaying a range of titles covering business machines (its home titles are in the National Hall).

Computer Terminal Services Stand No 2220
Bryant House
Bryant Road
Strood
Kent

Computer Terminal Services provides maintenance, sales and rentals, including a 24-hour response to fault calls.

Cumana Stand No 2000

Pines Trading
Broad Street
Guildford
Surrey

The floppy disk drive supplier is launching a series of upgrades at the Show which feature a full implementation of the multi-tasking OS-9 operating system running on the QL, ICL's OPD and the BBC B.

Dataproducts Stand No 2002
Unit 1
Heron Industrial Estate
Spencers Wood
Reading
Berkshire

Dataproducts is exhibiting a range of daisywheel and dot-matrix printers.

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dBMAN (UK) Stand No 4002/6
99 London Road
Sawbridgeworth
Herts

On show is dBMAN, a program that builds on the framework of dBase11. dBMAN is claimed to have a rich storehouse of new and powerful functions, commands and productivity features.

Gingerbread Display Stand No 2222
317 New Kings Road
London SW6

On show are lightweight and portable display systems.

Greater London Council Stand No 4009
Room B75

County Hall
London SE1

This stand illustrates some of the achievements of the GLC's Information Technology for Londoners programme.

Handic Software Stand No 4021
5 Albert Road
Crowthorne
Berks

Handic Software is unveiling its database Base Result which integrates with Calc and Word Result. Also on show for the first time is the Voice Management System.

Interquadram Stand No 2014
653 Ajax Avenue
Slough
Berks

The Datavue 25, an IBM PC-compatible portable reviewed in this issue, is on Show, as well as the full Quadram range of add-ons for the PC and compatibles.

KGB Micros Stand No 2210
106 St Leonard's Road
Windsor
Berkshire

KGB Micros is showing a general range of business hardware and software as well as two new products, an enhanced version of Autocad and the Torus Icon networking system running on the IBM PC/AT.

Mannesmann Tally Stand No 2020
Molly Millars Lane
Wokingham
Reading

Mannesmann Tally is showing a new range of printers, including models compatible with the IBM and the Apple Macintosh.

Merlin Gerin (UK) Stand No 2216
Stafford Park 4
Telford
Shropshire

Merlin Gerin is showing Micropac line conditioners and uninterruptible power supplies. Line conditioners remove voltage variations, electrical noise and atmospheric disturbances from supplies up to 5000VA. UPS units give total protection against all mains disturbances, including breaks and microbreaks, up to 1000VA.

Micro Decision
VNU Business Publications
32-34 Broadwick Street
London W1

Micro Decision is a publication designed to provide information guidance to business and professional users, and first-time buyers. *Micro Decision* will be sponsoring the Applications Advisory Centre, which will offer unbiased advice and direction to business visitors. Issues and subscription details will be available on the stand.

Microguard Stand No 2126
24 Foregate Street
Worcester

A new uninterruptible power supply device joins Microguard's range of power protection systems at the Show. The UPS 500 goes between the AC power line and a micro or peripheral to provide automatic, clean, no-break power.

Microware (London) Stand No 4035
Futures Way
Bolling Road
Bradford
Yorks

Microware is offering a range of computer solutions including its IBM Network and the UDMI network terminals. Vertical market applications include point of sale, project management and insurance broker packages.

Miracle Technology (UK) Stand No 4034
St Peters Street
Ipswich

Miracle Technology, maker of the popular WS2000 modem, is demonstrating its full range of WS3000 professional modems. The whole range is fully intelligent, upgradeable and Hayes-compatible from V21.23 through V22 to V22 BIS. Also on show is Miracle Technology's own software.

NCC Microsystems Centre Stand No 2200
11 New Fetter Lane
London EC4

The NCC aims to help business and professional people make a success of using micros by providing objective advice, guidance, information, consultancy and training services. On display is a range of information products, and staff are present to explain the services offered to users and suppliers.

Ozwise Computers Stand No 4005

236 Imperial Drive
Rayners Lane
Harrow
Middx HA2 7HJ

As one of the leading Apple dealers in the UK, Ozwise is displaying a range of Apple products and peripherals centring on the Macintosh, with continuous demonstrations of all the latest software. Also on display is a range of other leading business computers and software.

PC Magazine
VNU Business Publications
32-34 Broadwick Street
London W1

PC Magazine is the independent guide to IBM personal computers, offering its readers news, information, advice, tests and tips. In the year since its launch it has achieved an audited circulation of 23,720 (ABC July-December 1984). Issues and registration details will be available on the stand.

PC Week
VNU Business Publications
32-34 Broadwick Street
London W1

Launched officially at the Show, *PC Week* is designed to cater for the professional personal computer user. Editorially *PC Week* focuses its attentions on a variety of topics, from hardware and software launches to the latest marketing and financial trends. Issues and registration details will be available on the stand.

PC Week will also be sponsoring the Corporate Computing Feature.

Philips/Kingsway Data Systems Stand No 2114
30 Guildford Street
Chertsey
Surrey

Philips is demonstrating three new business machines on its stand. The lowest-entry model has 128k of RAM and a 720k 3½in disk drive. In the middle of the range is a twin-drive version, while a 10Mbyte hard disk model marks the top of the series.

Pitman Publishing Stand No 2227
128 Long Acre
London
WC2E 9AN

Titles on display at the Pitman stand not only feature those published by Pitman, but also those from Howard W Sams, Sybex, Ashton-Tate, Longman, and Macdonald and Evans; in short, a wide range of up-to-date books on personal computers.

Prospero Software Stand No 4000
190 Castlenau
London SW13

Prospero Software is featuring Pro-Pascal, said to be the only Pascal compiler available for the IBM PC and other compatibles which has been officially validated to the international

PEGASUS ACCOUNTING SOFTWARE
Fast, accurate, flexible and adaptable to a wide variety of individual company needs, we feel simply that Pegasus is a superb system. The degree to which the individual user can make adjustments within the system means Pegasus comes very close to being a system designed specifically for you, but at a fraction of the cost of "bespoke" software. The full system comprises eight modules, most of which can be run as "stand-alone" or fully integrated into a total accounting environment:

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standard for Pascal. Prospero is also showing Pro-Fortran, an ANSI 66 Fortran which is widely used to run mainframe programs on micros.

Psion Stand No 4037
18-19 Harcourt Street
London W1

Psion is demonstrating its three main products at the Show. These are the Psion Organiser, the Xchange integrated software suite and Psion Chess for the QL and Macintosh.

Research Machines Stand No 2207
Mill St
Oxford

Research Machines is exhibiting two new network systems. On this stand is the 16-bit Nimbus network including the new Microsoft Windows. In the National Hall, for education only, 8-bit 480Zs will be linked by a 16-bit Nimbus on the Chain 64 network to offer more speed, stations and security.

Satellite Computing Stand No 2214
236 Sandycombe Road
Richmond
Surrey TW9 2EQ

Satellite Computing is launching its relational database package at the Show and is also displaying its other packages.

Victor Stand No 2102
Unit 1
Valley Centre
Gordon Road
High Wycombe
Bucks

On Victor's stand are the V9000 (the improved version of the Sirius), the VI which runs both Sirius and IBM PC software, the VPC (an IBM clone), and the Vicki (the portable version of the Sirius). Software on show includes the Smart modular series of business packages, the Cycero program generator, and the Sensible Solution database.

NATIONAL HALL

New machines and software on display in the National Hall show that there's still life at the home/small business end of the market.

In addition to its 464 and 664 machines, Amstrad is showing its brand new 6128 home/business machine for the first time. This machine (reviewed in this issue) features 128k of RAM and the ability to run all popular CP/M business applications programs. Amstrad also hopes to be showing an even newer machine, but details on this one are hard to come by.

In addition to its standard range, Commodore is showing its new 128 and the Commodore PC. The 128 features 128k of RAM plus the ability to run Commodore 64 home software and CP/M business software as well as programs written specifically for the machine. The Commodore PC is a full-function IBM compatible for around 30 per cent less than the IBM PC.

Acorn is still alive and kicking, and exhibiting at the Show. In addition to the BBC+ and the Electron, it is also showing two new machines — the Cambridge Workstation and the Communicator. The Cambridge Workstation is designed for research applications and is based around the 32016 microprocessor (and the last we heard, comes with a wide range of languages). The Communicator is Acorn's anwser to ICL's OPD and is designed for executive communications.

Sinclair is showing its range of micros—the Spectrum Plus and the QL. It will be featuring 'serious' software for the QL including packages such as Cash Trader, Integrated Accounts and Decision Maker.

And for the first time in the UK, Atari is showing its new 520ST. This features a fast Motorola 68000 processor, 512k of RAM, a disk drive and monitor for less than £1000. The 520ST comes with the GEM friendly user interface and a mouse. Atari is also hoping to be able to show its new CD ROM unit for the 520ST which allows an entire encyclopedia to be stored on one optical disk.

On the theme of games, Beyond, one of the most imaginative software houses this side of the Atlantic, has followed up its excellent Shadowfire with Enigma Force, and concluded the Midnight trilogy with Eye Of The Moon.

Enigma Force is quite a departure from its predecessor, being an animated graphic adventure along the lines of Valhalla. Beyond's Clive Bailey is quick to point out, however, that it is graphically far superior to Legend's program.

Two further games, Nexus and Superman, are also being demonstrated by Beyond. The former is claimed to contain graphics which surpass those in Epyx's Impossible Mission, while the latter is another animated graphical adventure.

Also launched, but this time on the new Monolith label, is Crisis 3350. This is described as 'fast-moving and violent', and seems to be a cross between Way Of The Exploding Fist and Rollerball.

On a rather more serious note, HiSoft is showing its utility software running on the Amstrad, MSX and Spectrum, as well as CP/M-based micros. Along with its C-Compiler and Devpac, HiSoft will have a new Pascal Compiler and an undisclosed program for the Atari 520ST.

Mirrorsoft, a name that has become synonymous with good-quality software, is previewing Boulderdash on the Amstrad and Atari, plus Dynamite Dan, an excellent Manic Miner type game on the Amstrad. A new Flight simulator called VSTOL will be launched for the BBC, as well as Spectrum and Amstrad versions of the popular Spitfire 40.

Ariolasoft will be making its presence felt at the Show, not only with its games, but with a vast video wall (*á la* Tomorrow's World) which will be used to display what is going on both at the stand and around the hall. On show will be Skyfox, an Electronic Arts game which went straight in at number six on the American Billboard chart. Immodestly billed as 'the most realistic air-to-air combat game on a home micro', Skyfox should be worth a look if only to see if it lives up to its hype.

Racing Destruction Set, also from Electronic Arts, sounds like a real winner. This is a split-screen, two-player racing game containing the world's top Grand Prix circuits — there's even a facility for designing your own.

Ariolasoft's third big production is Golf, a game which contains many top courses and, like Racing Destruction Set, allows you to build your own.

Also on the stand will be a text adventure from Ram Jam and several serious programs from Batteries Included.

For the under-fives, Mirrorsoft is showing a game based around Yorkshire Television's soon to be networked *Giddy Games Show*. This will run on the Spectrum, Commodore 64 and Amstrad. Two new Mr Men games are also on display.

Budding Robert Maxwells will soon be able to create their own newspaper with Mirrorsoft's Fleet Street Publisher, a BBC-based graphics package which allows you to lay out, typeset and prepare the artwork for your own journal. When you are ready to go into production, you can keep track of your funds with the new Cash Trader for the Amstrad.

Activision will be out in force demonstrating Ghostbusters, Decathlon, Space Shuttle and Music Studio running on the Commodore 64, Spectrum, Amstrad, Atari, Apple, IBM and MSX micros. As for new games, Activision

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seems to have gone very sporty, producing such things as Great American Cross Country Road Race, Tour de France, World Championship Boxing, and Great European Cross Country Road Race. There's also a 3D space game called Rescue on Fractalus, and something called Hacker which speaks for itself.

Firebird is showing all the products in its Gold Range, and you could get a chance to see Elite running on the Spectrum. A new game, Cylu, claimed to be every bit as good as Ultimate's Knight Lore and Alien 8, will be appearing in the £2.99 Silver range so look out for that one. Also on the Firebird stand will be MUD (Multi User Dungeon), the adventure that can be played over the telephone. The news here is that BBC owners will now be able to play, but be warned — mind that beggar.

Two of the most interesting and novel products on show are the Bee-Card from Hudson Soft and the SoftCard from Electric Software. These are credit card sized memory modules which can store up to 256kbits and one megabit of data respectively. The Japanese designed Bee-Card was previously only



available for the MSX machines, but Hudson Soft is promoting an interface that allows the little card to be slotted into the rear of a Spectrum, Commodore 64 and Amstrad CPC464. Most programs on Bee-Card are games-related, although several serious pieces of software, including a communications package, will be demonstrated at the show.

In addition to the exhibitors' stands, two special features are being run in the National Hall, one concentrating on education and the other on the living room of the future.

The Tomorrow's Micro Home stand is being sponsored by Toshiba. You can walk into a living room of 10, five or perhaps even two years into the future, with a home computer controlling all the functions of the home and linking directly into home entertainment systems.

A database of educational software and hardware is available at the Computers in Education stand, and a team of experts in different aspects of educational computing are there to give advice and guidance. Also present are the final projects in the Schools Micro Award competition.

BBC television's London and south-east news programme, *London Plus*, is sponsoring this new education award for schools. It will go to the school team or individual who applies microcomputing to the best advantage in the study of an unrelated subject. This year's award is being presented on Friday 6 September.

The computer club feature on the National Hall's gallery level is larger than ever this year, with 12 clubs displaying micros and programs. Everyone there is eager to talk to visitors about what they do and what they could do. If you are interested in becoming involved in a computer club or just want to talk to people who are knowledgeable about micros, pay them a visit on stand 3008/1-12.

AB European Marketing Stand No 1820
Forest Farm Industrial Estate
Whitchurch
Cardiff

On display is the Flying Start Concept Keyboard, designed to make learning with a computer more fun by eliminating the need for a typewriter-style keyboard. Previously only available to schools, the Concept Keyboard is being launched for the general public at the Show.

Acorn Stand No 1303
Fulbourn Road
Cherry Hinton
Cambridge

Two new machines, the Cambridge Workstation and the Communicator, are expected to be on display.

Activision Stand No 1103
15 Harley House
Marylebone Road
London NW1

This home computer software house is giving visitors the opportunity to experience all its new autumn titles — and preview what's in store for Christmas.

Adder Stand No 1800/1
12 Sterndale Close
Girton
Cambridge

Adder Technology is launching its peripheral management system at the Show, while Adder Publishing is displaying its range of books and software.

Alligata Software Stand No 1016
1 Orange Street
Sheffield

Home software house Alligata is keeping its plans for the Show quiet.

Amstrad Stand No 1403
Brentwood House
169 Kings Road
Brentwood
Essex

The 464 and its disk-based bigger brothers are on display.

Anirog Computers Stand No 3049
29 West Hill
Dartford
Kent

Anirog Computers is showing its range of games software for popular home micros.

Argus Press Software Group Stand No 1010
Liberty House
222 Regent Street
London W1

On show are two new games from Quicksilva, a golf simulation, a war game from Lothlorien, and two 'serious' packages for the Commodore 64.

Argus Specialist Publications Stand No 3057
1 Golden Square
London W1

Argus Specialist Press is showing its range of micro magazines. As an added attraction, Tony Hetherington, editor of *Computer Gamer* magazine, is giving demonstrations during the Show.

Ariolasoft Stand No 1019
Asphalte House
Palace Street
London SW1

A 36-screen 'video wall' dominates Ariolasoft's stand this year, and includes displays of Skyfox, Racing Destruction Set and Golf.

Atari Stand Nos 1503, 1511 & 1601
Railway Terrace
Slough
Berks

On show is the Mac-alike 520ST, supported by the 8-bit 130XE and a range of software for both machines.

BBC Publications Stand No 1100
35 Marylebone High St
London W1

From BBC Publications in the autumn, the Inside Information project combines a series of radio programmes, two audio cassettes, software and a book to form a course recognised by City and Guilds. This multimedia course offers a basic introduction to all forms of information technology and is designed to be especially valuable to younger people looking for jobs.

Bernard Babani Publishing Stand No 1001
The Grampians
Shepherds Bush Road
London W6

Babani's range of technical publications includes titles on specific micros and computing in general. A free catalogue is available at the stand.

Beyond Software Stand No 1617
Durrant House
8 Herbal Hill
London EC1

What's new from Beyond? Visit its stand and experience three new adventure games — Eye of the Moon, Shadowfire 2 and Superman. Two new action games may also be on display at the Show for the first time.

Boot Out Stand No 3058
PO Box 147
Putney
London SW15

Boot Out distributes the magazine *Call Apple* in the UK.

Bowthorpe EMP Stand No 1800/9

Stevenson Road
Brighton
East Sussex BN2 2DF

Bowthorpe EMP's exhibits will include its new UPS unit together with its range of surge protector plugs for the UK, European, US and Australian markets, the surge protection link boxes, and the automatic solid state sensor device.

Bubble Bus Software Stand No 1006
87 High Street
Tonbridge
Kent

Bubble Bus's faithful old bus is at the Show where three new packages are being featured — versions of Wizard's Lair for the Commodore 64 and Amstrad, Use It for the Amstrad and Einstein, and Hi Rise for the Amstrad.

Collins Stand No 3102
8 Grafton Street
London W1

Collin Soft and Collin Educational publish a range of software with particular emphasis on education and practical applications. Titles include Paddington's Early Learning Software, starter packs, a range of computer books, and the new Brainpower series. Collins Educational with Hill McGibbon publishes the Microspecial pack of life skills resources for schools.

Commodore Stand No 1203
1 Hunters Road
Weldon
Corby
Northants

The Commodore 128 (which includes 64 emulation) and the IBM-compatible PC are on show, plus a range of software for the company's already established machines.

Computer Bookshops Stand No 1004
30 Lincoln Road
Olton
Birmingham

This company is the major UK wholesaler of computer books, and is displaying a range of titles covering home machines on this stand (its business titles are in Olympia 2).

Dennison Manufacturing Company Stand No 1323
Colonial Way
Watford
Herts

Dennison is showing its range of Elephant Memory Systems' floppy disks and computer supplies.

Domark Stand No 1400
204 Worple Road
London SW20

The games Eureka and A View to a Kill have pride of place on the Domark stand.

Duckworth Publishers Stand No 1701/11
The Old Piano Factory
43 Gloucester Crescent
London NW1

Duckworth produces a range of books and software, including educational software. The Duckworth Highway Code for the Spectrum will be launched at the Show. Duckworth also publishes a series of books for business computer users, including the *Wordstar User's Reference Manual.*

EEC Distribution Services Stand No 1623
14 Western Parade
Barnet
Herts

On show is the Datex MS-1 optical mouse whose software turns a Commodore 64, 128 or SX64 into a graphics-drawing utility.

Electric Software Stand No 1811
91 High Street
Longstanton
Cambridge

Electric is demonstrating its new credit card sized SoftCard with up to 1Megabit storage capacity, plus its comprehensive range of MSX entertainment and utility software.

EMAP Business and Computer Publications Stand No 3031
Priory Court
30-32 Farringdon Lane
London EC1

On sale are the September issues of *Computer and Video Games, Sinclair User, Commodore User* and a new magazine called *Computing Age.*

Enterprise Computers Stand No 1211
31-37 Hoxton Street
London N1

On display for the first time is Enterprise's Disk Drive Controller, which runs on any Shugart 400 compatible 3½in or 5¼in drive. Also present are the Enterprise 64 and 128, supported by a range of software and other peripherals.

Firebird Software Stand No 1011
Wellington House
6/9 Upper St Martins Lane
London WC2

Firebird, a division of British Telecom, is establishing itself as one of the leading software houses in Europe. On the stand you can see its Silver and Gold ranges, including Gyron and the chart-topping Elite. Also running on the stand is the UK's largest multi-user online computer game, MUD.

Glentop Publishers Stand No 1622
Standfast House
Bath Place
High Street
Barnet
Herts

Glentop Publishers is showing the Doctor Watson series, including Watson Notes and Watson Workbooks for the home micro user. Special emphasis will be given to Honeylogo, a 3D grapics package for the BBC, and a preview of a series of packages for primary schools to be launched in 1986.

HiSoft Stand No 1701/2
180 High Street North
Dunstable
Beds

Serious software for a range of machines is on display, including Devpac, an assembler/debugger package, and Pascal and C language packages.

Hudson Soft Stand No 1517
26 Wycombe Gardens
London NW11

Hudson Soft is introducing the Bee-Card, a credit card sized memory module that can store up to 256kbits of program information.

Interceptor Micros Stand No 3040
Mercury House
Calleva Park Industrial Estate
Aldermaston
Berks

On show for the first time are some Amstrad utilities supported by languages, business software and adventures for the same machine.

Kempston Micro Electronics Stand No 1117
c/o Chameleon Arts
Singer Way

Woburn Road Ind Estate
Kempston
Beds

Kempston is exhibiting and demonstrating its new range of products. For the QL there is a disk interface and Centronics interface; for the Spectrum there is a disk interface; plus all the existing range, not forgetting Kempston's action game, Chicane.

Level 9 Adventures Stand No 3038
229 Hughenden Road
High Wycombe
Bucks

Level 9 is showing its full range of adventure programs, including a preview of its soon-to-be-released 'The Worm in Paradise', a political science fiction adventure.

Lightning Distribution Stand No 1217
841 Harrow Road
London NW10

Lightning is a nationwide wholesale distributor of home computer software and hardware. Available from its North London office is a wide range of software, hardware and peripherals for Acorn, Amstrad, Commodore, MSX and Tatung home computers. A free software catalogue is available with weekly updates by means of a weekly newsheet. In addition, Lightning distributes telephones, telephone accessories, over 4000 videos, laser vision disks, and LPs and singles.

Llamasoft Stand No 3061
49 Mount Pleasant
Tadley
Hants

Jeff Minter's range of programs are on show, including his newest, Batalyx, and the latest developments of Psychedelia and Colourspace.

Macmillan Information Systems Stand No 1715
4 Little Essex Street
London WC2

A new series of book/software packs blending entertainment and learning are on show for the Spectrum, Commodore and Amstrad micros. This Professional Touch series offers three titles: Screenplay, World Cup Soccer and Magic. Future projects include two games to tie in with the children's television series, *Orm and Cheep.*

Melbourne House Stand No 1423
Castle Yard House
Castle Yard
Richmond
Surrey

Visit Melbourne House's stand to enter the mysterious and magical world of JRR Tolkien's *Lord of the Rings.* Special effects have been used to create an atmosphere on the stand to match the game. Also on the stand is a range of books and software due to be launched before Christmas.

Metacomco Stand No 1800/2
26 Portland Square
Bristol

Metacomco is a software house that specialises in systems software for computers based on the Motorola 68000 microprocessor family. It is exhibiting its products for the Sinclair QL and the Atari ST. There will also be demonstrations of the Tripos multitasking operating system, and a new Basic interpreter.

Micro Dealer Stand No 1222
29 Burrowfield
Welwyn Garden City
Herts

The home computer distributor is selling its range of software and peripherals at the Show, and introducing its services to new dealers.

Microdeal Stand No 3055
41 Truro Rd
St Austell
Cornwall

On its stand, Microdeal is demonstrating its fully computerised order entry/despatch system, along with various new releases for the QL, Commodore 64 and C16.

Mikro-gen Stand No 3090
44 The Broadway
Bracknell
Berks

Mikro-gen is showing its Mikro-Plus interface and games for the Spectrum. The Mikro-Plus allows 64k of memory to be used in the game and includes a joystick port.

Microvitec Stand No 1111
Futures Way
Bolling Road
Bradford
Yorks

Microvitec is showing its range of monitors for both home and business micros, including fully-compatible monitors for the Sinclair QL and IBM PC. Also on show is an intelligent touch screen for the BBC B and other home micros.

Mirrorsoft Stand No 1017
Mirror Group Newspapers
Holborn Circus
London EC1

Mirrorsoft is releasing VSTOL, a Harrier simulation, and Ninja, a martial arts game, at the Show. Also expected is a program for producing typeset and illustrated newspapers and newsletters. The Mr Men are there, too.

Molimerx Stand No 1501
1 Buckhurst Road
Bexhill-on-Sea
East Sussex

Molimerx, which has been exhibiting at the *PCW* Show since 1979, is selling a range of software this year, including Sanyo, Tandy, IBM and BBC packages.

Music Sales Stand No 1701/1
Dettingen Way
Newmarket Road
Bury St Edmunds
Suffolk

Music Sales is demonstrating its range of music software for the Commodore 64 and 128. Programs to be shown are: Music Maker — turn a Commodore into a musical instrument; Playalong Albums — learn to play the latest pop hits or classics; Commodore Sound Studio — the world of the sound studio; and Sampler — explores the possibilities of digital sound.

Ocean Software Stand No 1317
6 Central Street
Manchester

Previewed at the Show are Rambo: First Blood 2, Transformers, and Knight Rider, three new games destined for the Christmas market. All will be available for the Spectrum, Commodore, Amstrad and Atari machines. Alongside are the first products from Ocean IQ, a utility company formed together with Oasis Software. Included are Laser Basic, a Laser Compiler for the Commodore 64 and Amstrad, White Lightning, an assembler for the Amstrad, and a version of Laser Basic for the Spectrum. Imagine Software, now under Ocean's guidance, is also represented at the stand.

Opus Supplies Stand No 1200
55 Ormside Way
Holmethorpe Industrial Estate
Redhill
Surrey

Disk systems for the Spectrum, QL and a new development for the BBC are on show — and the Wren portable micro may reappear here.

Page Six Stand No 1701/6
PO Box 54
Stafford

Page Six was the first British Atari-

dedicated magazine. Now nearing its third birthday, the magazine provides in-depth support for Atari users. At the Show are its latest issue plus back issues, a collection of public domain disks and much more for users of Atari systems.

Pas-Master Computing Systems Stand No 3076/1
Index House
Ascot
Berkshire

Pas-Master Computing Systems is featuring a customised sales ledger program designed to cover the financial details of running a fee-paying school.

Personal Computer World Stand No 1411
VNU Business Publications
32-34 Broadwick Street
London W1

Our stand and your chance to talk to us. Back issues are on sale, and special show competitions and features are being run.

Precision Software Stand No 1701/5

6 Park Terrace
Worcester Park
Surrey

Precision Software is launching Superbase, a programmable database, and Superscript, an intelligent word processor for the Commodore 128. On the 128, you can load both programs together and pass information between the two.

Hayden Book Company Stand No 3052
1 Gower Street
London WC1

Hayden Book Company is displaying its range of new publications, including official Apple books and the Inside series of software/book packages aimed at business users.

Research Machines Stand No 3060/2
Mill St
Oxford

Research Machines is exhibiting two new network systems. On this stand, for education only, 8-bit 480Zs will be linked by a 16-bit Nimbus on the Chain 64 network to offer more speed, stations and security. In Olympia 2, the 16-bit Nimbus network will be displayed, including the new Microsoft Windows software.

Sanyo Stand No 1003
Sanyo House
Otterspool Way
Watford
Herts

On display is the new IBM-compatible MBC885. Its features include 256k RAM as standard, plus twin 360k disk drives. The MBC885 is joined on the stand by the rest of the MBC range, as well as Sanyo's MSX machine with a range of peripherals.

Seiko Stand No 1000
Hattori House
Vanwall Road
Maidenhead
Berks

Seiko is displaying its computer component watch and computer wrist terminal at the Show, while UK subsidiary Hattori is promoting pocket televisions and an electronic music keyboard alongside the Soundproducer stopwatch and an electronic notebook-cum-scheduler.

Sharpsoft Stand No 1716
86/90 Paul Street
London EC2

Sharpsoft is displaying a range of Sharp machines, add-ons and peripherals.

Sinclair Research Stand No 1311
25 Wells Rd
Cambridge

Both the Spectrum Plus and the Sinclair QL will be on display. They will be backed up by a range of serious software including Cash Trader, Integrated Accounts and Decision Maker from Tryptych Software.

Software Communications Stand No 3045
Martech House
Bay Terrace
Pevensey Bay
East Sussex

Three new software packages from Martech are on display: Geoff Capes' Strongman Challenge, Zoids — the Battle Begins, and The Planets.

Sportscene Specialist Press Stand No 3092
14 Rathbone Place
London W1

Sportscene is exhibiting — and selling — its range of micro magazines: *Mac User, Your Spectrum, Your 64* and the trade weekly *Microscope.*

Sunshine Publications Stand No 3100
12/13 Little Newport Street
London WC2

Popular Computer Weekly and *Commodore Horizons* are on sale at the stand. Also available is the range of Sunshine books, backed up by special Show offers.

System 3 Software Stand No 3029
Suite 180
Southbank House
Blackprince Road
London SE1

System 3's offerings include International Karate, Enter the Ninja and Twister.

Transform Stand No 1800/11
24 West Oak
Beckenham
Kent

Transform specialises in serious software and peripherals for home computers, including the Spectrum, Amstrad and QL.

Tynesoft Computer Software Stand No 1020

Addison Computer Software
Blaydon
Tyne and Wear

New games are on show for the C16, Commodore 64, Spectrum, Amstrad and Atari ST range.

US Gold Stand No 1417
Unit 10
The Parkway Industrial Centre
Heneage Street
Birmingham

Along with its usual programs, US Gold is offering two new series — KIDS!, featuring entertainment from Walt Disney and The Muppets, and All American Adventures, war games and simulations.

WHS Distributors Stand No 1201
St Johns House
East Street
Leicester

On display is a range of books, educational and business software, plus adventure games for which this company acts as distributor.

What Micro?
VNU Business Publications
32-34 Broadwick Street
London W1

What Micro? is a monthly buyers' guide for personal computing covering predominantly the business area of the market. Its editorial focuses on comparative tests of hardware, business software surveys, vertical market features and peripheral tests. Each issue incorporates a classified buyers' guide providing specific details on over 500 products. Issues and subscription details will be available on the stand.

John Wiley and Sons Stand No 3078/1
Baffins Lane
Chichester
West Sussex

Wiley this year is concentrating on books covering artificial intelligence and expert systems, communications, and the Unix and Pick operating systems, plus titles for the educational market. END



Liberator

An easy-to-use text processor for civil servants was the brief — Thorn EMI responded to the challenge with the Liberator. Nick Walker tests the friendliness of this 'ideal' lap-held.

In 1984 a government organisation, the CCTA (Central Computer and Telecommunications Agency), conducted a survey into lap-held computers and their possible application in the Civil Service. Concluding that a lap-held would be useful for certain mobile civil servants, it went on to look at a number of currently available lap-helds.

The findings? While most lap-held users were enthusiastic about their machines, all contenders had some fault (unfriendly operating systems or difficulties connecting to printers). Even worse, none of the contenders were British!

The CCTA contacted a number of existing lap-held manufactures with proposals to make their machines to CCTA standards, but with no response. A specification was drawn up by the CCTA as to the ideal machine for Civil Service use (basically an A4-size lap-held word processor that would be simple for anyone to use, and easy to connect to printers). Thorn EMI responded to this specification with the Liberator.

Hardware

On removing the Liberator from its box, the first thing that strikes you is how slim the unit is. In a light matt-grey plastic case, it occupies the desk space of an A4 pad and is no more than 1½ins thick.

The screen hinges up to reveal a full-stroke keyboard and an LCD screen. On the right there is an expansion port for additional ROM applications, and to the rear there is a RAM port for additional RAM cartridges, two serial ports, a RAM protect switch and a reset switch. The machine is driven by four AA batteries in a holder that clips into the rear of the machine, or an optional rechargeable battery pack.

The Liberator comes in two models: the LPT1001 with 40k RAM; and the LPT1002 with 64k RAM reviewed here. To further reassure non-technical users Thorn EMI expresses the memory in terms of blocks, even though one block corresponds exactly to one kbyte. On the 64k model the memory is organised as two banks, A and B, consisting of 39k and 23k each. An additional 23k can be added as bank C via the RAM expansion port. Bank C also has a battery back-up which maintains data when it is removed from the machine.

The screen is 16 lines by 80 columns, surprisingly large for a machine of the Liberator's price, and as such is capable of holding a decent amount of text on a single screen. As on all lap-held machines, the LCD screen suffers from reflection problems, so unless you're willing to paint the walls with matt paint and have no direct lights, you just have to accept typing beneath your own reflection. If you position the machine carefully it's quite usable. Unfortunately there are only three angles available for the screen — back against the machine, supported by the carrying handle, and using the carrying handle to tilt the whole machine, making it difficult to find an ideal position.

'Certainly, anyone familiar with electronic typewriter operations would be at home with the Liberator, but I did yearn for a few of the features found on more complex word processors.'

The keyboard is full-stroke qwerty, consisting of 62 keys and probably the slimmest full-stroke keyboard I've seen on a lap-held machine. Even so, the keyboard is nice to use, with sculptured keys and a good, positive feel. The alphanumeric keys are coloured light grey, the control keys are in a darker grey, and a four-key cursor in the right-hand top corner is black. One large blue key dominates the top row, and is marked 'BREAK/CMND'. All keys auto-repeat.

To the right of the keyboard is a slider bar that is supposedly the contrast control, but, at least on the review machine, it took a very keen eye to spot any difference between one extreme and another of this slider.

One of the more dubious of the CCTA proposals is that for the connection of printers. Finding that both the traditional interfaces, RS232 and Centronics, caused a lot of problems, it proposed the use of a less well-known interface — the PSWP (Public Sector Working Party) S5/8 interconnection standard. Consequently, the Liberator has two hi-fi-like DIN connectors on the rear for connection to printers. It's doubtful that this new standard will be adopted by printer manufacturers, and until it is, the connection of the Liberator to a printer will be complicated rather than simplified, needing a black box to convert formats. Even Thorn EMI's own printers, especially selected for the Liberator, are Centronics machines with the necessary conversion box.

The manual warns that the machine contains no user-serviceable parts, but I couldn't resist peering inside.

After removing all visible screws from the base of the machine, I found another four screws cunningly hidden under rubber feet — it looked like I was in with a chance. But no, the machine held fast. It seems Thorn EMI, like most lap-held manufacturers, wants to make sure that no unauthorised persons can get near all that delicate CMOS circuitry. From what I could see, the board was nicely made and well laid out, and the processor looked like one of the common general-purpose 8-bit devices, probably a Z80. The company won't say what the CPU is, again preferring to emphasise the machine's functions rather than its technical specification.

Software

The Liberator makes no attempt to be anything other than a portable text processor, and an easy-to-use one at that. Thorn EMI's intention was to create a portable machine for non-computer professionals. The word pro-



cessing function is menu-driven with the blue CMND key giving a menu of all options at any one time. Selection on that menu is made by the cursor keys, and execution of a chosen command is done by the ENTER key.

Opening the lid switches on the Liberator, and you are presented with three 'windows': the main window in the centre of the screen lists all documents currently in the machine; a menu to the right lists available commands; and a single line at the top of the screen gives an explanation of each option as it is selected. From here you can create new documents, edit existing ones, print documents, and perform all the usual operations you'd find at the system level of a word processor.

The final option on the menu allows you to transfer to a second menu of more specialised options such as time setting, setting printer escape codes, and transmission of files to other Liberators. Commands at this level (operations on documents rather than text editing functions) are very comprehensive but simple to use, and fit in well with the Liberator's philosophy.

Selecting FILE or NEWFIILE from the top-level menu takes you into the document editing screen. This screen has a high degree of WYSIWYG (what you see is what you get), making it easy to create documents such as letters or memos. The top row of five keys allows ease of alteration to a document. The three keys to the right let you delete in either direction and toggle between insert and overwrite mode. A single key to the left lets you mark sections of text for manipulation in the normal cut and paste manner.

The single blue key brings up a menu of options available to operate on the document. If you have delimited text, this will show cut-and-paste type options; if not, it will show options to act on the entire document such as finding specified text, changing print widths, and merging other documents.

Exiting back to the main menu automatically saves the latest version of your file, so it's easy to flick from one document to another. The paste buffer stays intact as you flick between documents, therefore you can take bits out of one document and paste them into others, an operation that can be surprisingly complex on many professional word processors.

Overall I found the machine similar to the latest generation of electronic typewriters, but with some added bells and whistles such as a paste buffer. Certainly, anyone familiar with electronic typewriter operations would be at home with the Liberator, but I did yearn for a few of the features found on more complex word processors. Most noticeable was the lack of line spacing and centring or right justification for headings and addresses. After mastering the basic machine I feel that some users will want more features, and hope that Thorn EMI will respond by making a ROM cartridge of more advanced features.

As a final test of the machine's simplicity, I left it in the hands of a non-computer user. Within an hour she was creating finished documents, and was familiar with most of the editing operations.

Similar experiments with a full-scale word processor can take weeks, so it does seem that Thorn EMI has succeeded in making the machine very easy to use.

Thorn EMI has no plans to open up the machine to third-party software developments, preferring to treat the machine as a purely specialised, portable text processor. It is interesting to note, however, that the copyright notice on the rear of the machine refers to both Thorn EMI and Digital Research — perhaps there is an operating system lurking underneath after all (again, Thorn EMI doesn't want to discuss the technical aspects).

Software presently available consists of two cartridges, a keyboard familiarisation program, and a communications program used in conjunction with an external modem, but neither of these was supplied with the review model. We might also see in the near future other machines based on the Liberator, with specialised software built in such as accounting or stock-taking.

Conclusion

Initially, the machine will be available to civil servants from HMSO (Her Majesty's Stationery Office). After initial orders have been satisfied in that market, Thorn EMI will be making the Liberator available through its own dealer network, so we can expect to see it selling alongside Televideo and Thorn EMI software.

The 40k model will cost approximately £700 and the 64k machine £800. Both machines should be available to the public in mid-September.

The pre-production manual that accompanied the machine was incomplete in that illustrations are intended for the finished version. However, it is very clear and concise, consisting of just 28 pages and yet covering everything you need to know about the machine.

If you can see your portable needs extending beyond the creation of documents to other common computing functions such as spreadsheets or databases, you'd be well-advised to tolerate a less friendly operating system and word processor, and buy a general-purpose lap-held such as an Epson PX-8 or a Tandy 200.

If, however, you will only be creating small documents, the Liberator is by far the easiest lap-held for this, with its larger screen, better keyboard and friendlier software, than any machine of a comparable price. **END**

Only one careful user...

The initial cost of new, sophisticated systems is persuading many people that used is best, but second-hand goods can contain many hidden defects. Wendie Pearson did the rounds of used-micro dealers, and here she presents her findings.

Buying a second-hand computer system may strike you as a risky business, especially if want your machine for serious use. But with retail prices being what they are, some users are putting their money on systems which may only be a few months old and much cheaper.

It's true to say that those selling second-hand systems will often know more about micros than those selling new ones, as second-hand dealers usually have to take the thing in, test it from start to finish, repair it and polish it. They then have to persuade you that it's worth buying and, under law, they must not verbally refuse you warranty unless you are buying from an individual rather than a company.

Prices, which vary considerably with a machine's age and condition, can be slashed by as much as 50 per cent off list price, and fans of discontinued machines will often find just what they want in a second-hand store. But if you're buying a machine that isn't generally available, you should also get back-up. Make sure you can still obtain software for a particular system: sometimes second-hand dealers sell this, sometimes not.

A dealer must only sell original software — selling or making copies is illegal. If you're dumping your old micro and old, original software on a dealer in part-exchange for another system, you're meant to destroy any copies you may have of that software.

Things to watch for when buying include noisy disk drives which may be wearing down/nearing retirement age. Also, check each key on the keyboard, as this part of a micro's anatomy has a habit of packing up and misfunctioning over time.

Keith Linsey, managing director of Simple Solution in Newton Abbott, says it's a good idea to get the dealer to run through the engineer's test program while you watch to ensure that all is well. This tests features such as I/O ports, disk drives, the CPU and the video board, among other things.

Other tactics include taking a friend along for a second opinion, although ideally you should know a fair bit about micros before you buy one second-hand. Make sure you are given the right leads, mains adaptor, manual, packaging, and a *receipt stating the amount paid and the warranty period.*

If you're good at building things, you may want second-hand systems for spares, or old VDU units which you can convert into monitors, but get the system up and running before you buy to check the screen quality, and so on.

When buying a printer, check to see which interfaces it has and test the full character set, too. If any characters are faint or missing, it may be best left, as the needles on a dot-matrix head can break and cost you a fortune to replace — around £90 a time.

Also, beware of defective stepper motors in printers. If the printer you want has trouble in this area, you'll often be able to tell after you've printed about 40 lines of text. If the printer's motor is sick or dying, the spacing will be rather erratic, suggesting that it is too old to function properly. The carriage return will slow down and overprinting may occur, too.

Watch for loose components inside the printer, and cracked rollers. Check software to make sure it loads and runs before you commit yourself.



Photography by John Mason

Testing

The only dealer I talked to which didn't think it necessary for a buyer to test second-hand equipment was CW/P in Victoria, which deals in second-hand Apple, IBM, Osborne and Cortex micros. This may be because it already has an established reputation when it comes to service, maintenance and training, but nonetheless director Richard Baer is horrified at the suggestion that customers might not trust his company implicity.

'It's like opening a can of beans on the bus before you get it home from the supermarket,' he said, shocked. 'Or drinking your can of Pepsi before you



get to the checkout desk.' On reminding Baer that buying computer equipment is a rather more expensive venture, he said: 'People selling second-hand equipment must be more technically competent than those selling new systems, as they must be able to repair and look after the machines they handle. You just have to buy from someone trustworthy — any specialist second-hand dealer knows how to make things work. Also, make sure you can't get it cheaper new — you sometimes can!'

CW/P deals mostly in Apples, 'our biggest second-hand market by miles,' according to Baer. 'We give 90 days warranty on all peripherals, and one year on second-hand Apples as they are extremely reliable,' he says.

'People don't stuff them full of cards, which makes the Apple fail more easily due to the heat the cards generate. This is sometimes greater than the heat generated by the Apple itself, depending on the card's components.'

Baer points out that although CW/P will sell second-hand, original software, the company has to satisfy itself that the person selling has destroyed any copies he may have.

Prices & stockists

CW/P buys IBM PCs for a minimum of £1000 and sells them for £1800, with IBM PC/XTs at £2000. When the company began selling Apples second-hand nearly three years ago, the price was £499. However, Baer says it's getting more difficult to sell Apples second-hand as the prices of new machines have fallen so much, and that supplies are drying up.

He also has reassuring words for those who have bought machines at auctions — if they go wrong, take them to CW/P which will repair them for you.

Printers are available for less than half price — examples are the Fujitsu SP830 reduced from £1601 to £750 and the Qume 545 at £650 which, when it was in production, cost approximately double.

At D & R Computer Services in

Nottingham, partner Phil Rose said: 'We buy second-hand computer equipment anywhere we can get it and sell it trade or direct. We have £25,000 worth of stock at any given time and if we don't have something available, we'll try to get hold of it.'

Systems often turn up from companies that have had cashflow problems, or from people who have bought the wrong system. D & R carries Apple, IBM, Apricot, Superbrain, HP-150, Sirius and Data General machines, and it has also had one or two Amstrads passing through. Generally, the lowest level of machine the company carries is the BBC B, and it is currently selling 8271 disk controllers at £49.50 each.

At the Morgan Camera Company, assistant Ralph Taylor said: 'We buy whatever we can get hold of — lots of it is ex-demo or bankrupt stock, although we try to avoid Atari or Spectrum machines as the profit margin is so low.'

The company will only take machines in good working order, and gives three months' warranty on everything it sells. Unlike most other dealers, it does hold auctions occasionally — the last two were in April and June, so contact the company direct for future plans.

Apple IIIs sell here for £862.50, IBM PCs for £1380, Apricot PCs from £1265, Apricot F1s for £977.50, Sanyo NBC 2000s at £454.50, Juki 6100 daisywheel printers at £345, and Epson KX80s for £172.50.

Anyone looking for a Macintosh may be able to lay their hands on one for £1150 depending on availability, and original copies of WordStar cost £172.50.

Leeds is catered for by the Computer Exchange, started up in April by John White. 'I had the idea for selling second-hand 18 months ago, but the only premises I could get were at a vasectomy clinic which had spare rooms,' he says. Careful not to frighten off prospective clients, he preferred to move into the next available, more suitable premises.

The Exchange is an agent for Datacover, the Bristol-based firm which insures hardware and software, so you can take care of maintenance when you buy your system.

Iotech, Epson and ACT have been the main names to pass through the shop, and White finds that most people will spend between £1000 and £3000 on a system. Epsons are half price, while a mono version of the Amstrad would go for £190 with software.

The idea is that you take your unwanted gear round to White and tell him how much you want for it. He then tries to get the required price and takes a 10 per cent cut on each sale. If, however, the machine breaks down but it's still in warranty, he arranges repairs with the previous owner.

'The advantage of buying second-hand is that the system's been used by someone else who has debugged it and sorted it out — and it's cheap,' he says. 'On the other hand, watch out for people selling lots of other things besides micros and be careful about adverts in the newspapers.'

The Exchange doesn't involve itself in auctions or part-exchange, but it does mail order and plans to produce a catalogue soon.

'Ideally you should know a fair bit about micros . . . Make sure you are given the right leads, mains adaptor, manual, packaging, and a receipt stating the amount paid and warranty period.'

Users nosing after a Zenith system would be well-advised to visit PMS in Hereford, where director Andrew Reed also sells Cifer, Minstrel and ACT systems. Apricot is the lowest level it deals in, and although the company was reluctant to quote price examples, it was about to sell a herd of Zenith 8-bit machines for around £470 each as part of a part-exchange deal.

Education is its main market, with business a close second, and its supplies come from various sources including hire purchase, finance companies and bankrupt stock. 'Watch out for disk drives making nasty noises, which implies they're wearing out. If the electronic components are going to fail, they usually do so within the first few hours of using a machine,' he says.

White finds the most common repair is disk drives, and that generally, Japanese equipment is more reliable than the 'old American stuff'.

He advises choosing MS-DOS — 'a good, safe operating system. CP/M is looking rather dated,' he says, stressing that prices vary considerably in the second-hand market 'as every item has its own price'.

The Computer Junk Shop in Widnes, Cheshire, will occasionally bargain on prices, and it sells quite a few monitors as well as home micros. Black and white 9in monitors for the BBC go for £10 each, while a BBC B with Wordwise, a toolkit chip, twin disk drives and a high-resolution colour monitor costs £632.50. The Tandy 1 is £57.50, 48k Orics are £34.50, and warranty is three months.

'If a machine is in such bad working order that it can't be sold intact, it is sold for spares instead, but most things are repairable,' says assistant Stephen Douglas. 'Once a machine is superseded by something else, it tends to find its way here. For example, when the Commodore 64 came out, we sold a lot of Vic-20s for £30 each.'

At independent maintenance company Anita Electronic Services in London, Carl Purser, field engineer, said that the company provides second-hand equipment to personal order, with

Where to go

Anita Electronic Services, Anita House, 15 Clerkenwell Close, London EC1R 0AD. Tel: (01) 253 2444
Berkshire Micros, 30 Tawfield, Bracknell, Berks RG12 4YU. Tel: (0344) 484423
Complete Word Processing Services Ltd (CW/P), Willow House, Willow Place, London SW1P 1JH. Tel: (01) 828 9000
Computer Exchange, 5a The Balcony, Queens Arcade, Leeds LS1 6LF. Tel: (0532) 435583
Computer Junk Shop, 10 Waterloo Road, Halton, Widnes, Cheshire WA8 0PY. Tel: (051) 420 6671
D&R Computer Services, 29 Highfield Road, Nuthall, Nottingham. Tel: (0602) 761504
Dectrade, Network House, 20 Ludlow Hill Road, West Bridgford, Nottingham NG2 6HF. Tel: (0602) 235141
Display Electronics, 32 Biggin Way, Upper Norwood, London SE19. Tel: (01) 679 4414
Henry's Computers, 404 Edgware Road, London W2. Tel: (01) 402 6822
Microsave Systems, 245 Warwick Road, Solihull, West Midlands. Tel: (021) 706 9748
Morgan Camera Company, 160 Tottenham Court Road, London W1. Tel: (01) 388 2562
Vic Odden's, 6 London Bridge Walk, London SE1. Tel: (01) 403 1988
PMS Developments, Netherwood Road, Rotherwas, Hereford. Tel: (0432) 265768
Simple Solution, 4 Falkland Drive, Kingsteignton, Newton Abbott, Devon. Tel: (0626) 64544
Wychwood Systems, 19 Lynwood Road, Redhill, Surrey. Tel: (0737) 71715

particular emphasis on Superbrain systems. 'Because it was discontinued, it has a high resale value,' he says.

A Superbrain II with two double-sided disk drives sells for about £1380. The company will do mail order, but insists on using a security firm such as Securicor, which would cost extra. It will also supply IBMs and Apricots where possible, but the usual problem of their scarcity is ever-present.

Berkshire Micros has tackled the latter problem head-on, and is specialising purely in Apricots. Managing director Brian Poulton sells Apricot PCs with two single-sided disk drives for £1000 plus VAT, and intends to sell most systems at just over half the retail price. As if talking about some rare, exotic fruit, he says: 'Apricots are very few and far between, and we have a list of people who want them. We've been offered some highly suspect ones in the past, with people wanting to be paid in used £1 notes, not wanting to give their phone numbers, and so on.' Being an ACT dealer, Poulton gives those people a miss.

He gives a one-week money-back warranty so the purchaser can take away his machine and see if it works. 'We only give warranty after that if the customer is willing to pay 10 per cent of the second-hand price for three months' worth,' he says. 'We don't buy a machine unless it's as reliable as a new one. If it's been mistreated, there's no way you can sell it.'

His advice is: 'It's like buying a second-hand car — take someone with you or go to an authorised dealer. Remember that while you can save money buying second-hand, you can cost yourself a lot if you buy the wrong equipment.'

Printers are half price, with an Epson DX100 daisywheel at £330 as opposed to £546 new. The company also sells second-hand software, but has found that software houses don't always help with this. 'Most software companies we've spoken to don't want to know about transferring the licence agreement on the software,' he said.

'If a machine is in such bad working order that it can't be sold intact, it is sold for spares instead, but most things are repairable. Once a machine is superseded . . . it tends to find its way here.'

'People buying a system for the first time from us will save money and get the same kind of support they'd get on a new system. Many of our customers travel hundreds of miles to see us, and we will look out for other machines too, such as Sirius and Apple.'

The company does mail order and part-exchange, but never buys equipment from auctions, something it considers 'too dodgy'.

Lurking in the depths of the West Country is aforementioned TABS dealer Simple Solution, specialising in Apricot and Olivetti machines. 'We get a good few Sirius micros, which are easy to sell, plus the odd Superbrain, Apricot, IBM, Osborne, Transtec and Alphatronics models,' says managing director Keith Linsey.

Prices hover around 50 per cent of list price, and a healthy two-year-old Apricot PC with two 720k disk drives, monitor and software would be £1035.

'If a machine's in good condition we'd give a 12-month warranty, but there would be conditions attached,' he says. 'For example, we'd want to install it. We'd also want to know that the customer was using the right software and knew what he was doing. We'd be cagey about anyone who didn't know exactly what he wanted a system for.'

Linsey, who won't buy anything unless it's in good condition, warns that the customer should be more careful than if he was buying new equipment, especially with regard to after-sales support.

Henry's Computers is a computer buff's heaven, and a haven for Gemini fans. Even on the phone one has visions of exhausted hacks with intense expressions, living in a world filled with components and cables.

General manager David Hunt wasn't keen to give details of his goods, but did confirm that the company deals in build-it-yourself Gemini systems, selling all the bits and pieces required for this particular piece of 'Meccano' at around 50 per cent of list price.

'Second-hand boards are between £125 and £500,' he said, 'and we deal with *serious* programmers, colleges and universities.'

In south-east London, Vic Odden's is a sea of home micros, run by general manager Bob Noakes. All the popular micros are shifted at around 50 per cent off, with the exception of the QL. 'No-one buys them second-hand and I can't imagine anyone buying them new, either,' says Noakes. If you want a whole system, Vic Odden's can supply you with BBC or Commodore 64 set-ups, but the price won't be so low.

Warranty is three to six months and part-exchange is available, all the machines coming from the general public. 'We warn the customers if there isn't much software for a particular machine, and we check everything before we sell it,' says Noakes, who doesn't sell any second-hand software.

Second-hand DEC micros appear to be in short supply, but two companies which may be able to help you are Dectrade and Display Electronics. Dec-

What you'll pay

Machine	**New(£)**	**(£)Second-hand, from**
Apricot F1 (no monitor)	1029.50	977
Apricot PC (with monitor)	1834	1121
ACT Sirius	Discontinued in March. Price then was 3329	1000
Atari 800 XL	130	65
Amstrad (mono) CPC464	229	218.50 with software
Amstrad (colour) CPC464	349	218.50, no extras
Apple Macintosh	2064	1265
Apple II	Discontinued. Was 776	402.50
Apple IIe	587	286.50
Apple III	2755	862.50
BBC B	349	287.50 without DFS; plus 100 with DFS
Commodore 64	179	90
Commodore Vic-20	Discontinued. Was 100	34.50
Ericson PC	1917	1265
Epson QX10	1995	920
HP-150	3680	1850
Iotech 64	1144	530
IBM PC	1951	920
IBM PC/XT	4103	2300
Osborne	575	345
Oric 48k	Discontinued. Was 80	34.50
Superbrain	1975	1380
Printers		
Epson DX100	546	330
Epson FX80	503	150
Brother HR15	445	350
Brother HR1	799	200
Juki 6100	459	300
NEC Spinwriter 3500	1690	875
Fujitsu SP830	1601	750

All prices include VAT
Prices as at beginning of June

trade salesman David Espinner says his company deals with DEC micros from time to time, but that prices were impossible to quote — depending, of course, on what was orginally paid for them.

At Display Electronics, however, manager Dave Fish said DEC would set you back between £1380 and £2300. If you appreciate a jovial atmosphere, then this is certainly the place to go providing you don't need advice on what to buy. Fish says he's happy to serve 'anyone in waders, rubber macs, boots and gas masks', and makes no bones about the fact that he is not a public information service on the mysteries of new technology. 'If they want that kind of advice, I just send 'em off to Tandy at Centrepoint in London,' he says.

Display Electronics mostly handles peripherals, but also sells Kaypro systems as well as the aforementioned DECs. Shugart and BASF disk drives for the BBC cost £57.50, while a Rodime 10Mbyte Winchester drive for the IBM is £299. Warranty varies from 30 days to a year, depending on how much you've paid.

Fish says his company sells mostly to universities and government bodies as well as the public, who will find themselves well served when it comes to modems. The shop is awash with them. Fish bought 6000 units from British Telecom and is getting rid of them at £33.35 each complete with year-long guarantee, although, one experienced modem user said, the modems concerned were 'as big as a house'.

Fish doesn't approve of auctions, saying: 'It's a well-know fact in this business that the dealers put all their rubbish into the auctions.'

A second-hand Kaypro with software and disk drives will cost £1380. Anyone buying from here may also be persuaded to phone the company's very own public database, Distel, on (01) 679 6183.

Wychwood Systems in Redhill runs a phone service based on its database of buyers and sellers, known as the PC Register. Partner Stuart Jeffrey, who formerly worked on Computercar doing set-up work and producing the original output on microfilm, charges sellers £34.50 for the service, while buyers get it for free.

'It's an offence to state that there is no warranty, but the law is unclear in that it doesn't say what that warranty should be. The law expects goods to be of merchantable quality. . .'

Although Jeffrey says the company specialises in IBM, Compaq and Apple machines, it will also deal with home micros. If you have something to sell, you phone with the details and name your price. There is an optional test service whereby Wychwood will try out the system and give you an estimate.

'We feel the service is good value as an advert in the paper would be about £60,' says Jeffrey. 'We do advise people as to what system they should get and what to watch out for when they buy. When we have a seller's details we'll put them on the database, but it's not an on-line system so people can't just dial into it. Potential buyers should contact us and we'll tell them what's available or send them a printout.'



'Well done! Your British Rail program is very realistic . . .'

Conclusion

It seems that most second-hand dealers avoid auctions like the plague, unless they're looking for spares. The general concensus was that auctions were an unreliable way to buy and sell, with no warranty unless you go to an independent company.

On the subject of warranty, it's well worth being careful. If you buy a second-hand machine that's still under the manufacturer's warranty, you should *never* accept the dealer's word that you will be covered by the original owner's warranty. Even if the first owner had six months' warranty left to run, you might not be eligible to take that on.

A Sinclair spokesman confirmed that 'should ownership change within the year, the warranty is broken, and it says this on the guarantee card'. On the other hand, IBM says that the warranty goes with the box, not the person.

Always check with the manufacturer on this point *before* you buy second-hand. This is especially worth doing, as some dealers I spoke to thought that a machine's warranty automatically passed on to the next owner.

It's certainly advisable to look before you buy, although most companies do mail order. Some dealers don't offer warranty, but as long as they don't actually say you can't have it, they're still within the law. If you're unsure, it's best to insure with one of the schemes available or go to an independent company for maintenance.

A spokesman for the Trading Standards Authority said: 'It's an offence to state that there is no warranty, but the law is unclear in that it doesn't say what that warranty should be.

'The law expects goods to be of merchantable quality and fit for the purpose for which they're sold. The customer has rights in law whether he buys new or second-hand, and can sue the supplier if necessary. At any court hearing, the law would view a computer in the same way as it does a car. That is, the warranty would vary from one part of the machine to another.' The mind boggles.

Apricots, IBMs and Macs are the most difficult machines to obtain second-hand, closely followed by the Sirius. Prices hover around the 50 per cent off list price mark and there are obviously some good bargains out there, but test everything first, paying particular attention to disk drives, keyboards and printers which can all deteriorate with age. Make sure there's lots of software available — if a machine is discontinued, it may be harder to service and the software supply will dry up. Happy hunting! END

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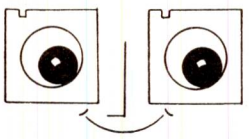

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Computer talk

Graham Storrs tries to improve communications between computers and people/computers by presenting speech recognition in the form of BBC Basic natural language programming — nouns, prepositions and all.

Natural languages are the languages that people use every day to speak to one another. For the past two decades, a major theme in artificial intelligence (AI) research has been the development of computer programs that can understand and use natural language.

This is an important area for two main reasons. Firstly, many people believe that communicating with a computer in natural language will be far easier than using a man-made language such as a command language or a programming language. Secondly, people could communicate better with each other — with a computer to do the translation, businessmen and politicians would be able to speak directly to their foreign counterparts.

Yet the problem of giving language ability to a machine is not a trivial one. Several programs exist which handle a wide range of sentence constructions and can discourse quite intelligently about particular, limited knowledge areas. There are programs that will paraphrase or translate newspaper stories about particular subjects, and ones which will allow users to ask questions in English of large databases, but there are no programs which display a *general* competence at any natural language.

> *'. . . many people believe that communicating with a computer in natural language will be far easier than using a man-made language . . .'*

Syntax

There are two main aspects to the natural language problem: parsing the sentences and extracting the meaning. Parsing involves resolving a sentence into its component parts and labelling the parts according to their grammatical roles: this is called 'syntactic analysis'. In the sentence 'The little girl inserted a blank cassette into her new computer', we can identify a noun phrase ('The little girl') followed by a verb phrase ('inserted a blank cassette into her new computer'). The noun phrase is composed of a determiner ('The'), an adjective ('little') and a noun ('girl'). The verb phrase has a verb ('inserted') followed by a noun phrase ('a blank cassette') and a prepositional phrase ('into her new computer'), and the prepositional phrase is a preposition ('into') followed by a noun phrase

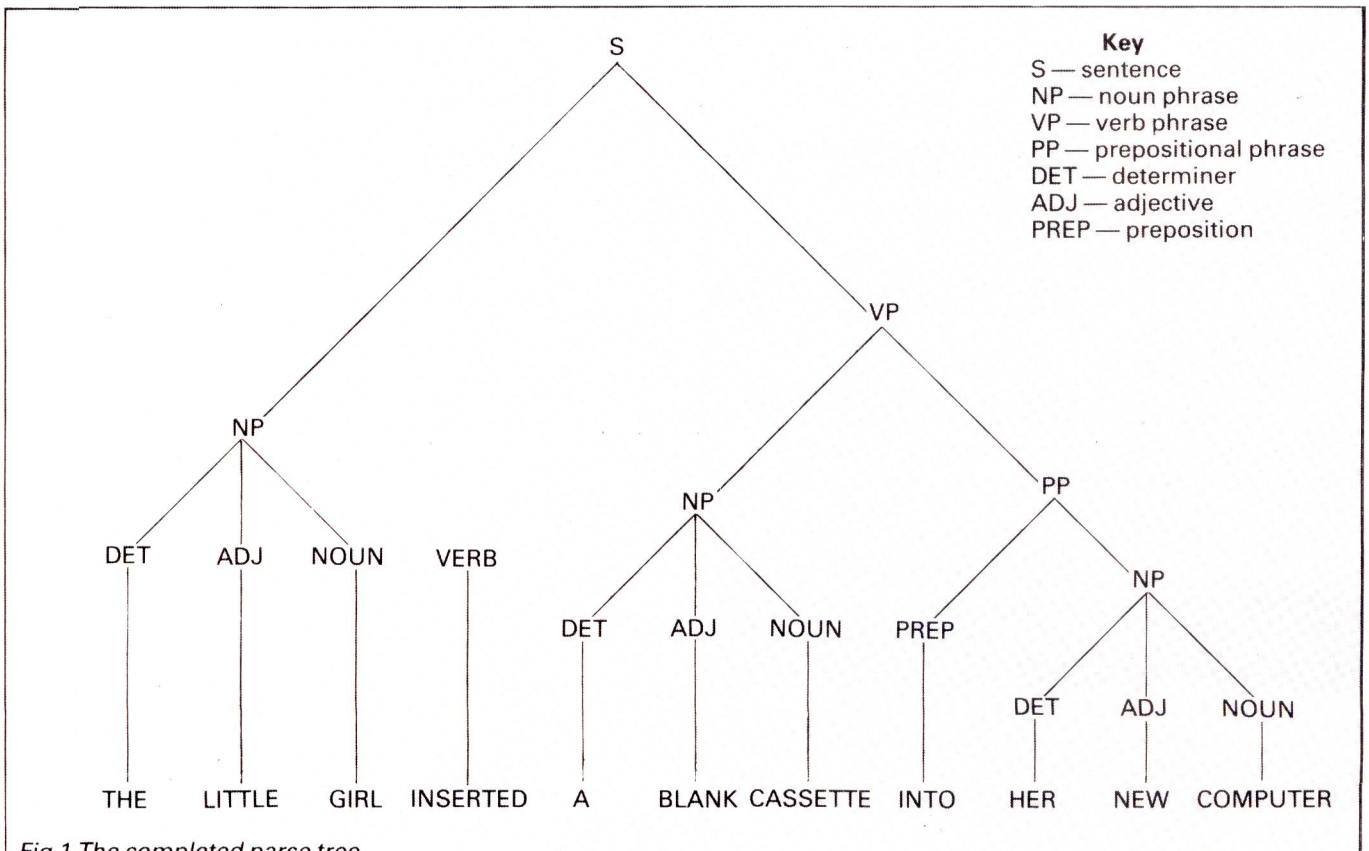
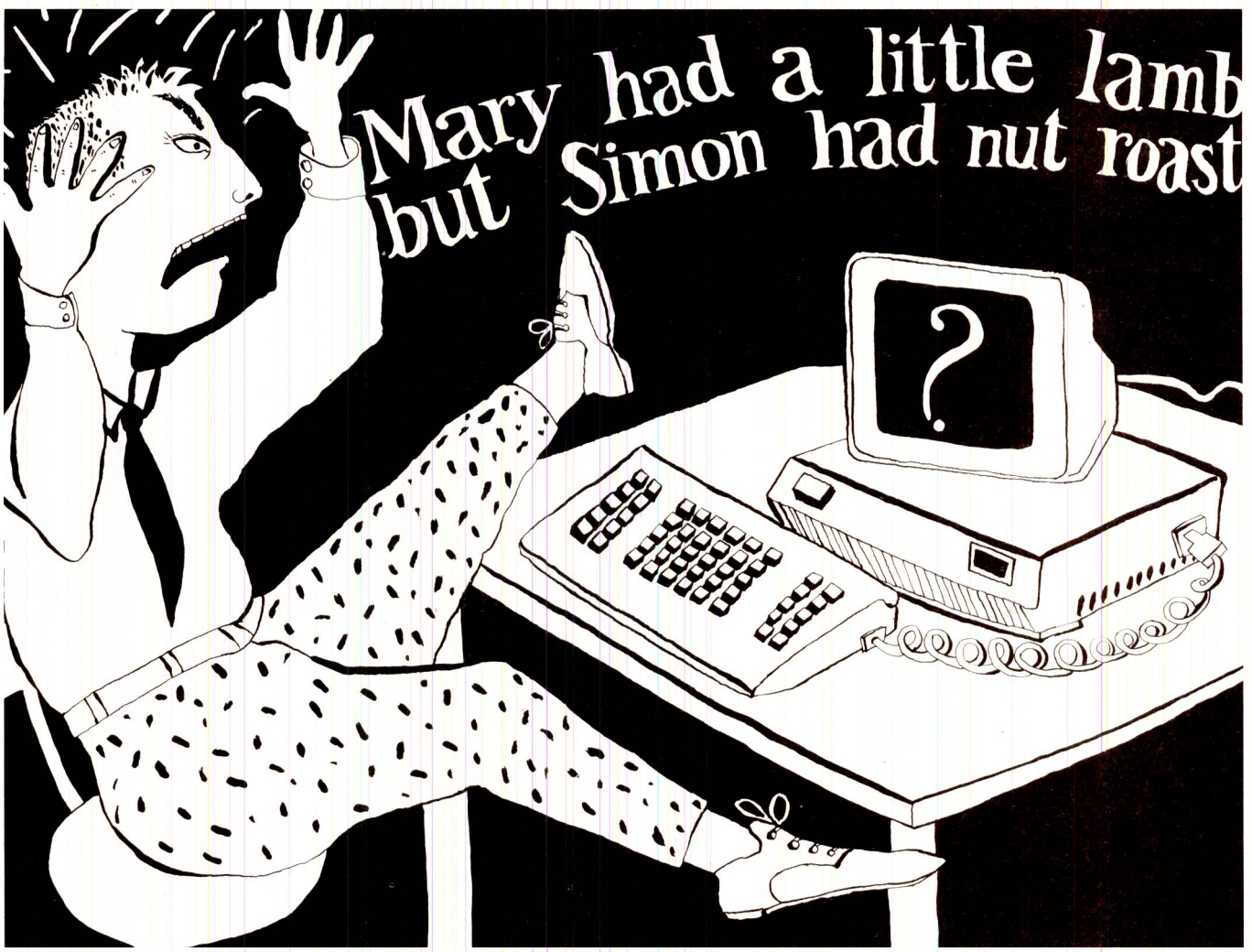


Fig 1 The completed parse tree



('her new computer') (see Fig 1).

Note that the parse in Fig 1 gives a hierarchical structure. These structures are known as 'parse trees' and are the usual end-product of most kinds of parse. It is the parse tree that is the input for processes at higher levels that extract the meaning of the sentence.

Like many computer people who come fresh to this field, you are probably wishing you had paid more attention in your English classes at school! Indeed, what we have used to analyse this sentence is a rather simple type of grammar known as 'context-free' grammar. There are many other kinds which make more use of the structure of a sentence, and even the meanings of the words, in determining how the parts should be labelled (see last November's *PCW* for details of other approaches).

Just to show that you don't need Prolog or Lisp to write natural language programs, the listing in Fig 2 is a BBC Basic program that will parse our example sentence. It applies context-free grammar through a series of nested procedure calls. Think of the program as trying to prove that a sentence exists. It does this by testing that the input string is a noun phrase followed by a verb phrase with a call to PROCSENTENCE1. This in turn calls the PROCNOUNPHRASE procedure which tests that a determiner is followed by an adjective then a noun. The tests for each of these are done by the function FNFIND(P), which tests the next word in the input string against a list of words in a dictionary that fit the syntactic category specified by the input parameter P. The program works down the tree for the verb phrase in the same way.

'To understand what is meant by a natural language sentence, we need an enormous amount of knowledge. Knowledge about what words mean and what they refer to . . .'

As it succeeds in finding words to fit its expectations, the program prints them, showing by indentation how they fit into the parse tree (Fig 3). The program incorporates a simple form of backtracking so that if the parse fails, it can try a different sentence structure. This is achieved with the REPEAT . . . UNTIL loop at lines 130 to 160; it is left to the reader to add new structures and procedures for coping with them. The backtracking too can be extended to try alternative sub-structures — different types of noun phrase, for example.

The first thing you might want to do will be to extend the program's vocabulary so that it will accept a greater range of sentences. If you do, don't forget to change the values in the array LAST(i) or you will get in a mess. A final improvement would be to modify the program to create an internal representation of the finished parse tree, rather than simply printing it and then losing it.

Formally equivalent to context-free grammars are transition nets. Fig 4 shows the nets we would need to interpret the 'little girl' sentence. Each net is a set of nodes (represented as circles) with one node being the end node (double circle) all joined by arcs (arrowed lines). The arcs are labelled with the grammatical unit they analyse.

To work through a sentence, we start at the 'sentence' net. A sentence, we see, is a noun phrase followed by a verb phrase. The arrow beside NP in the diagram indicates that we should look at the 'noun phrase' net to see whether a noun phrase can be found; this tells us a noun phrase is a determiner followed by an optional adjective and ending with a noun. None of these arc labels have arrows, so they can be satisfied by finding individual words. 'The little girl' gives us the necessary words, so we reach the end node of the noun phrase net and go back to the sentence net to cross the verb phrase arc, and so on.

A more powerful form of transition

net is the augmented transition net (normally just called ATN) which allows other linguistic properties to be attached to the parse, such as tense and mood. This allows the parser to check that verbs 'agree' in their tense or that nouns have the right determiner. For example, if the parser finds the determiner 'a' (as in 'a blank cassette') it can attach the 'singular' property to the noun phrase and spot mistakes such as 'a blank cassettes'.

Parsing has a great many difficulties concerned with problems of reference: that is, discovering the objects that words refer to. In 'John loves Mary and she quite likes him', both 'John' and 'him' refer to the same real-world object (the person named John). Similarly, 'Mary' and 'she' co-refer to another single object. The parser must be able to detect such cases of co-reference.

More difficult are anaphoric references, where words refer back to objects mentioned in earlier sentences. A naval database might receive the following queries: 'Tell me the tonnage of the Renown. What is her class? Her captain? His last ship?' Here, 'her' refers back to the ship named in the first sentence, while 'his' refers to the captain of the ship named in the first sentence.

The general problem here is context. When human speakers converse, they have a topic of discussion which sets a context which helps them disambiguate the words they are using. 'It ran all over the floor' would mean something different to someone talking about spilled water than it would to someone talking about their pet gerbil! In fact, a great deal of comedy, especially farce, is based upon the misunderstandings that can occur when people interpret sentences using the wrong context. Even within a general context, the 'focus' of the discussion can change very quickly and frequently between different aspects of the topic. For this reason, a natural language understander needs to have some representation of the current context and focus.

Semantics

To understand what is meant by a natural language sentence, we need an enormous amount of knowledge. Knowledge about what words mean and what they refer to in the world (often called 'lexical' knowledge), knowledge about how words can modify each other's meanings in different ways, and general knowledge about the world. Consider the sentence: 'George hit the man with a broken leg on his nose.' You will see at once that, despite the deliberate ambiguity, the sentence can only sensibly mean one thing. This is because we have knowledge of what men are, what broken legs are, where legs are usually found, and the types of thing usually used as weapons. Similarly, in 'John loved Mary and she quite liked him', the only clue as to which pronoun ('she' and 'him') co-refers to which noun is the knowledge that 'John' is a man's name and 'Mary' is a woman's.

```
>LIST
   10 REM A sentence analyser using a context free grammar
   20 REM
   30 DIM DICT$(5,5):REM           the word "dictionary"
   40 DIM WORD$(12):REM            an array for holding the words in the sentence
   50 DIM LAST(5):REM              gives the number of words in each category
   60 REM
   70 PROCINIT:REM                 sets up data array
   80 WORD=0:REM                   marks the current word being analysed
   90 TYPE=0:REM                   marks the sentence form being tried
  100 FAIL=FALSE
  110 SUCCESS=FALSE
  120 PROCGETSTRING
  130 REPEAT
  140   TYPE=TYPE+1
  150   ON TYPE GOSUB 210
  160 UNTIL SUCCESS OR TYPE=1
  170 IF NOT SUCCESS THEN CLS:PRINT''S$:PRINT'"is not a legal sentence."
  180 PRINT''"Another sentence ";
  190 A=0:REPEAT:A$=GET$:A=INSTR("YyNn",A$):UNTIL A>0:PRINT A$
  200 IF A>2 THEN END ELSE GOTO 80
  210 PROCSENTENCE1:RETURN
  220 DEFPROCINIT:REM             sets up data array and constants
  230   DET=1
  240   ADJ=2
  250   NOUN=3
  260   PREP=4
  270   VERB=5
  280   LAST(DET)=3
  290   LAST(ADJ)=3
  300   LAST(NOUN)=3
  310   LAST(PREP)=1
  320   LAST(VERB)=1
  330   FOR J=1 TO 5
  340     FOR K=1 TO LAST(J)
  350       READ DICT$(J,K)
  360     NEXT K
  370   NEXT J
  380   DATA "THE","A","HER"
  390   DATA "LITTLE","BLANK","NEW"
  400   DATA "GIRL","CASSETTE","COMPUTER"
  410   DATA "INTO"
  420   DATA "INSERTED"
  430 ENDPROC
  440 DEFPROCGETSTRING:REM          reads in the input sentence and
  450 REM                           breaks it into individual words
  460   WC=1:REM                    word count
  470   PRINT''"Please enter a sentence for analysis"''
  480   NEWWORD$=""
  490   INPUT S$
  500   L=LEN(S$)
  510   FOR J=1 TO L
  520     C$=MID$(S$,J,1)
  530     IF ASC(C$)<>32 THEN NEWWORD$=NEWWORD$+C$
                       ELSE WORD$(WC)=NEWWORD$:WC=WC+1:NEWWORD$=""
  540   NEXT J
  550   WORD$(WC)=NEWWORD$
  560 ENDPROC
  570 DEFPROCSENTENCE1:REM          nounphrase then verbphrase
  580  CLS:PRINT S$
  590  INDENT=0
  600   PRINT'"Trying sentence type 1"
  610   PRINT'"NOUNPHRASE"
  620   PROCNOUNPHRASE
  630   INDENT=0
  640   PRINT'"VERBPHRASE"
  650   PROCVERBPHRASE
  660   IF NOT FAIL THEN SUCCESS=TRUE
  670 ENDPROC
  680 DEFPROCNOUNPHRASE:REM         determiner then adjective then noun
  690   INDENT=INDENT+5
  700   W$=FNFIND(DET):PRINT TAB(INDENT) "Determiner      ";W$
  710   W$=FNFIND(ADJ):PRINT TAB(INDENT) "Adjective       ";W$
  720   W$=FNFIND(NOUN):PRINT TAB(INDENT) "Noun            ";W$
  730 ENDPROC
  740 DEFPROCVERBPHRASE:REM         verb, nounphrase then prepositional phrase
  750   INDENT=INDENT+5
  760   W$=FNFIND(VERB):PRINT TAB(INDENT) "Verb            ";W$
  770   PRINT TAB(INDENT) "NOUNPHRASE":PROCNOUNPHRASE
  780   PRINT TAB(INDENT) "PREPPHRASE":PROCPREPPHRASE
  790 ENDPROC
  800 DEFPROCPREPPHRASE:REM         preposition then nounphrase
  810   INDENT=INDENT+5
  820   W$=FNFIND(PREP):PRINT TAB(INDENT) "Preposition    ";W$
  830   PRINT TAB(INDENT) "NOUNPHRASE":PROCNOUNPHRASE
  840 ENDPROC
  850 DEFFNFIND(P):REM              locate a word in the dictionary
  860   WORD=WORD+1
  870   FOUND=FALSE
  880   FOR J=1 TO LAST(P)
  890     IF WORD$(WORD)=DICT$(P,J) THEN WD$=WORD$(WORD):FOUND=TRUE
  900   NEXT J
  910   IF NOT FOUND THEN FAIL=TRUE:WD$=""
  920 =WD$
```

Fig 2 BBC Basic parsing program

To take a famous example of how word meanings can change depending on the context of the sentence as a whole, consider: 'Mary had a little lamb'; then add 'but I had roast beef' and we have a completely different

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interpretation. Here, 'had' changes from meaning 'owned' to 'ate', 'little' goes from 'small in stature' to 'small in amount', and 'lamb' changes from the live animal to a cooked part of the animal. Or how about 'Time flies like an arrow' and 'Fruit flies like a banana'!

To sort out this tangle of meanings, a natural language program needs to represent all this semantic knowledge. In fact, finding a suitable knowledge representation for natural language understanding is the rock upon which the whole enterprise is foundering.

The earliest schemes for this were semantic networks, where words were represented as nodes in a network which were linked to other words which formed part of their definition, creating a structure rather like a dictionary (Fig 5). These are still widely used, and have become increasingly sophisticated and versatile.

Another popular representation is the 'frame'. A frame is a data structure which represents a concept, and has a number of 'slots' which need to be filled by properties of that concept. A major advantage of frames is that they can contain default values in the slots, or procedures for locating the information they need.

The notion is very similar to what linguists call a 'case grammar'. Here, linguistic objects will have a fixed set of properties that they *must* possess. The verb 'insert', for example, will have an agent (who does the inserting), an object (that is inserted) and a destination (into which the object is inserted). We can therefore describe our sentence about the little girl in terms of the cases of its main verb like this:

```
                agent
INSERT  ------------> 'the little girl'
   :
   :          object
   : ------------> 'a blank cassette'
   :
   :       destination
   : ------------> 'her new computer'
```

This is very convenient if we are trying to extract the meaning of the sentence, as we already have a lot of information about the roles of the objects in the sentence and their relationships with one another. We can even mix formalisms in order, say, to use the 'property inheritance' features of a semantic net with the default values of frames. The power of such a representation can be seen if we take another verb, 'post'. We can link this to 'insert' via an ISA link (meaning that 'post' is a sub-type of 'insert') so that 'post' inherits the slots of 'insert'. We can then set the default values of the object slot for 'post' to 'a letter' and of the destination slot to 'a post box'. We could even attach a procedure to the agent slot that would look specifically for a noun phrase referring to a person.

'To achieve a perfect machine translation is not possible, and to achieve the best possible requires a huge computational effort, which takes time.'

Cooperation

The widespread use of databases has given a new impetus to the development of natural language programs which can be used as interfaces to large collections of facts. The problem is a smaller one than general language understanding due to the 'universe of discourse' being restricted to only those things that the database knows about, yet there are enough linguistic problems even here to keep the researchers busy.

One of the more interesting problems involves 'pragmatics'. This is a branch of linguistics that deals with the practical consequences for the conversers of what is being said, not just its formal content and meaning. Consider this conversation with a database system:

User: How many Scottish customers have a turnover greater than £2 million?
Program: None.
User: How many have a turnover of £2 million or less?
Program: None.

Something is obviously wrong. The problem is that there are no Scottish customers in the database, so 'none' is all the system can say in the circumstances. Yet asking the first question on its own could have led the user to the false conclusion that all the Scottish customers had turnovers less than £2 million. The system is answering truthfully but not cooperatively.

A cooperative response, and one having the right pragmatic consequences, might have been:

Program: None, because there are no

```
THE LITTLE GIRL INSERTED A BLANK CASSETTE INTO HER NEW COMPUTER

Trying sentence type 1

NOUNPHRASE
      Determiner        THE
      Adjective         LITTLE
      Noun              GIRL

VERBPHRASE
      Verb              INSERTED
      NOUNPHRASE
            Determiner        A
            Adjective         BLANK
            Noun              CASSETTE
            PREPPHRASE
                  Preposition      INTO
                  NOUNPHRASE
                        Determiner        HER
                        Adjective         NEW
                        Noun              COMPUTER
```

Fig 3 Sample output from the parser

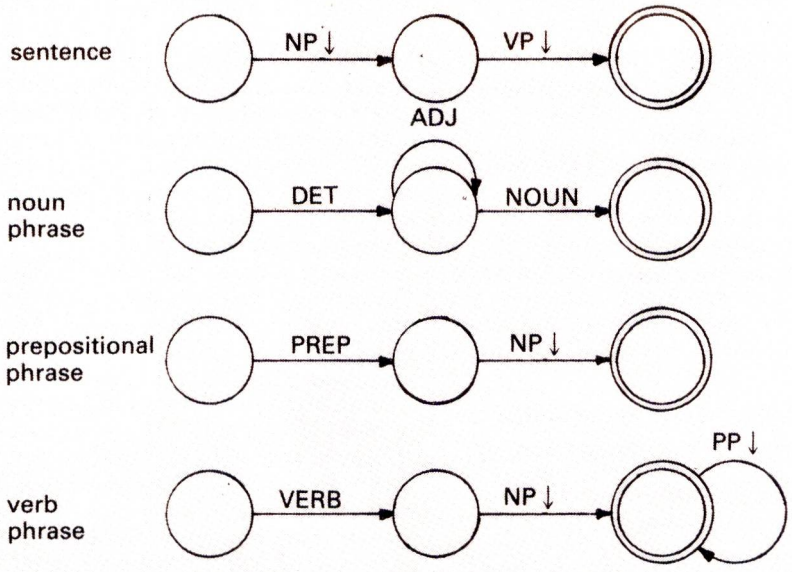

Fig 4 Transition nets suitable for parsing the example sentence (for key, see Fig 1 and text)

customers in Scotland.

There are many other pragmatic considerations of this kind which must be considered in natural language communications.

Translation

Not long ago, linguists believed that there was a universal or 'deep' grammar that people used, and into which all natural languages could be translated. The benefits of this for machine translation would have been tremendous, as it would have provided a common representation into which a sentence in one language could be put and from which the same sentence in any other language could be generated.

Alas, it was not so. Although there is a great deal of similarity between languages, especially those with a common root (for example, Latin), there are so many basic differences in their grammars that no single deep grammar can cope with them all. But there is great pressure these days to produce effective translators. Not only that, with the rise of institutions such as the European Parliament, the need is for rapid, mass translations.

The solution to the problem has been a trade-off between accuracy and speed. To achieve a perfect machine translation is not possible, and to achieve the best possible requires a huge computational effort, which takes time. The quickest translations are literal ones, where sentences are translated word for word.

Unfortunately, literal translations rarely make any sense. This is because different languages have different ways of structuring sentences: different placings for verbs and adjectives, for example. It is also because many speech idioms either do not mean quite what they seem to (as in 'Now, where was I?' or 'Putting the cart before the horse'), or they do not have any literal meaning (as with 'losing face' and 'keeping mum').

Therefore, translation programs, of which there are several commercial offerings, take a middle course. The translation is basically literal, with appropriate modifications to accommodate, and syntactic differences in sentence construction. Some polishing of the result is then done by components which try to eliminate some of the more obvious ambiguities, and detect and substitute the more common idioms.

The final output still needs to be checked and corrected by a human translator, though. Nevertheless, the latest systems boast that over 80 per cent of their output can go through unchanged.

Speech

Of course, all the techniques and programs discussed so far deal only with text — and grammatically correct text at that.

None of them can deal with the problems of continuous speech with its disjointed, ungrammatical, highly idiomatic form, its dialect words and local idioms, and its heavy use of stress and intonation. Stress especially can change the pragmatics of a sentence. Try it yourself by saying 'Mary had a little lamb' five times with a strong emphasis on a different word each time.

Perhaps it is lucky for the natural language programmers that good, continuous speech recognition is still a few years away. END

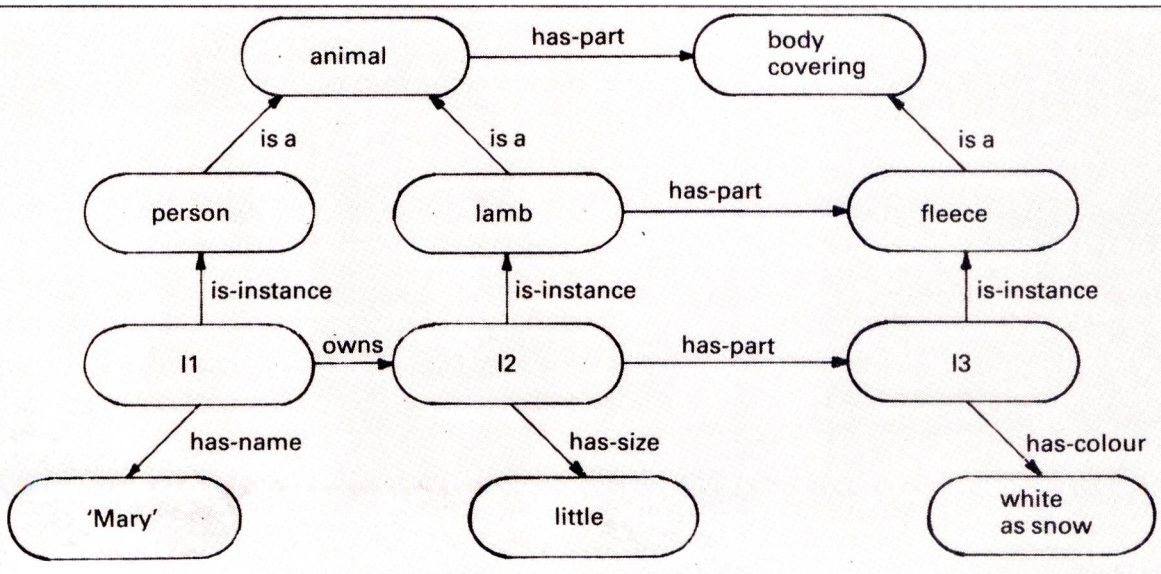

Fig 5 A semantic net. The ovals represent classes of thing or individual objects (these are labelled I1, I2, and I3). The arrows represent relationships between the classes and objects

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At your service

Antony Ginn operates a walking, talking machine, using Forth and Logo as robot-controlled languages.

The home micro and the home robot make the ideal couple. The computer supplies the brain and the robot supplies the muscle — and a programming control language unites the two. The growing popularity of robots, and the understanding that a robot, no matter how sophisticated, is as limited as its programmability, has prompted several recent developments in these control languages.

Many observers have compared the state of home robotics to that of home computing five or six years ago. There is a 'back-shed pioneering spirit' with a sense of rapidly growing interest. Turtles, buggies and robot arms are becoming common, and the price of robots has fallen to within reach of the home user. Some of the larger toy companies have also sensed the wind and invested in the home robotics/toy market. For example, Lego, Milton Bradley, Tomy and Fischer Technik have all produced respectable robotic toys in the past year. There is no shortage of hardware, but the accompanying software is of varying quality, sometimes leaving users to struggle with machine code rather than offering easier-to-master methods of control.

The only method of programming the most sophisticated personal robot on the market, Hero 2, is with 6800 machine language. The programming section of the Hero ET-18 technical manual recommends you go away and study 6800 machine code before attempting to control the robot — hardly state-of-the-art user friendliness.

Hero contains its own onboard computer, which has a keypad and a one-line digital display. A typical program (taken from the manual) using monitor subroutines REDIS and OUTCH is shown in Fig 1.

Looking in detail at the first two lines, 0600 is the instruction address, usually called the 'program counter'. In order to execute a command, the program counter must contain this address. BDF64E is the instruction, normally one, two or three bytes of data. It indicates, in hexadecimal machine code, the operation to be performed. START is the label of a subroutine (the address to be entered to begin execution) used more than once in the program. JSR is a three-letter mnemomic, indicating the source instruction. REDIS is the mnemonic operand, supplying additional information required for the operation, a label, an address or data.

The second line begins with the instruction address, followed by the machine code instruction 86 and the operand 01. The mnemonic LDDA contains four letters; the fourth A is added to indicate which of two accumulators the instruction applies to. The # in the last section indicates that the immediate addressing opcode is to be used, and the $ indicates that the information is a hex value. If you find this confusing, don't worry. Most robot manufacturers have realised that their market will increase if they make their products available to non machine code programmers.

The simplest programming method is to manually move the robot, and let the computer record and replay the movements. So-called 'first generation' robots in industry, used for large batch-repetitive tasks, are often programmed in this way, and several home robots also have this 'learn by example' facility.

The Beasty robot arm may be taken manually through a routine, using control keys in the immediate mode. The arm is moved to a particular location, lifts something and puts it down elsewhere. The computer records each motor's movement and is able to replay the sequence indefinitely. As another example, the Tomy Omnibot carries a cassette recorder — putting it on RECORD and moving the Omnibot around the floor with the hand-held remote-control joystick will record the movements. The robot may then be programmed to execute the routine at any time. It is also possible to record human speech in the program, through a microphone in the control unit. It is capable of wheeling in a glass of orange juice and singing 'Oh, What a Beautiful Morning' at 6am every day.

Unfortunately, a robot programmed in this way has no way of knowing if an object it is to lift is in the correct position, or if there is an obstacle in its path. It will move to the same place whether the object is there or not, and is unable to cope with any environmental change. The Omnibot could easily bump into your slippers, tip the orange juice over your duvet and sing to the cat, without knowing anything was amiss.

For more sophisticated control of robots, a formal programming language is required. 'Second generation' industrial robots are designed to work in more varied environments and are used for small batch work. They must be switched between tasks, and be able to adapt to a new environment, without requiring extensive reprogramming. Developments in home robotics have followed a similar trend: sensors, and the software to support them, are increasingly common, enabling turtles and buggies to interact with their environment. The BBC Buggy has a light sensor, touch detectors and a bar code reader. The Snap EV1 vision system comes with software to teach object recognition and detect movement, mimicking industrial robot vision systems. Advances in robotics have prompted development and extension of languages such as Forth and Logo for control purposes.

```
0600 BDF64E START JSR REDIS          Set up first display address
0603 86 01        LDA A #$01         First segment code
0605 20 09        BRA OUT
0607 F60FF3 SAME  LDA B DIGAGG+1     Fix display address
060A CB10         ADDB #$10          For next segment
```

Fig 1 A typical program using REDIS and OUTCH

Forth

Forth is a stack-oriented language, which makes it fast and flexible. It is procedural, and allows you to create a dictionary of your own primitives or alter the definition of existing primitives. Forth is a compiled language, and

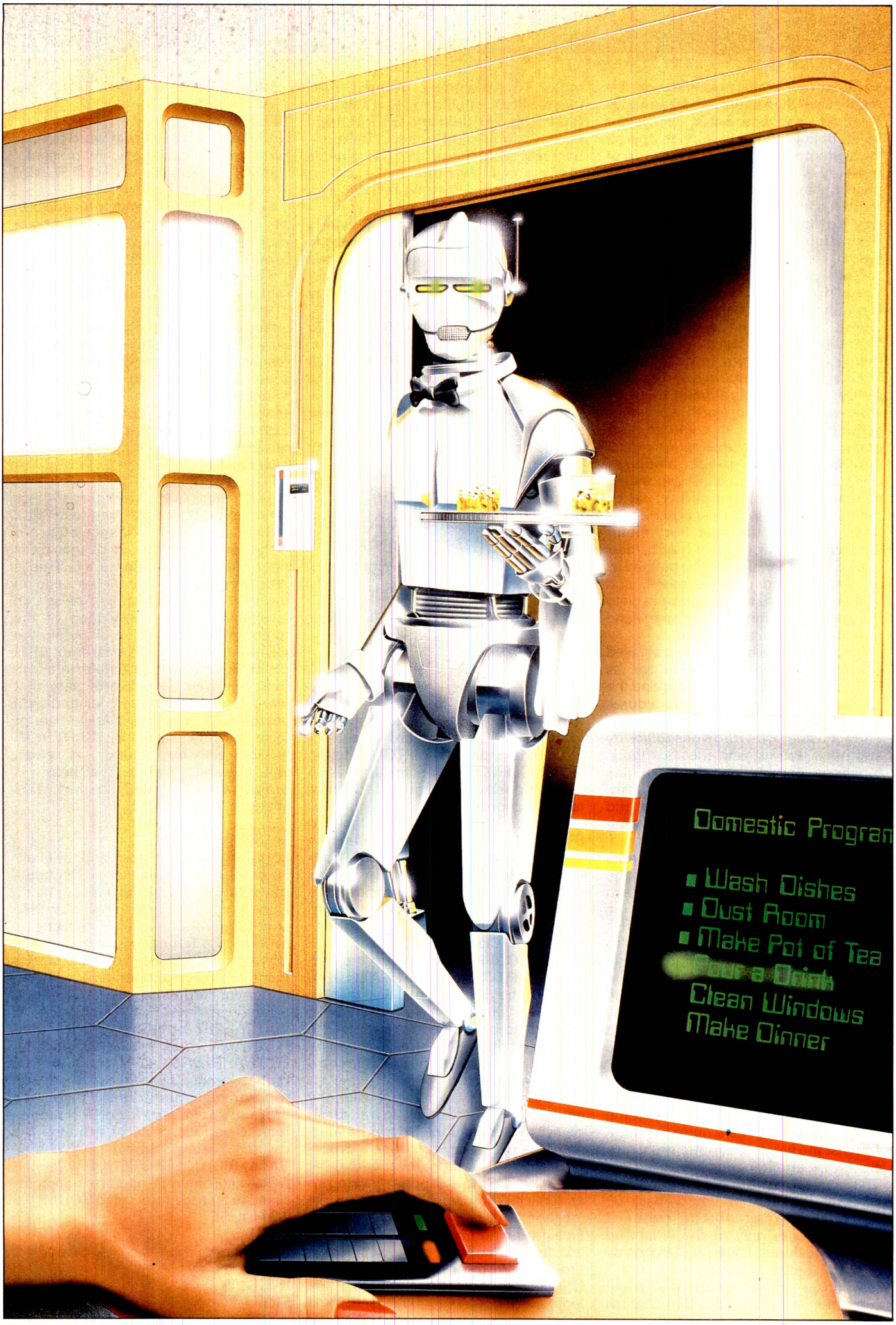


Illustration by Stuart McKay

because it generates machine code, it is much faster than interpreted languages such as Logo and Basic. The lower levels of Forth don't require an operating system speaking directly to a port or memory bit, and the easy access Forth gives to hardware and peripherals has made it popular among roboticists. The world's best-selling industrial robot, Unimation's Puma, is programmed in Forth.

Forth uses Reverse Polish notation (instead of 1 + 2, we write 1 2 +). Programs are written in groups of words, defined by the programmer. There are several levels of programming. At the bottom level, machine language primitives drive the robot's motors. The syntax is difficult, and only when a dictionary of Forth words has been created does it begin to look comprehensible. For example, a procedure written to put data for a buggy's driver motors onto the corresponding channels of the output port would be defined in such a way as to describe the task. PC could turn the Port motor Clockwise; PA would turn it Anticlockwise. Each channel would be defined as an address and given a name, and signals sent to that address would go to the appropriate motor in the buggy and turn it in the desired direction.

Colne Robotics has recently released Colneforth, a Forth package for its Armdroid robot arm. It has avoided the difficulty of having to build procedures with Forth primitives by extending Forth's usual 150-word vocabulary by another 80 words, with specific robotic functions. Before using the robot, it is necessary to program the output port, initialise the acceleration profile and motor phase patterns, set the starting positions and speeds of the motors, deselect any joints that are waiting for a specific instruction, and select the sense of all joints to GLOBAL. All these instructions have been defined in a Colneforth procedure called START: typing START will tell the computer to carry out the above functions. Many new words are for programming specific joints of the arm. ELBOW selects the elbow for commands, WRIST selects the wrist, and MOVE, followed by a numeric input, moves a selected joint a specific amount.

TELL ELBOW MOVE 50 moves the elbow stepper motor through 50 steps. TWIST is a command specifically for the wrist. It also requires a numeric input. To twist the wrist, one motor must turn clockwise, another anticlockwise.

TWIST 50 turns the right motor forward 50 steps and the left motor back 50 steps, causing the wrist to twist.

TILT also talks only to the wrist and requires an input. It will tilt the wrist by the given input.

When a move is complete, the computer shows the position of each motor. Six columns, headed BAS (base), SHO (shoulder), ELB (elbow), RIG (right), LEF (left) and GRI (grip) will display a three-digit number. The numbers represent the current coordinates of the arm. If the coordinates scroll off the screen, they may be relisted with WHERE.

If the base is at position 100, typing TELL BASE MOVE 100 will move the base motor 100 steps and change the coordinate beneath BAS to 200; MOVETO 100 will return it to its previous position. MOVE is a relative command, and it is possible to talk to more than one joint simultaneously.

TELL ELBOW SHOULDER MOVE 100 will move both elbow and shoulder through 100 steps.

Any arm position may be labelled and used in a Forth procedure.

'Forth is a compiled language, and because it generates machine code, it is much faster than interpreted languages such as Logo and Basic.'

PLACE tells the computer you are about to name the arm's position. PLACE CLIFTON will record the current coordinates under CLIFTON. Typing GOTO CLIFTON when the arm is in another position will cause it to return to those coordinates.

Another location could be labelled BULWELL, and a procedure defined to send the arm on a 'journey' from CLIFTON to BULWELL. A new word is defined with the Forth command : at the start, followed by the word, its definition, and ; at the end.

:JOURNEY CLIFTON BULWELL;

Typing JOURNEY will move the arm first to CLIFTON, then to BULWELL. The value of the gripper's position may be held in a variable, allowing different 'objects' to be defined in terms of the gripper position. The arm may then be instructed to go to a place and pick up a particular object.

If the robot is to interact with the environment, for example to wait for an object to be positioned during a journey, it is necessary to define a procedure at Forth's bottom level. HANGON will tell the arm to wait before picking up an object. Whatever value is at the port location FD00 is placed on the stack as an eight-bit number. BEGIN and UNTIL are the parameters of a loop which repeats until the value in the address C@ corresponds to the 1 before the logical AND.

```
: HANGON BEGIN [HEX] FD00 C@ 1
  AND UNTIL ;
*LEARN HANGON
```

We may create a Forth word to miss three lines if the object is not present:

```
: SKIP [HEX] FD00 C@ 1 AND IF 3 LINE#
  +! THEN ;
```

Forth will allow another procedure to be executed at any stage during a journey. This could be another route, or a word such as GET PLACE or PUT.

The arm may be programmed to move until a particular event takes place, such as finding an object of unknown location. A light beam on the arm could be interrupted when the arm reaches the object. The criterion for the search is programmed in Forth. A word is defined to leave a 'true' when the search is finished, represented by the value of 1 produced by the light beam on port FD02 changing to 0 when interrupted.

```
: FOUND FD02 AND 0= ;
```

This reads a byte from port address FD02 rather than FD01 and tests bit 2 rather than bit 1. 0= changes a 0 to a 1. If the value coming out of that bit is not a 0, then 0= will leave a 0. True is represented by 1. If this is the value on the stack, the search stops. The search is executed after every step of the motor. When the value changes, the robot decelerates and backs up. SETCRITERION, an extra Colneforth primitive, followed by a word, sets that word to be the criterion for ending a search. The word must leave true or false on the stack. SETCRITERION FOUND sets the criterion. A search will be ended when the beam is broken and the value on port FD02 changes from 1 to 0.

Logo

Forth is powerful, fast and difficult. Logo is another procedural language, powerful, not so fast and not so difficult. One of Logo's original functions was to control a robot turtle. The turtle is becoming a familiar sight in schools, leaving an inky trail as it trundles across the floor drawing polygons and knocking down cardboard towers. Six Logo primitives drive it FORWARD or BACK, turn it LEFT or RIGHT, PENUP and PENDOWN raise and lower its pen. FORWARD, BACK, LEFT and RIGHT all require inputs; these are used to define turtle graphics procedures. Procedures are built up similarly to Forth. Routines for the various parts of a house are defined using simple FORWARD, BACK, RIGHT, LEFT, PENUP and PENDOWN commands, and are then combined in a procedure called HOUSE:

```
TO HOUSE
WALL
ROOF
DOOR
WINDOW
END
```

The appearance of a variety of low-cost robotic devices, such as the Beasty arm, Fischer Technik kits and Milton Bradley's new Robotix kits, has prompted developments to Logo, which is the only accessible means for children, and most adults, to have powerful computer control without struggling with difficult syntax. Commotion, distributor of the Beasty robot arm, has recognised this and replaced accompanying Basic-oriented software with Logo packages, and Logotron is working with several home robot manufacturers to interface their products with its Logo for the BBC. Logotron Logo has been extended to include primitives specifically for control purposes. TURNON and TURNOFF turn on and off a specified list of bits on the output port; SENSE? returns a true or false reading from a specified port location; ON? returns true or false from an outport bit; ADVAL returns the A/D reading of a specific channel; PULSE sets the value of a delay from an output port; ZEROTIME and TIME control the internal clock; PORTVALUE reveals the state of the output port and SETPORTVALUE will set its value; COUNTBIT returns the number of times an input changes state; BIT returns the decimal value of a specified bit; SETINPORT sets a port to an address and INPORT returns the current address of an inport; and OUTPORT and SETOUTPORT behave in a similar way.

Logotron Logo for the BBC has a primitive, USE, which allows new primitives to be created in machine code and operate in the same way as any other Logo primitive. As the Logo is crammed onto a 16k ROM chip, the extra control primitives, along with other primitives to enhance turtle graphics and list processing, are on an Advanced Logo disk. This also contains a kit for developing and debugging extra primitives written in machine code.

Anyone who is familiar with writing turtle graphics procedures will have no difficulty writing procedures for a robot. The control primitives allow individual servos to be addressed and their angles specified. Many Logos have multiple, redefinable screen turtles known as 'sprites', which are addressed using TELL, TELL 2 FORWARD 120, for example. A robot's motors may be addressed in the same way. The Beasty robot arm is controlled by three or four servo motors which are assigned a number dependent on which port channel they are driven from, with MAKE. The gripper, driven by servo 1, can be closed with:

```
TELL 1 SETANGLE 5
```

This could be written into a procedure:

```
TO CLOSE
TELL 1 SETANGLE 5
END
```

Logo allows several small routines to be combined to form an involved procedure. Seymour Papert, one of Logo's architects, calls this 'Dealing with a problem in mind-sized bytes'. A procedure for the Beasty arm to pick up, move and put down an object would be written in small parts and combined in a final procedure.

Each servo rotates an output arm though 100°. In the example, servo 1 will control the gripper, servo 2 the forearm, servo 3 the upper arm, and servo 4 will rotate the arm in a horizontal plane.

We will use CLOSE in the definition, and define OPEN in a similar way:

```
TO OPEN
TELL 1 SETANGLE 100
END
```

The arm is rotated, in line with the object, with POS1:

```
TO POS1
TELL 4 SETANGLE 80
END
```

The object will be lowered at POS2, the equivalent of 20° on the setting of servo 4. Moving the arm directly from the keyboard, in the immediate mode, displays the current setting for each servo. Values included in the program are ascertained by moving the arm manually and noting the reading:

'With the introduction of sprites, multiple turtles with speed and heading, and Logo's control application, work is under way to develop faster versions.'

```
TO POS2
TELL 4 SETANGLE 20
END
```

Two positions for the forearm are defined. It is lowered to pick up the object and raised to carry it:

```
TO LOWFOR
TELL 2 SETANGLE 20
END

TO RAISFOR
TELL 2 SETANGLE 90
END
```

Similar procedures are written for the upper arm:

```
TO LOWUP
TELL 3 SETANGLE 40
END

TO RAISUP
TELL 3 SETANGLE 75
END
```

The above procedures are then combined in routines to lift, carry and lower an object:

```
TO GRAB
OPEN
POS1
LOWFOR
LOWUP
CLOSE
END

TO MOVE
RAISFOR
RAISUP
POS2
END

TO LOWER
LOWFOR
LOWUP
OPEN
END
```

These three procedures are combined in GETOB:

```
TO GETOB
GRAB
MOVE
LOWER
END
```

GETOB may then be used to build another procedure.

Writing the above program in Basic would involve dozens of subroutines and difficult syntax, making it incomprehensible to most users. Logotron's control extension has already been used to program the Beasty arm, BBC Buggy and many puppets.

Conclusion

There was no great need for speed in the original versions of Logo. With the introduction of sprites, multiple turtles with speed and heading, and Logo's control application, work is under way to develop faster versions. Express Logo, several times faster than existing Logos, has been written for use in French schools. Work is also in progress to write a version of Logo which uses the stack in a similar manner to Forth, which will greatly increase its speed.

Other control languages have been developed for specific robots, but they are often written in Basic which makes them slow and limited. Savvy, a language developed in the US to control the RB5X personal robot, is a 'plain language system' with an extendable robot control language (RCL). It compiles RCL words into Tiny Basic code.

Paul Cheung, of Edinburgh University's Artificial Intelligence Department, has written an educational control language called Concurrent Logo. It allows parallel processing of up to eight procedures, and contains extra primitives such as WHENEVER.

Microrobotics of Cambridge, creator of the Beasty interface and Snap Vision system, replaced the Robol language for the Beasty with a more powerful Logo-style control language designed for Beasty owners who don't own a Logotron Logo chip. Logo Systems is developing a control extension to its BBC Logo.

The trend in control languages is towards power, speed and friendliness. The days of trying to learn machine code before you can move your buggy across the carpet are over.

Thanks to Chris Roper of Logotron and David Sounds of Sounds Technology for their help with this article. END



Amstrad SSA-1

Make your CPC464 more sociable by adding speech to its programs, courtesy of Amstrad's SSA-1. Stephen Applebaum does the talking.

Speech can add an interesting dimension to any program: you only have to look at games like Activision's Ghostbusters and Access' Beach Head II (see this month's Screenplay) to see how it can enhance an otherwise run-of-the-mill arcade bash.

But what about adding speech to your own programs? If you are a BBC owner, there is always Acorn's speech chip featuring the refined digitised tones of Kenneth Kendall, while Commodore 64 users have the excellent Magic Voice at their disposal. Speech systems for the CPC464 are somewhat more elusive, although Amstrad has recently introduced its powerful £29.95 SSA-1, a package which should satisfy anyone interested in getting their computer chatting to the best of the rest.

Hardware

The SSA-1 is a versatile speech synthesiser and amplifier which features an interface, software and two speakers which look as though they'd go well in a car alongside the fluffy dice and nod-



ding dog. Inside the interface, which is similar in design to that used to house the firmware for Amstrad's disk system, is a PCB containing a 50-way edge connector, a volume control, two sockets for the speakers, and the all-important General Instruments SP0256A-AL2 allophone speech processor (which, incidentally, is the same as the one used in Cheetah Marketing's popular Sweetalker for the Spectrum and BBC computers, and William Stuart Systems' Chatterbox).

Like Amstrad's disk interface, the SSA-1 plugs into the CPC464's expansion bus, but, unlike the former, it has another edge connector poking through the back, giving users an opportunity to expand the system while the gadget is attached, instead of leaving them with a dead-end at the rear of the machine. Also connected to the interface is a flying lead which goes into the CPC464's I/O port, diverting the micro's sound away from its small, tinny-sounding speaker and out through the SSA-1's external 200mW stereo amplifiers, a feature which will thrill games players' tympanic membranes but will be an absolute headache for anyone else.

Loading the software

Before being able to successfully use the SSA-1, beginners will have to load the cassette-based software provided with the unit. Computer buffs, on the other hand, will probably want to access the chip directly, especially when writing dedicated games. This is also possible, but you do have to know something about machine code programming.

On the tape is a machine code program that locates itself at the top of the memory, and permits simple additional speech commands (Resident System Extensions (RSXs)) to be used in Basic programs. These RSXs give the user direct access to the SSA-1's text-to-speech system, one of the device's most powerful features.

The text-to-speech system works by converting characters typed in at the keyboard into allophones, which give words their sound. I'll explain how this is done in a moment, but it's first worth considering why the use of allophones makes the SSA-1 so much more flexible than speech synthesisers which utilise a pre-set dictionary of digitised words and sounds, such as those from Acorn and Commodore.

To illustrate what allophones are, just say the three words CALL, CUP and COOP. As each is spoken, you should feel that the point of contact between your tongue and the roof of your mouth moves further back for each successive 'c' sound (or so says the SSA-1 manual).

The 'c' at the start of each word is known as a phoneme. Phonemes cannot be spoken, so why, when you speak each word, is a different 'c' sound produced? The answer is simple: these sound differences are allophones, therefore allophones are different ways of expressing phonemes. Most phonemes are influenced by other phonemes around them, which is why the same letter within a different word can make a different sound. As the SSA-1 has a total of 59 allophones and five pauses, the system is obviously much less restrictive in the number of words that can be produced than the type that uses a dictionary.

The conversion of ASCII into speech is extremely complex, especially as, in English, two words with completely different meanings can sound exactly the same. In an attempt to produce accurate speech, the SSA-1 uses the principle of Synthesis by Rule. In practice, this involves two stages: 1) text interpretation; and 2) the application of phonological rules.

Text interpretation

Text interpretation is no simple task for a speech system. Probably the greatest difficulty is recognising two different words which sound the same, although they are both spelt differently. Minicomputers overcome this problem by having a database containing the meaning of each word. With this, the system is able to determine the context of the phrase in which the word is being used, and hence its correct pronunciation. As this method requires vast amounts of memory, text interpretation on a system such as the SSA-1 is restricted to the identification of word boundaries, the recognition of symbols and abbreviations such as '@' and 'Dr', and the conversion of numbers. Although this method is not as accurate as using a database, it at least allows words to be written phonetically, leaving room for experimentation.

The set of rules applied to the interpreted text determines the corrsponding allophones for a specific letter group within a word. There are some words in the English language which defy what few phonological rules there are, and in order that it can deal with these, the SSA-1 is equipped with an exceptions directory which contains a correct set of allophones for words with odd spellings. Unfortunately the directory of exceptions is not capable of covering all the possibilities, so an |APHONE command has been included in the list of RSXs to allow the user to send allophones directly to the allophone buffer, completely avoiding any text-to-speech conversion.

Accessing the SSA-1 via the additional Basic commands provided by the cassette-based software is simple, and few, except those who like to program in machine code, should find themselves restricted.

In all there are nine external commands, of which the most commonly used are |SAY and |ECHO: both these commands perform text-to-speech conversion. |SAY takes a string and outputs it as speech through the stereo speakers. Its syntax is |SAY,@<string variable>, so to make the computer say 'Amstrad' you'd type:

```
10 a$="Amstrad"
20 |SAY,@a$
```

By changing line 10 to INPUT a$, the program can be made to say anything that is entered at the keyboard. An excellent application for this would be in education for the blind. A BBC Micro equipped with a speech synthesiser has already been used to help blind typists produce manuscripts in Braille, and the same could be done with the CPC464.

|ECHO is similar to |SAY except that it says words printed to the screen rather than just string variables. This is handy for making the SSA-1 read out a listing, although you'll probably find that it either says things too quickly or incomprehensively to make it really worthwhile.

Apart from |SAY and |ECHO, most of the other seven commands are for more advanced programming. |APHONE, which I have already mentioned briefly in pasing, sends allophones directly to the interrupt-driven allophone buffer. This buffer can store up to 63 allophones simultaneously, and acts as a 'waiting room' for allophones heading towards the speech processor. When using the |APHONE command, allophones are specified using numbers: for example, 'hello' in allophone form would be 27,7,62,53,0. Quite complex words can be constructed in this way using the various allophone tables supplied in the small but detailed SSA-1 manual.

There are 14 tables within the SSA-1 instruction booklet, each giving the effects of different allophone combinations. Amstrad appears to have taken great care in making sure that even the novice will be able to make up quite complex words with the minimum of trouble.

Example programs, including one for a speaking clock, have been included, along with several pages full of clear and concise technical data.

Conclusion

The SSA-1 is an excellent addition to the range of add-ons that is gradually becoming available for the CPC464. At £29.95 the peripheral is certainly affordable, and the range of extra commands supplied in the software makes it easily accessible by anyone — you don't have to be heavily into machine code to appreciate some of its more subtle functions.

I have some reservations about the quality of the voice — it is rather slurred on some words, but on the whole it is as understandable as most other speech synthesisers I have heard (with the exception of the Acorn and Commodore models, that is).

The SSA-1 also works with the CPC664, but due to the design of the interface, it lifts the back of the computer. Amstrad says that a new, redesigned SSA-1 will be available shortly for the larger-memory micro. END

SCREENTEST

Vicom

True communications for the Macintosh is finally here with AM Technology's terminal emulation program, Vicom. Peter Bright lends an ear to what the rest of the world has to say to the Mac.

Trying to persuade a Macintosh to communicate with other computers has been the bane of my life. Until recently, the only terminal emulation program for the Mac has been Mac-Terminal. While this is great for some things, it falls down on lots of day-to-day chores such as echoing to a printer, inserting carriage returns and line feeds. Then Vicom arrived.

Vicom is manufacturered in the UK by AM Technology. It runs on both the 128k and the 512k Macs, and its great advantage is that it offers Prestel communications as well as standard ASCII.

The review version of Vicom was supplied in a low-tech cardboard box with a paper wrapper carrying the Vicom name and logo. A thin manual was included, plus two Macintosh 3½in disks: one containing the program and one marked 'Key Disk'.

In order to run the program, you have to boot the program disk and then insert the copy-protected key disk when prompted by the system. This arrangement means that you can make as many copies of the program disk as you like, but they will only work with the one key.

The problem with the key disk is that by its very nature, the information on the disk is hidden away and therefore at the mercy of variations in the drive setting of different machines.

The first time you boot up the system, you are asked to enter licensing details which are then permanently stored on the key disk. You are also expected to produce a screendump of the data and send it to AM Technology for warranty registration.

When Vicom has successfully booted up, you are faced with a screen which is split into three parts. The majority of the space is occupied by a blank desk-top, the far-left of the screen contains 10 icons, and the standard Mac pull-down menu bar runs along the top of the screen.

All the main Vicom functions are accessed via the icons running down the left-hand side of the screen. From top to bottom they are: Dial Up, Phone Book, Modem Select, Prestel Colour Control, Call Statistics, Load Saved Documents, Create New Documents, Help and Quit, and a tenth display shows how much free RAM is available. If you double-click this area, Vicom will remove transient code and increase the amount of free RAM.

The first two icons — Dial Up and Phone Book — are used most frequently. When you want to call up a remote database, you select the Dial Up icon. Vicom then displays a window with a scrollable list of all the databases it knows about; you select the service you require and double-click its name. Vicom will open up a communications window and dial the number if you have an auto-dial modem, or display the number you need to dial if you have a manual modem.

When you click Phone Book, you are greeted by a very elaborate window which allows you to add, change or delete details from Vicom's list of phone numbers and settings for various dial-up services. The top of the window contains a scrollable list of the services that Vicom is aware of.

Permissable modes are ASCII and Prestel. Release 2 of Vicom, which will be a no-cost upgrade for Release 1 owners, will also have DEC VT100 terminal emulation. The selection of mode, baud rate, and so on, is achieved by using the mouse to drag scroll bars for the different settings until you come to the right one. The default baud rate for Prestel is 1200/75, and for ASCII it is 300/300. At the bottom of the Phone Book screen you can enter the name and telephone number of any new service you include.

The final option is to associate a macro file with a remote service entry in



The Prestel communications window

the Phone Book. Using a macro file you can store log-on commands, passwords, and so on, which Vicom will automatically enter when it detects a carrier to the remote computer.

The automation of log-on sequences can be very useful, but it is surprising how intelligent your computer has to be to cope with all the line faults and problems that occur when talking to remote computers.

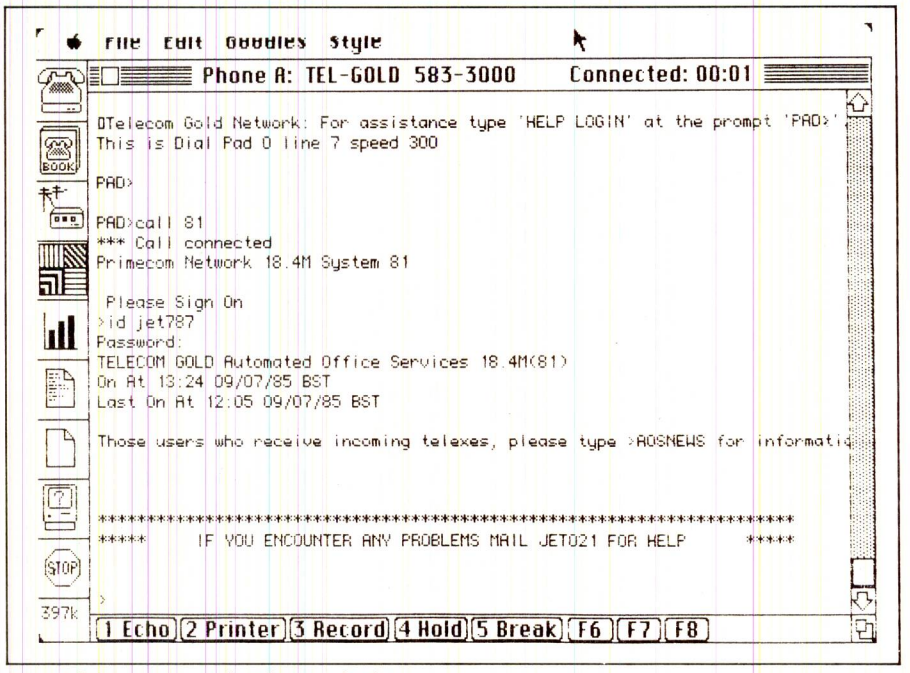
Unfortunately, Vicom macro files have no intelligence built into them. The best you can do is insert four-second time delays by typing a comma, so a macro file to access Telecom Gold would be as follows:

(CR)
CALL 81
,ID JET787
****

Vicom transmits this sequence each time you phone Telecom Gold, irrespective of what is happening the other end. If everything at Telecom Gold's end is fine then this would work, but if there is an error or a glitch on the line, everything would be out of sync.

The Modem Select option allows you to set up Vicom to drive your modem. The problem with the majority of communications programs I've come across in the past is that they're designed to work with US-based auto-dial modems rather than UK modems. Vicom, however, comes with a wide range of drivers which will allow it to work with the most popular British modems. If you have a manual modem, Vicom will display the number to dial onscreen and wait for connection.

One of the nicest features of Vicom is that it treats Prestel and TTY services in two very different ways, rather than trying to do a hashed-up compromise display for both. Due to this approach, the communications windows for the two services look and behave very differently.



The ASCII communications window

Prestel mode

Prestel type services work in a way that is far removed from the more traditional TTY-type textual dial-up services. The main difference is that Prestel displays are transmitted one page at a time using special colour block graphics which are unique to Prestel. The advantage is that you can have colour graphics which don't take up too much memory space on the host computer: the disadvantage is that you need special Prestel software to receive the data.

A further problem with Prestel is that whereas most dial-up services work at 300/300 or 1200/1200 baud, Prestel uses a split-speed 1200/75 baud system. On some micros the hardware can't strictly handle split baud rates, so software designers are forced to resort to software trickery to make their Prestel software work.

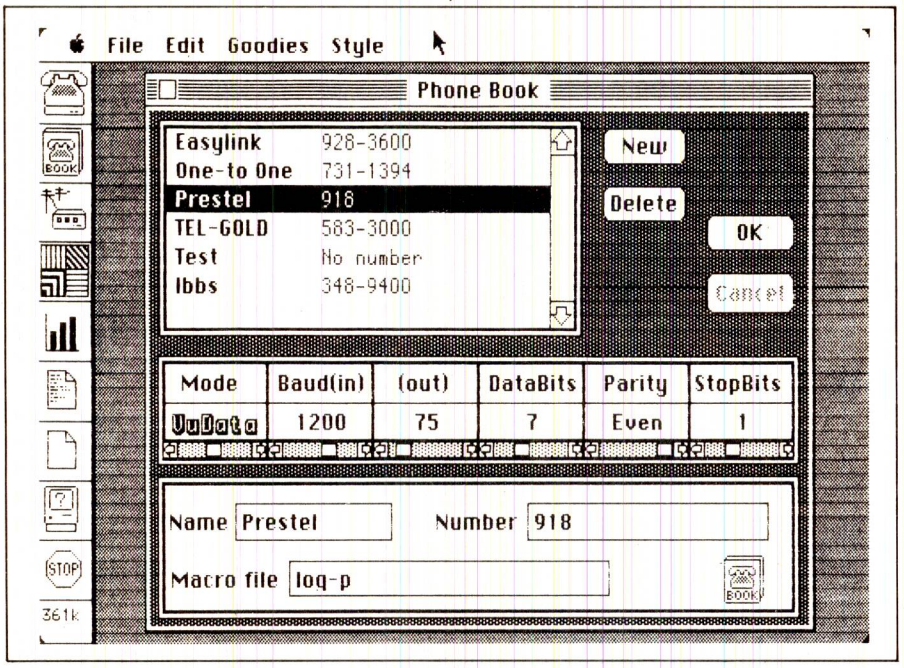
The first problem is that Prestel works in colour — the Mac doesn't. Vicom neatly gets around this by making use of the various text styles on the Mac to represent the colours on a Prestel page. By using the Colour Control icon on the left of the screen, you can set which colour is represented by which Mac style.

The Prestel communications window can be divided into four distinct areas. Most of the space in the window is taken up by the Prestel display page; to its right are a keypad, a mini Prestel page display, and various Prestel commands which can be selected via the mouse. These last three features go a long way to making Vicom the nicest Prestel package for any micro.

The keypad display contains the digits 0 to 9, as well as the '*' and '#' keys necessary for accessing Prestel pages. You can select Prestel pages using the mouse rather than having to type the page numbers at the keyboard.

Prestel documents often run over more than one page. When this happens, you sometimes get a message on-screen to the effect 'key 1 for more 9 to exit'. With most Prestel packages, you would then simply type 1 or 9 at the keyboard. While you can do this in Vicom, you can also move the mouse pointer over the Prestel page display to the option you want and click the mouse button. This type of interactive ability is certainly impressive.

The Prestel command keys below the numeric keypad are also very useful. Most Prestel commands take the form of numeric codes, which makes them hard to remember. Vicom displays the command names on the tops of the screen keys, and sends the appropriate numeric command to Prestel when you select the key, making Prestel much easier to use.



The elaborate Phone Book window



SCREENTEST

Movement commands supported by the Vicom command panel include: 'Prev' for the previous page; 'Next' for the next page, and 'Main' for the top Prestel screen. 'Paint' will repaint the current page if the data on the telephone line is corrupted. 'Show' and 'Hide' will reveal and conceal 'hidden' data on a Prestel page.

Two very useful commands are 'Print', which dumps the current page to the imagewriter, and 'Invert', which prints the screen as white on black instead of the Mac's usual black on white. On Release 1 of the Vicom software this function only works for one Prestel page, after which the screen reverts to its original state. I was also provided with a pre-production updated release of Vicom on which the pages stay inverted until you toggle off invert again.

Two commands which aren't part of Prestel but which I found extremely useful are 'Note' and 'Recall'. Prestel contains over 300,000 information pages, each of which has its own page number. Note allows you to save page numbers on the Vicom disk under meaningful names, so you could save an often-used page number as 'Pete's Page', for example. The Recall function could then be used to send the page number associated with Pete's Page to Prestel without you having to remember the page number.

In addition to online work you can prepare messages and Prestel screens off-line using Vicom's built-in editing functions. These are accessed via two of the icons on the left of the screen: one allows you to call up previously created documents, the other allows you to create new ones.

Vicom allows you to create three types of document: a text document for TTY systems, and either a Viewdata Picture or Viewdata Message for Prestel-type systems. Viewdata Message seems specifically designed for Prestel electronic mail: the system automatically prompts for the address of the recipient.

The nice thing about the control icons which run down the left-hand side of the screen is that most of them are multitasking, so you could be online to Prestel *and* editing a message *and* printing out a saved document, all at the same time.

TTY mode

The ASCII communications window takes a much more traditional approach to communications. Most of the screen is occupied by the text area, although one line at the bottom of the window is used to display a number of special-purpose control buttons.

There are a total of eight buttons on the bottom line, but three don't do anything and are reserved for future use. By selecting the others with your mouse you can turn on local echo of characters, echo to the printer, save the transaction to disk, and send a 'Break' to the host computer. Although echoing to a printer may seem an obvious thing to do, MacTerminal can't do it, so it is useful that Vicom can. The Break function is also useful for getting out of trouble on systems such as Telecom Gold. It is also a function that hasn't always worked correctly on some comms packages.

The final key is marked HOLD. This doesn't do much on Release 1 of Vicom, but later releases allow you to use the vertical scroll bar to look at text that has run off the top of the screen. On these releases, the HOLD key holds the text in place while you look at it.

The first thing I found when I logged onto ASCII dial-up services was that the communications window isn't wide enough to display a full 80-character line of text.

There are two ways to solve this: one is to set up the remote service to transmit 72-column lines; the other is to use a smaller point size for the letters on the screen. Unfortunately the only one small enough is six-point, which is virtually unreadable.

Documentation

The documentation for the review system consisted of a 55-page spiral-bound manual. Much of this had been prepared on a Macintosh, although the text was typeset. The documentation was adequate rather than overwhelming, but it told me most of what I wanted to know when I had to refer to it.

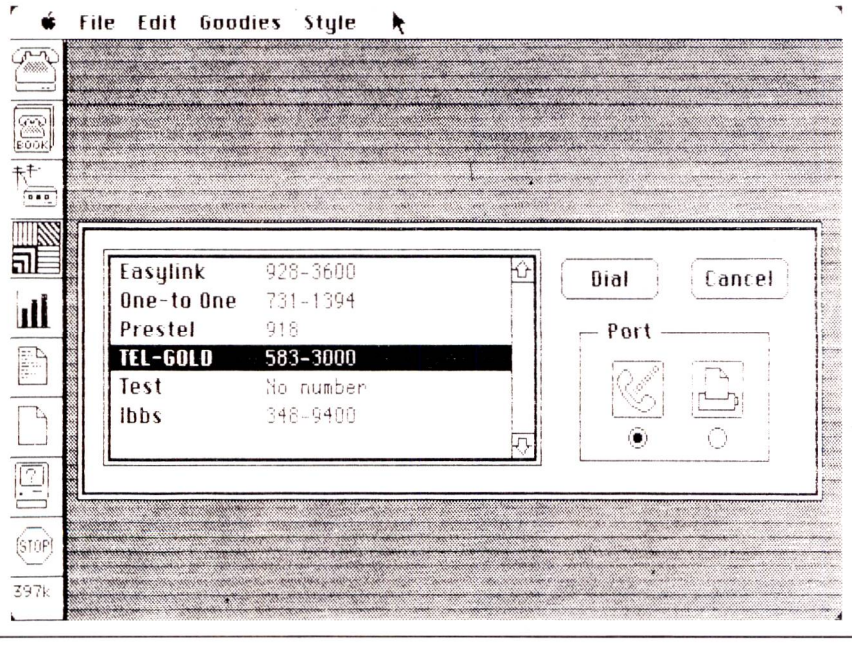
Conclusion

Most of this review relates to Release 1 of the software, with occasional looks at pre-production versions which contain some of the features of Release 2.

The Prestel implementation is very good. As far as I know, this is the only communications package for the Mac which supports Prestel at all, which makes the quality and user-friendliness of the implementation an added bonus.

As far as Release 1 is concerned, the ASCII communications aren't up to the same standard as the Prestel ones. Release 2 will add XModem and Mac-to-Mac protocols, DEC VT100 emulation, and the ability to scroll through text which has gone off the top of the screen. When this happens, I will be happy. The only things I would like to see added are a Jazz-style parser which allows you to filter or change unwanted character codes as they come in, and more intelligence in the log-on macro files.

Release 1 of Vicom is great if you have a Mac and want to get onto Prestel, and OK if you want ASCII communications. If Release 2 appears on time with the specified functions, Vicom will be everything I want from a communications package. And it's British!



The Dial Up option is used to call a remote database

Vicom costs £150 and is available from AM Technology, 11 Cornwall Gardens, London SW7. Tel: (01) 589 4642. END



CUB COLOUR MONITORS DISPLAY THE WIDEST CHOICE

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Questions & answers

Harvey Mellar solves a hypothetical murder case with the help of Logo pattern matching.

This article demonstrates some powerful techniques that make use of lists. I won't be introducing many new Logo primitives, but I'll use those already known to develop procedures for 'pattern matching' and apply these to the task of interrogating a simple database. The techniques are similar to those which lie at the heart of many artificial intelligence (AI) programs.

The murder

Imagine the following scenario: a terrible murder has been committed in a small community in the Ozark Mountains. Zachariah has been viciously attacked with a sharp implement and killed. His close family seem the obvious suspects. We know that his brothers, Matthew and Joshua, both have axes, that his cousins, James and Ebenezer, have guns, and cousin Jane has a knife. When questioned by the sherriff shortly after the murder, Matthew, James and Joshua all had traces of blood on their clothes. It is also known that Matthew and Ebenezer both hated Zachariah because of an old argument about a piece of land. Joshua is full of self-loathing and hates only himself!

It may not be difficult to work out a prime suspect for the murder, but how can we program a computer to use the same kind of logic?

We have to begin by representing the data in some way. Each fact can be represented as a list, and for simplicity we'll take each list as having three terms —a noun, a verb and another noun or an adjective. The procedures we will develop will work for facts of any length and structure, but it will be easier to remember their form with this simple grammar.

One fact in the database would be [JAMES OWNS GUN]. The database will be a list of such facts, a list of lists. Let's begin with an empty database:

```
MAKE "DATABASE []
```

and add facts to it one at a time, for example ADD [JAMES OWNS GUN]. ADD could be defined as follows:

```
TO ADD :FACT
  IF NOT THING? "DATABASE THEN
    MAKE "DATABASE []
  IF NOT MEMBER? :FACT :DATA-
    BASE THEN MAKE "DATABASE
      FPUT
:FACT :DATABASE
END
```

This procedure makes sure there is a variable called DATABASE; if there isn't already one, it creates one. It then checks to see if the fact is in the database; if it isn't, it adds it.

The database to represent the facts outlined previously might be:

```
[[MATTHEW OWNS AXE] [JOSHUA
  OWNS AXE] [JAMES OWNS GUN]
  [EBENEZER OWNS GUN] [JANE
  OWNS KNIFE] [KNIFE IS SHARP]
  [AXE IS SHARP] [JAMES IS BLOODY]
  [JOSHUA IS BLOODY] [MATTHEW IS
  BLOODY] [MATTHEW HATES
  ZACHARIAH] [EBENEZER HATES
  ZACHARIAH] [JOSHUA HATES
  JOSHUA]]
```

We can now interrogate the database to determine whether a particular fact is true. For example: DOES [JAMES OWN GUN], which should give the answer YES.

DOES is easily defined:

```
TO DOES :FACT
  IF MEMBER? :FACT :DATABASE
    THEN PRINT "YES ELSE PRINT
    "NO
END
```

Pattern matching

There is a more interesting form of questioning the database, where WHICH [?PERSON IS BLOODY] would receive the responses:

```
[?PERSON JAMES]
[?PERSON JOSHUA]
[?PERSON MATTHEW]
NO (MORE) ANSWERS
```

We use a question mark at the start of ?PERSON to show that this is not the name of an actual person but a variable. We want the computer to go through the database, looking for facts which are of the form ?PERSON IS BLOODY, and to answer that James, Joshua and Matthew are the possible values of ?PERSON.

This is a simple example of what we mean by pattern matching. The computer looks for facts of the pattern IS BLOODY, and lets us know what values could possibly fill the gap.

The procedures needed to carry out this more sophisticated way of interrogating the database are:

```
TO WHICH :QUERY
  LOCAL "ANSWER
  LOCAL "RESULTS
  MAKE "ANSWER []
  MAKE "RESULTS []
  COMPARE :QUERY :DATABASE
  PRINTOUT :RESULTS
END
```

WHICH sets things up and passes the main work over to COMPARE. LOCAL is a primitive which makes the named variable local to that procedure; when that procedure is finished, the variable will cease to exist. The value of the local variable is available to all the procedures that WHICH calls, and only disappears when WHICH itself finishes. Some versions of Logo do not have LOCAL, and it could be omitted here, but this would leave a couple of variables in the workspace that are no longer required.

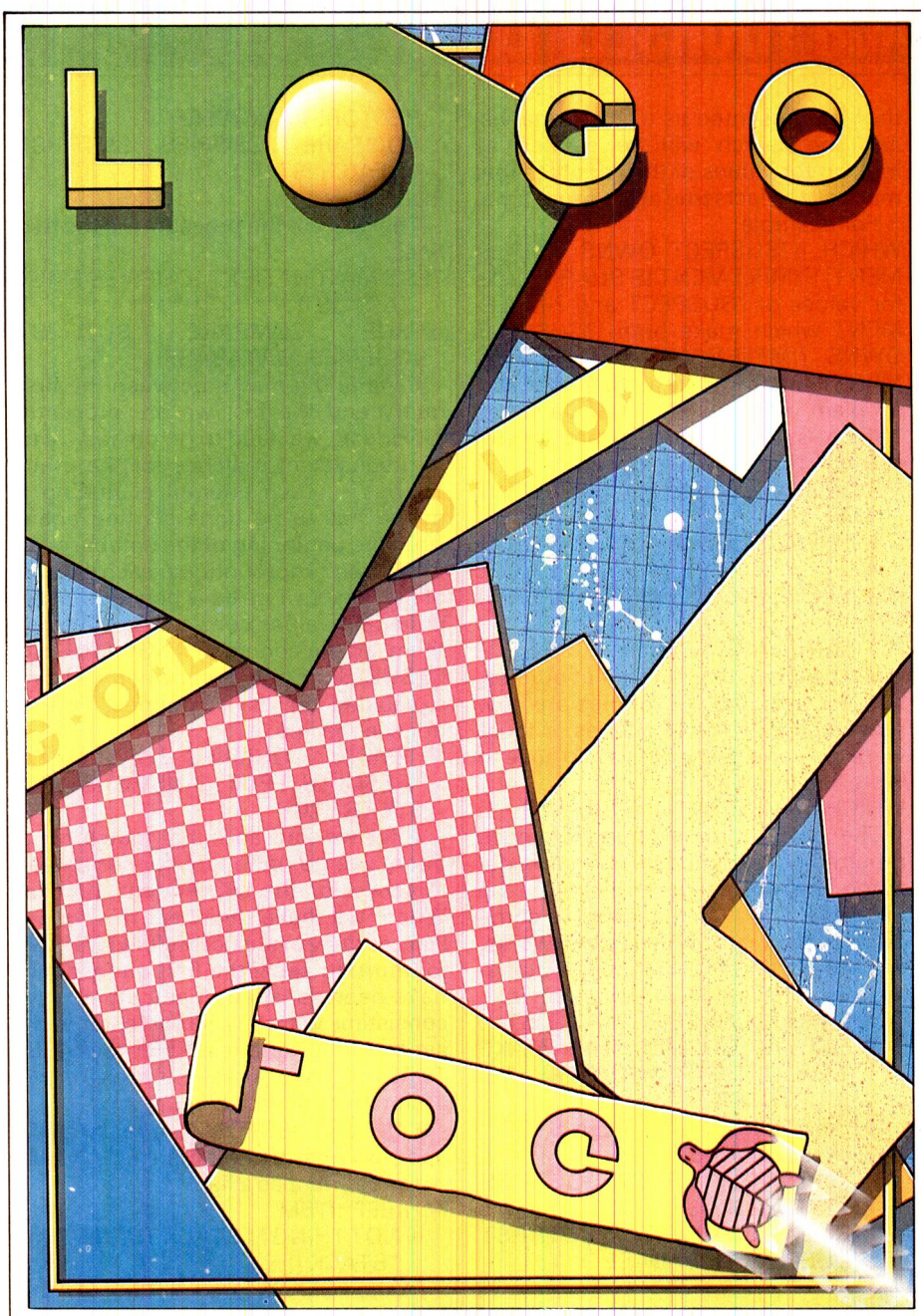
Each individual answer will be stored in the variable ANSWER, and these will then be put together as a list of answers in the variable RESULT. The procedure PRINTOUT prints the answers one below the other and prints out NO (MORE) ANSWERS at the end.

```
TO PRINTOUT :MESSAGE
  IF EMPTY? :MESSAGE THEN PRINT
    [NO (MORE) ANSWERS] STOP
  PRINT FIRST :MESSAGE
  PRINTOUT BUTFIRST :MESSAGE
END
```

The real work begins with the procedure COMPARE. This takes each fact in the database in turn and passes it over to MATCH? to determine if it is the same. If it is, MATCH? will also make sure that ANSWER is set to the corresponding value, and COMPARE will string this value of ANSWER onto the front of RESULTS.

```
TO COMPARE :QUERY :FACTLIST
  IF EMPTY :FACTLIST THEN STOP
  TEST MATCH? :QUERY FIRST
    :FACTLIST
  IFTRUE MAKE "RESULTS FPUT
    :ANSWER :RESULTS
  COMPARE :QUERY BUTFIRST
    :FACTLIST
END
```

MATCH? does the actual pattern matching. It must compare the input pattern with a single fact from the database and determine if it is a possible match: if so, it must record the



possible value of the variable in ANSWER.

```
TO MATCH? :QUERY :FACT
  IF ALLOF EMPTY? :QUERY EMPTY?
    :FACT THEN OUTPUT "TRUE
  IF ANYOF EMPTY? :QUERY EMPTY?
    :FACT THEN OUTPUT "FALSE
  TEST FIRST :QUERY = FIRST :FACT
  IFFALSE IF NOT (VARIABLE? FIRST
    :QUERY) THEN OUTPUT
"FALSE
  IFFALSE (REMEMBER FIRST :QUERY
    FIRST :FACT)
  OUTPUT (MATCH? BUTFIRST
    :QUERY BUTFIRST :FACT
END
```

The first two lines check to see if we have come to the end of either or both lists. If we have come to the end of both lists at the same time, then there is a match. If one list is longer than the other there cannot be a match (with this definition of matching). In studying how this procedure works, remember that in Logo, a procedure stops when it outputs a value.

The next test is to see if the first element in the query is the same as the first element in the fact. If they are not the same, the only way we could have a match would be if the first element of the query is a variable. If it is not a variable, there is no match. If it is, we must make a note of its value. Then if everything is matching so far, we carry on checking the rest of the two lists.

REMEMBER can make a record of a value when it subsequently turns out that the rest of the patterns do not match. This is not a problem, as MATCH? will finally output FALSE so ANSWER will not be tagged onto RESULTS by COMPARE.

Notice the last line OUTPUT (MATCH? BUTFIRST :QUERY BUTFIRST :FACT). Novice Logo programmers often forget the OUTPUT. It is needed because the recursive call to MATCH? will return a value to MATCH?, but this value must itself then be passed back up to the procedure that called MATCH?.

The two helping procedures, VARIABLE? and RECORD, are both quite simple and they introduce a new element of Logo programming.

A 'word' in Logo is just a collection of characters or numbers — like a string in Basic. Many of the list processing primitives can be applied to words as well as to lists, so FIRST "JAMES outputs J, and BUTFIRST "JAMES outputs AMES. In order to discover if something is a variable in our query, all we need to do is establish whether its first character is a ?. VARIABLE? does this:

```
TO VARIABLE? :WORD
  IF FIRST :WORD = "? THEN OUTPUT
    "TRUE
  OUTPUT "FALSE
END
```

FPUT is useful for adding an element to the front of a list, but it often happens that we want to create a list from a number of words rather than by extending an existing list. A useful primitive to do this is LIST. To put ?SUSPECT and JAMES together as a list, we can type LIST "?SUSPECT "JAMES giving the result [?SUSPECT JAMES]. REMEMBER uses this method in order to create the value of ANSWER as a list:

```
TO REMEMBER :VARIABLE :VALUE
  MAKE "ANSWER (LIST :VARIABLE
    :VALUE)
END
```

Variables

The procedures so far only look for a single variable. To make the query system more powerful it needs to be able to look for more than one variable, and so be able to ask queries of the form WHICH [?PERSON HATES ?SOMEONE] to which the reply would be:

```
[?PERSON MATTHEW] [?SOMEONE
  ZACHARIAH]
[?PERSON EBENEZER] [?SOMEONE
  ZACHARIAH]
[?PERSON JOSHUA] [?SOMEONE
  JOSHUA]
NO (MORE) ANSWERS
```

The new procedures will also have to be able to deal with the case where the same variable is used more than once, for example:

```
WHICH [?PERSON HATES ?PERSON]
```

Here, ?PERSON must have the same value in both places. The result should be:

```
[?PERSON JOSHUA]
NO (MORE) ANSWERS
```

The major change that needs to be made is to change MATCH? to take account of the possibility of inconsistent assignment of variables. This involves adding one line:

```
TO MATCH? :QUERY :FACT
  IF ALLOF EMPTY? :QUERY EMPTY?
    :FACT THEN OUTPUT "TRUE
  IF ANYOF EMPTY? :QUERY EMPTY?
    :FACT THEN OUTPUT "FALSE
  TEST FIRST :QUERY = FIRST :FACT
  IFFALSE IF NOT (VARIABLE? FIRST
    :QUERY) THEN OUTPUT "FALSE
  IFFALSE IF NOT (CONSISTENT?
```

```
    FIRST :QUERY FIRST :FACT
    :ANSWERS) THEN OUTPUT
    "FALSE
  IFFALSE (REMEMBER FIRST :QUERY
    FIRST :FACT)
  OUTPUT (MATCH? BUTFIRST
    :QUERY BUTFIRST :FACT)
END
```

Checking whether an assignment is consistent means going through the list ANSWERS to see if there is already a value for the variable, and checking to see if the values are the same. If not, there is an inconsistency:

```
TO CONSISTENT? :VARIABLE :FACT
    :ANS
  IF EMPTY? :ANS THEN OUTPUT
    "TRUE
  TEST :VARIABLE = FIRST FIRST
    :ANS
  IFTRUE IF NOT (:FACT = LAST FIRST
    :ANS) THEN OUTPUT "FALSE
  OUTPUT CONSISTENT? :VARIABLE
    :FACT BUTFIRST :ANS
END
```

REMEMBER must also be altered as there may be more than one set of answers. REMEMBER now makes a list of pairs, where each pair consists of a variable name and its value:

```
TO REMEMBER :VARIABLE :VALUE
  LOCAL "PAIR
  MAKE "PAIR (LIST :VARIABLE
    :VALUE)
  TEST MEMBER? :PAIR :ANSWER
  IFFALSE MAKE "ANSWERS LPUT
    :PAIR :ANSWERS
END
```

Questions

The questioning procedure is still not very clever, but we shall now extend it to be able to deal with more than one query pattern at a time. The queries will then be presented as a list of queries, and the search will be defined as looking for values of the variables that make all the facts true at the same time.

For example:

```
WHICH [[?SUSPECT OWNS ?IMPLE-
MENT] [?IMPLEMENT IS SHARP]] asks
for values of ?SUSPECT and ?IMPLE-
MENT which make both [?SUSPECT
OWNS ?IMPLEMENT] and [?IMPLE-
MENT IS SHARP] true at the same time.
In plain English, this translates as
'Which suspects own sharp imple-
ments?' The result would be:
[?SUSPECT MATTHEW][?IMPLEMENT
  AXE]
[?SUSPECT JOSHUA][?IMPLEMENT
  AXE]
[?SUSPECT JANE][?IMPLEMENT KNI-
FE]
NO (MORE) ANSWERS
```

We can have any number of queries, not just two, and the queries are now presented as a list of queries. If there were only one query, we would have to write it in this way:

```
WHICH [[?IMPLEMENT IS SHARP]]
```

The actual programming changes required to accomodate this new demand are not as great as might be expected, although it might take some doing to unravel how the system works. It is only COMPARE that needs changing this time, and the new version is:

```
TO COMPARE :QUERIES :FACTLIST
  IF EMPTY? :QUERIES THEN MAKE
    "RESULTS FPUT :ANSWERS :RE-
    SULTS STOP
  IF EMPTY? :FACTLIST THEN STOP
  KEEP :ANSWERS
  TEST MATCH? FIRST :QUERIES
    FIRST :FACTLIST
  IFTRUE COMPARE BUTFIRST
    :QUERIES :DATABASE
  RESTORE "ANSWERS
  COMPARE :QUERIES BUTFIRST
    :FACTLIST
END
```

The heart of the procedure is the two lines:

```
TEST MATCH? FIRST :QUERIES FIRST
  :FACTLIST
IFTRUE COMPARE BUTFIRST
  :QUERIES :DATABASE
```

If we find a match between the first query and the fact we are presently looking at, we need to go on and try to find consistent matches for the other queries — each attempt at finding a match has to be done starting again from the beginning of the database.

We won't know until we reach the end of the queries if we have been succesful in finding values consistent with all of them, so the adding of ANSWERS into RESULTS can only occur when we have exhausted the list of queries. This is done in the line:

```
IF EMPTY? :QUERIES THEN MAKE
  "RESULTS FPUT :ANSWERS :RE-
  SULTS STOP
```

After we find an initial match for a query, we go on to look for consistent matches for the subsequent queries. When we have finished this quest (successfully or unsuccessfully) we need to return to see if the first query could have been satisfied in any other way, consistent with any variables already set by earlier queries. KEEP and RESTORE are used to keep a track of the assignment of variables.

KEEP and RESTORE are really push and pop operations on a stack, which we implement as a list.

```
TO KEEP :ITEM
  IF NOT THING? "STACK THEN MAKE
    "STACK []
  MAKE "STACK FPUT :ITEM :STACK
END

TO RESTORE :VAR
  MAKE :VAR FIRST :STACK
  MAKE "STACK BUTFIRST :STACK
END
```

It is not easy to follow how COMPARE works, but it is well worth the effort of trying to do so.

Conclusion — who did it?

After all that preparation, we can now ask the fairly complex question: 'Is there anyone who hates Zachariah, owns an implement which is sharp, and who has blood on their clothes?'

```
WHICH [[?MURDERER HATES
  ZACHARIAH] [?MURDERER OWNS
  ?IMPLEMENT] [?IMPLEMENT IS
  SHARP] [?MURDERER IS BLOODY]]
```

To which the reply is: 'Matthew did it with the axe'.

```
[?MURDERER MATTHEW][?IMPLE-
  MENT AXE]
NO (MORE) ANSWERS
```

END



'I came downstairs this morning and there he was!'

This is part four of a six-part series.

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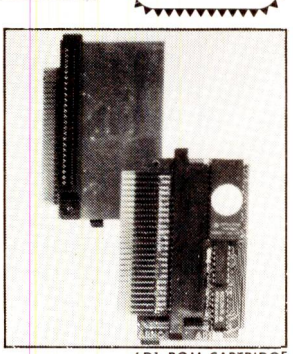

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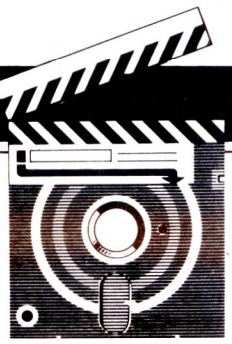


SCREENTEST

TIM IV

TIM IV, a basic data management package, has had great success in the US among non-programmers. But will its limited features be suitable for UK users? Kathy Lang finds out.

TIM IV (short for Total Information Management) has been an extremely popular package in the US for several years, providing basic data management features for the non-programmer at a reasonable price. Its originators, Innovative Software, continue to support and develop it alongside its recent integrated package, Smart, which contains a more powerful data management system at correspondingly greater cost. While TIM IV has been available in this country for a while, it has so far had an extremely low profile and very little promotion. The most recent version of the package is now being distributed by Paradigm Software, which markets and supports it as a middle-of-the-road package alongside the more powerful Smart suite of modules.

My own feeling is that there are many users who need straightforward data management facilities but do not want to pay the price, either in money or complexity, of a grander package with all the bells and whistles. With this in mind, it's worthwhile to look at a package which seems to fit that bill, and which is also widely used across the US.

Each record in a TIM IV file has the same format and occupies the same amount of space, so it is more suitable for applications where the information has a regular structure than for those which handle large amounts of text. You can link files with dissimilar structures, but only in a limited way, to allow the updating and checking of interrelated sets of information. Unlike the great majority of its competitors among data management systems (as distinct from integrated packages), TIM IV allows you to convert your data into a form which can be read by several different spreadsheet packages, allowing you to build up your applications gradually if necessary. TIM IV is operated by a system of menus and sub-menus, plus function keys; there are, however, no facilities for stringing together frequently-used procedures. This makes TIM IV extremely easy to use, but less suitable for use by system developers.

TIM IV is available for the IBM PC and compatibles, as well as a number of other 16-bit systems including the Wang, DEC and Texas Instruments PCs.

Constraints

The main constraints of TIM IV are shown in Fig 1. Those likely to be most serious are the limit on the length of character fields (60 characters) and the relatively small number of fields allowed (40). TIM IV provides several unusual field formats, including inverted fields, which allow you to store a field in the manner required for display, but to have it sorted with the two elements reversed. The most obvious example of its use is for names, where you frequently want to store both forename and surname, to display the names in that order, but to sort them with surname first. The inverted field type avoids the need to have two fields for this purpose. Dates may be in American (MM/DD/YY) or European (DD/MM/YY) format. Fields may contain calculated values, or totals of other field values.

'. . . there are many users who need straightforward management facilities but do not want to pay the price . . . of a grander package . . .'

File creation and indexing

The first step in creating a file is to define the name, length and type of each field. TIM IV makes this a relatively easy task — you just have to fill in a table with these entries. There are also some shorthand features: for example, to create a file similar to another, you can copy the structure and amend it accordingly. Any of the first 36 fields may be keys. Each major key field may have one or more subsidiary keys (in order that you can index by town within county, for example) up to a maximum of 16 minor keys to each major key, provided the total length of a major key and its related minor keys does not exceed 80 characters. Indexes can be added and deleted at any time; both processes are fast.

The next stage is to create a screen display format — there is a default format which shows one field per line of the screen. A single record may actually span two physical screens. The process of designing a customised screen is straightforward, but cursor movement is not very fast and gives flickers on the screen.

When a record format has been defined and data entered, it can be changed only by copying, but TIM IV has a special routine for this which allows you to have the old form of the file on one floppy disk and the new form on another. This, of course, allows you to restructure much larger files than those systems which oblige you to have a program disk mounted continuously.

Data input and updating

Records are added using the default screen layout or one designed during file creation. There are several useful touches to speed entry. One function key gives a repeat of the value of the equivalent field in the previous record

(an approach which I prefer to entering an instruction to that effect in the record definition). If a record does not require entries in every field, you can save it when the record is complete. You are not obliged, as you are in many packages, to press RETURN once for each empty field.

When retrieving records for editing, you can request records which match any key value, and these will be retrieved using the appropriate index. Alternatively, you can match part of a key field, or all or part of any non-key field, in which case the file will be searched sequentially. You can access the first record, or jump to a particular record by record number. Better still, you can jump forward or backward one record or many, relative to the current record, which allows you to browse quickly and easily using any index. Such provisions are unusually flexible for a package in this class.

When records are deleted, they are simply marked for deletion so that you can change your mind if necessary — up to the point where you ask for all deleted records to be expunged. The drawback to the TIM IV method of adding and editing records is that indexes are updated in a batch, either at the end of the session or later when you request it. This removes an overhead from record amendment, but means that you cannot retrieve new records, or retrieve for a second time records whose key field values have changed, until after the batch update has taken place.

As an alternative to amending individual records on the screen, you can set up conditions for the selection of subsets of records which will be automatically amended in the same way. For example, you can request that any two fields be added together, or a field incremented by 10 per cent. There are limitations on this feature, so you should check carefully that your particular requirements are met if you need automatic updating.

Screen display

For editing and viewing TIM IV records, whether selected by individual key value or by setting selection criteria, you can use the individual record format set up when the file is created. If you simply wish to view TIM IV records, then any list or report can be shown on the screen as an alternative to being printed or being sent to a file.

Printed reports

TIM IV provides a variety of formats for printing your results. A simple 'screen print' facility allows you to get an immediate listing of the current record, while the Quick Print feature gives a report on all the fields of all the currently selected records in the file, using the default field widths from the file creation information.

For more sophisticated formats, two basic report types are provided: lists and reports. Lists permit the printing of several lines for each record, usually with several records printed side by side; this format is most often used to print address labels. Reports provide for columnar display of information, with field and record selection. Two levels of sub-total are permitted, using key fields to dictate where the breaks are to occur. You can request just the printing of totals, which can be useful for obtaining summary information.

Both list and report formats can be amended, so you can experiment to get the format you need without starting from scratch each time. Text is 'wrapped' within narrow columns if necessary, but there is no special provision for writing personalised letters. To do this, you would need to pass sets of data across to a word processor with this capability.

Max file size	32767 records
Max record size	2400 characters
Max no fields	40
Max field size	60 characters
Max digits	NS
Max prime key length	80 characters
Special disk format?	No
File size fixed?	No
Link to ASCII files?	Yes, several formats
Data types	Numeric, char, date, and so on
Fixed rec structure?	Yes
Fixed record length stored	Yes
Amend rec structure?	By copying
Link data files?	Yes, in limited ways
No data files open	Two
No sort fields	36 (by using indexes)
No keys	36
Max key length (chars, fields)	80, 17
Subsidiary indexes kept up-to-date?	In a batch, after amendment
Data validation	Adequate
Screen formatting	Paint-a-screen or default
Unique keys	No
Report formatting	Columns, lists, default
Store calculated data	Input, batch updating
Totals & statistics	Totals + sub-totals
Store selecn criteria	Mandatory
Combining criteria	And, Or (may use brackets)
>1 criterion/ field?	Yes
Wild code selection?	String within field
Browsing methods	Any field
Interaction methods	Menus, commands
Reference Manual+	***
Tutorial Guide+	No
Reference Card+	**
Online help+	***
Hot-line?	NS

NS=Not stated *=rating, maximum five stars

Fig 1 Features and constraints
Details explained in January issue page 188

Selection and sorting

To select subsets of TIM IV records, you set up one or more tests in a single command. These tests may be of a field against another, or against a constant; comparisons may include the usual range of operators such as less than, greater than, and so on, together with testing for a value being within a range, or for a value containing a set of characters. You can therefore test for a name having the letters JOHN somewhere in it, or being between SMITH and THOMPSON. Tests may be linked with And and Or in any combination, and brackets may be used to ensure correct ordering.

It is therefore possible to devise a wide variety of tests. Before a selection can be performed, the set of tests must be stored with a name for subsequent use, so selecting subsets is always a two-stage process. You may, however, include provision for one or more test values to be entered when the selection is actually implemented. Included within the setting-up process is the order in which the records are to be selected: that is, you state at that stage which key is to be used for ordering the output.

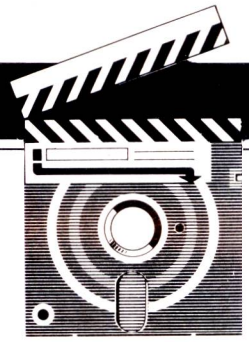
TIM IV does not provide sorting facilities as such — all ordering is controlled by indexes. It is, however, simple and fast to set up new indexes, and the limitation on numbers is very generous. As output in any form may be ordered by any key, this approach is likely to be much more efficient than physically sorting complete records.

Calculation

During input, TIM IV can calculate fields on the basis of formulae defined when the file is set up. Fields can also be automatically recalculated to provide a batch updating facility, as described under 'Data input and updating'. In either case, you build up the formula by selecting options rather than by entering the complete formula, so there are restrictions on the complexity of the formula which can be applied. The third possibility for calculating fields is described in the next section, as it relates to the ability to update one file from another.

Multiple files

TIM IV has limited facilities for relating two files together. The data file which controls the process is called the 'driver file', and the related file is called the 'target file'. The match between the two



SCREENTEST

is made by a key; where the key is composed of several elements, these must be in the same order in the key in each file. TIM IV expects to find one record in the target file for every record in the driver file (although not necessarily *vice versa*). Amendments can be made to either the target or the driver file; in each case, a field may be replaced by, have added to or subtracted from it the field value in the updating file.

Where the target file is updated by the driver, TIM IV calls the process 'posting', which is intended for such circumstances as updating a client's record containing his total indebtedness from an invoice record or a credit note. If the driver is being updated by the target file, TIM IV calls the operation 'look-up', and it would be most useful when you were creating, say, an order using a customer code, and wished to copy the customer's full name and address from the target file.

In a similar fashion, using a key to link the two files, you can include information from two files in a single report.

Clearly these options cannot cover all the possible relationships you might want to create between linked sets of information, but they do comprise those most commonly found in commercial applications, and will be adequate for many situations.

'The facilities for linking files together are simple but not particularly powerful; they should, however, be sufficient for many applications . . .'

Tailoring

There are no facilities for tailoring TIM IV to provide a particular 'user image' for individual applications — you cannot, for example, set up a menu of your own for novice users. The TIM IV manual does, however, include a full definition of the structure of the system's files, and a set of Basic subroutines with which to access them, so that you could relatively easily extend the package's facilities by writing supplementary programs in Basic if you needed to.

Security & housekeeping

TIM IV files can be protected with a four-character password if you wish. A variety of utilities are included within TIM IV, the most noteworthy being a directory of files and a back-up routine to copy files to floppy disk.

Links with outside

TIM IV provides unusually good facilities for communicating with other packages, especially spreadsheets — an incomprehensible omission from most data management systems. You can write data out either in DIF format, for input to packages such as SuperCalc 3, or in SYLK for Microsoft's Multiplan. The data may be a set of records, or you can have the data summarised into a table of the type more usually handled in spreadsheets. This latter feature is, as far as I know, unique, and would be extremely useful in some applications. If you have a data management system, you rarely want to handle the data in the same way in the spreadsheet. It is much more likely that you will want to extract summary information from the database and use it to make predictions about future trends.

For word processing — perhaps for including TIM IV data in personalised letters — you can write files in formats which can be read by WordStar's Mailmerge option, by Word Plus, Word Perfect and Peachtext. The Mailmerge format is ASCII comma-delimited, so it can be read by most programming languages too, including Basic.

User image

TIM IV is a menu-driven package, but it does not take this to ridiculous levels of nested sub-menus. In general, each main menu option, such as Add a record and Create a new file, has just one level of sub-menu, if any; the rest of the control is exercised using question-and-answer to a limited degree, plus function keys. You can jump directly from one main menu option to another without invoking the main menu each time, so a reasonable compromise has been struck between ease of use for the novice and speed for the more experienced user. The one aspect I found troublesome was the use throughout the package of field numbers rather than names. Where there is likely to be

BM1	Time to add one new record	2secs+merge
BM2	Time to select record by primary key	4secs 2secs
BM3	Time to select record by secondary key	7secs 2secs
BM4	Time to access 20 records from 1000 sequentially on three-character field (same field as in BM2 key)	3secs 14secs
BM5	Time to access record using wild code	3secs 4secs
BM6	Time to index 1000 records on three-character field	2mins 4secs
BM7	Time to sort 1000 records on five-character field	2mins
BM8	Time to calculate on one field per record and store result in record	13mins 10secs
BM9	Time to total three fields over 1000 records	3mins 40secs
BM10	Time to add one new field to each of 1000 records	12mins 20secs

Time to import a file of 1000 records: 9mins

Notes: NT=Not tested NT=Not possible +=including scrolling
Where two times are given, first is access to first record, second is access to each subsequent record

Fig 2 Benchmark times recorded on IBMPC/XT/H

Summary

Supplier:	Paradigm
Telephone:	(01) 228 5008
Cost (£):	295
Systems:	PC, some MS
Version reviewed:	4.02
Type:	Novice users, structured data
Features:	Data management system with good features for straightforward applications. Formatted screens, simple reporting, powerful selection with plenty of keys, simple relationships between files, and unusually good features for writing spreadsheet and word processor files.
Drawbacks:	Updating of indexes not immediate, so can't retrieve a new record until next session. Limited intra-file links.
Ease of use:	Good: menu-driven plus simple commands and function keys.

confusion, TIM IV usually displays the list of field names with the number alongside, and it is indeed faster to type numbers than names, but the dangers of confusion and inaccuracy still outweigh the advantages.

The other difficulty I had, although it was an irritant more than a serious drawback, was with the messages concerning program disks. Even if you install the system on a hard disk, you are regularly prompted to replace one program disk with another.

All that is needed with a hard disk is to press RETURN, but it does slow things down and I could not find a way to avoid it.

For those who have a colour screen, TIM IV is displayed in colour, but I could not find a way to adapt the colours to my own requirements. Those chosen are not displeasing, but I still prefer to be able to exploit the facilities on which good money has been expended.

Documentation

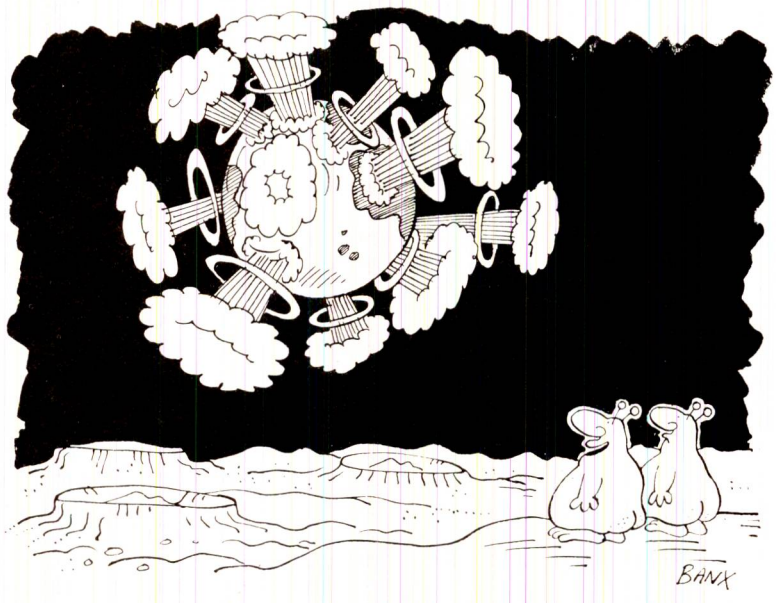
TIM IV comes with a very readable manual which does duty both as tutorial and reference. The content succeeds in this aim quite well, but the order is a little unusual. You are taken through each main menu option in turn, in alphabetical order, which means that adding a record is described before creating a file. It's OK when you get used to it, but I found it rather off-putting at first.

An appendix contains a list of all TIM IV options ordered by the menu in which they occur, so this provides a kind of menu 'road map' although as a list rather than in the diagrammatic form I prefer. There are also four detailed examples of using TIM IV in specific applications, and data files for use with these are provided on the disk — always a valuable way to get to grips with a package. There are no tutorials as such, but I'm rather sceptical about the extent to which users actually work through these when they are available — most people seem to look for an example close to what they want to do and adapt that, which can be done with the TIM IV approach.

Online help is available on request. You can either ask about the use of a particular option from the main menu, or, in some circumstances, press a function key to get more detailed information from within an option. The detail is not great, but the package is so simple to use that this is not really a problem.

Package	Cost (£)	Summary
DMS+	195	Stripped-down version of Delta from same supplier — one file open at a time, no tailoring. Good letter writer. Usable manuals, but no road map of menus. Separate set-up and execute (for example, in selection) tedious. Good value for money at this price.
Files & Folders	295	Good value, easy-to-use package, with basic linked file facilities (three open, eight linked). Good use of screen when setting up files. Good lift and sort features; no letter writer. Menu-driven, no tailoring or batch processing. Usable manuals, no road map.
Friday!	195	Simple, cheap, good-value package for single-file, fixed-format records. Drawbacks are clumsy approach in letter writer and when designing screen formats. Excellent tutorial manual and menu charts, reference manual is good used from screen to manual.
Pearl	195	Economical storage of varying length records, multiple indexes allowed and kept up-to-date, paint-a-screen formatting for screens and reports (though no letter writer). Entry screens can be read from several files at once. Good manuals. Excellent value.
TIM IV	295	Good value for money as an easy-to-use package with basic features. Extensive indexing gives flexible direct access and ordering. Especially suitable where you need simple relationships between files, or output to a range of spreadsheet formats.

Fig 3 Comparison of similar data management packages



'Now that's what I call computer error!'

Conclusion

TIM IV provides a good range of data management facilities for straightforward applications. It is better suited to information which has a regular structure, and the limit of 60 characters per field restricts its use in areas needing to store substantial amounts of text. The indexing capabilities are extremely good, being both flexible and powerful, although the approach of updating only in a batch at the end of an editing session will cause problems in some applications.

The package's reporting features include a good label-producing routine and some basic columnar reporting, but no letter writer. The features for linking to other packages are, however, unusually good, so personalised letters could be produced in conjunction with a word processor.

The ability to output data in a variety of spreadsheet formats, both 'as is' and in aggregated form, gives flexibility.

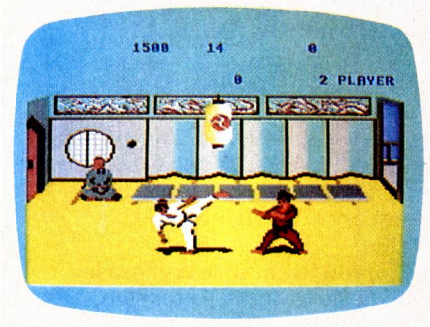
And the facilities for linking files together are simple but not particularly powerful; they should, however, be sufficient for many applications, and exceed what is usually provided in this price bracket.

All in all, TIM IV is good value for money, and should give very satisfactory results to people whose requirements it fits. END

SCREENPLAY



Bruce Lee's got nothing on Stephen Applebaum — his karate's beyond criticism. So's his storming of Beach-Head II and his behaviour at Rupert's party. Join him in this month's games feast for the Amstrad, Commodore 64 and Spectrum.

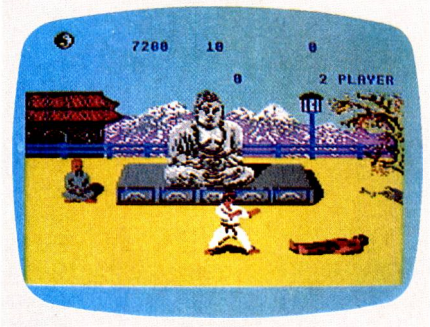


Explosive karate

Title: Way Of The Exploding Fist
Computer: Commodore 64, Spectrum, Amstrad
Supplier: Melbourne House
Format: Cassette
Price: £9.95, £8.95, £9.95

Karate may now be a lost cause for the cinema box office, but it should be a sure-fire winner when portrayed on a computer as realistically as in Melbourne House's superb simulation, Way Of The Exploding Fist.

The game's scenario of two men locked in hand-to-hand combat is simple, but playing it requires a good deal of skill and concentration. One and two player options are available, each providing the user with a very different challenge.



When playing against the computer, the idea is to try and defeat your opponent as quickly as possible within 30 seconds. For every two fights won, you progress by one dan, until you finally reach tenth dan and the accolade of Shaoulin monk. In two-player mode, the full 30 seconds must be fought out for each round. The winner is the fighter who has amassed the most points after four rounds.

Each timed bout is presided over by a Buddha-like Shaoulin monk who sits in the background of each screen looking inscrutible, and indicates his verdict at the end of a round by holding up a red or white scarf, depending on which of the fighters he considers to have won. An indication of how well you are doing during a fight is given in the form of Yin and Yang symbols. A Yin on its own is a half-point, whereas both together are awarded for a perfectly executed move.

Kung-Fu games are not new on the home micro scene, but their graphics have not been of the high standard of those in Way Of The Exploding Fist. Each of the two fighters is lucidly portrayed using, according to Melbourne House, over 700 sprites. In practice, this means that the movement of the two figures is very realistic, and they are able to go through a good number of different, and in some cases quite complex, movements. There are as many as 18 separate manoeuvres that can be performed, all of which are controlled from the one joystick.

Even with this number of movements, which include kicks, blocks, punches, jabs and somersaults, Way Of The Exploding Fist is surprisingly easy to get to grips with. All you do is twiddle about with the joystick, press the fire button every now and again, and you soon find that you're able to floor your computer-controlled opponent with no trouble at all.

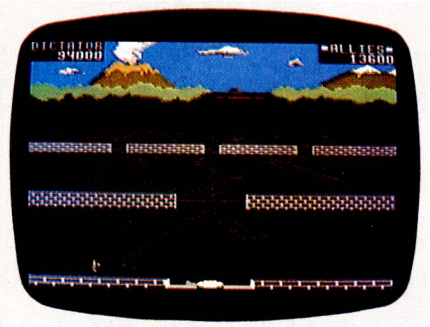
The brilliantly animated figures are complimented by some wonderful backdrops, which the programmer has obviously taken as greater pains to perfect as the two figures. There are four screens altogether, the first of which is a chinese garden followed by a beach, a gym and a courtyard.

The Way Of The Exploding Fist is virtually beyond criticism — technically brilliant and visually absorbing.



Suicide attack

Title: Beach-Head II
Computer: Commodore 64, Spectrum 48k



Supplier: Access Software Inc
Format: Cassette, disk
Price: £9.95, £14.95, Spectrum £7.95

It can't be easy programming a game in the knowledge that its success will depend on how well it sizes up to its predecessor. It must be even harder when the game it has to follow is one as popular as Beach-Head, so it was with a degree of scepticism that I loaded up Beach-Head II: The Dictator Strikes Back.

Happily this 'sequel' proved to be a whole new ball game, making comparison with Beach-Head pointless.

The aim of Beach-Head II is to infiltrate the Dictator's (aka The Dragon) inland fortress and destroy him. Like Beach-Head, the game's plot is split up into several sub-plots, each of which is repesented by a different arcade game.

In the first of the four sequences, you find yourself leading a group of men in a suicide attack on a gun emplacement

guarding the outer perimeter of the Dragon's hideout.

Should any of your men survive parachuting from a hovering helicopter, they then have to make a mad dash towards the gun which spits bullets everywhere. Soldiers caught in the cross-fire disintegrate with a cry of 'Medic!' or just plain 'Aaagh!'. The speech is a nice touch, and goes well with the superbly animated figures which run between a series of walls which provide shelter from the gunfire. You can be sure of losing many men in the attack, as some have to be used as decoys for others who attempt to immobilise the gun with a grenade.

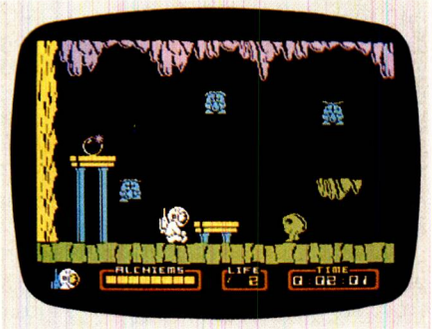
When all your men are across, the game proceeds to the rescue phase. Here the object is to provide cover fire for the Dragon's hostages who are trying to make a bid for freedom across the fortress courtyard. This time you have control of the gun, and believe me it's hard going. Not only do you have to watch out for enemy soliders who drop bombs from atop one of the surrounding walls, but also a man who places mines, a tank which juggernauts its way over the escaping men, and a truck carrying a sniper. Like parts of Beach-Head, the rescue can drag on, but there are better things to come.

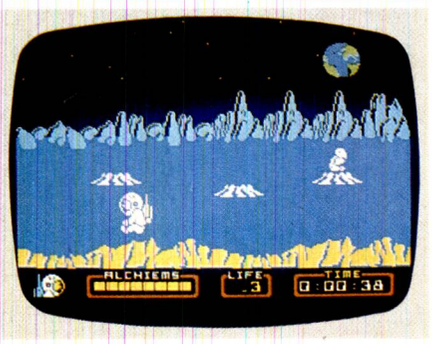
The hostages who manage to escape have to be flown to safety aboard a helicopter. Unfortunately the Dragon has prepared for your flight to freedom, and you find yourself having to negotiate low bridges while at the same time steering clear of the many shells that come your way from the various ground-based defence systems that have been erected.

Finally it is time to meet the Dragon face-to-face, and what a disappointment it is, too. The display, in what has over-enthusiastically been called 'the battle', features an underground cavern with a river running down the middle of it, and a wooden platform on either side.

You are perched on one platform, dressed all in white, while on the other is the Dictator, looking more newt than dragon-like. In what is the final conflict, either figure throws heavy, sharpened sticks at the other in an attempt to knock him off his platform. Beating the computer in this phase is nigh impossible.

Beach-Head II is a good companion to Beach-Head. The inclusion of a two-player option where one takes the part of the Dictator gives it that extra dimension which Beach-Head lacked. It's an excellent game for all players.





Mysterious monolith

Title: Nodes Of Yesod
Computer: Spectrum 48k, Commodore 64, Amstrad, MSX, BBC B
Supplier: Odin Computer Graphics
Format: Cassette
Price: £9.95

If you have fond memories of the days when Manic Miner was considered the most complex computer game around, then Nodes Of Yesod should be right up your street.

Just imagine it: a game where there is little more to do than bounce around the screen picking up objects — none of this brain-teasing strategy which has characterised so many programs lately. Yes, a simple game. It's enough to bring tears of nostalgia flooding to your eyes.

The scenario concerns the discovery of an alien monolith tucked away in the labyrinthine inner passages of the moon. It appears that the structure is a giant transmitter, mysteriously sending coded messages out into the darkest recesses of deepest space. When decoded, the messages are found to contain vital information on Earth's defences.

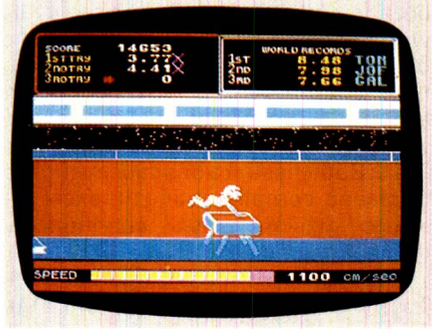
The object of Nodes Of Yesod is to search the moon's underground tunnels for the monolith. Not all the satellite's passages are immediately accessible, but help is at hand in the form of moon moles.

These are tiny creatures with a voracious appetite for moon rock, and capable of gnawing through some of the thickest walls. You must capture a mole before descending into the moon, because you won't get far without it.

Just as important as a mole are eight alchiems; these are small objects which, when amassed, serve as a key to the cavern where the alien structure is situated.

No arcade game of this type would be complete without its nasties, and Nodes Of Yesod is no exception. An assortment of beasts, including a bug, a fish, a horned demon and an alien astronaut who steals alchiems, roam around the moon. Although contact with these creatures will not kill you, it will sap your energy, but you can recover your strength by resting.

Nodes Of Yesod is a simple game, but one with a lot of character. The animation is excellent throughout, and a little piece of synthesised speech at the start of the game is some of the best I have heard on the Spectrum.





All sports for all sorts — test your strength

Title: Hyper Sports
Computer: Spectrum, Commodore 64
Supplier: Imagine
Format: Cassette
Price: £7.95, £8.95

Just when you thought it was safe to take off the wrist support required to play Daley Thompson's Decathlon, Ocean, under the guise of Imagine, releases a version of Konami's Hyper Sports for the Spectrum 48k (reviewed here) and the Commodore 64.

Once again, the object of the game is to compete in various sporting events while simultaneously demonstrating your prowess at frantic joystick waggling or manic keyboard thrashing.

Hyper Sports encompasses six very different tests of stamina, judgement, agility, speed and strength, not all of which only apply to the computer-generated sportsman.

First of the six challenges is swimming. Success in this event depends on how well you can sustain the intense keyboard bashing needed to propel your swimmer through the water. Successfully meeting the qualifying

time gains you entry to the next round and the skeet shooting.

This second event gives your computer a well-earned respite from being pummelled through the table-top. Instead of mindlessly hammering the controls, a leisurely tap of either the left or right key is all that is required to move the sights of the marksman's rifle from side to side, picking off the skeets as they whizz across the screen. If you score 100 per cent the word 'perfect' is flashed up onscreen, producing a tumultuous roar from the crowd.

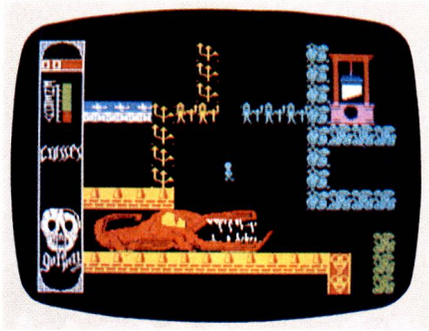
Next comes gymnastics, and a test of agility in the form of the long horse. Like the swimming event this involves a large amount of key drumming, although rather more skill is required to get your man onto the horse and into a spin that will impress the judges into awarding you a high enough score to get you through to the archery.

There's little to do in this event except try to judge the angle at which an arrow must be shot to overcome the cross-wind determined by the computer. Gaining the required score in the archery moves you back into the gymnasium for the weightlifting, the most gruelling of the six events.

The object of this event is to lift the heaviest weight possible. By vigorously fingering the left and right controls, the lifter is made to stand and eventually raise the weight above his head. However, the lift is not considered a clean one until all three judges have lit their scoring lights. Achieving a good lift returns you to the swimming, but this time there is a much lower qualifying score.

Hyper Sports is not original, but it's the best in its category. Graphically it is far superior to the popular Daley Thompson's Decathlon, although it is yet to be seen how it will compare with Daley Thompson's Super Test.





Not in the best possible taste

Title: Go To Hell
Computer: Spectrum 48k
Supplier: Triple Six
Format: Cassette
Price: £6.99

There must be something strange in the beer down at Triple Six because Go To Hell, its first foray into the world of computer maze games, is a mite more than warped, and that's being kind. In an attempt to shock unwary players, Triple 6 has produced a game which combines graphics that resemble outtakes from a George Romero film with a weird variation on the theme of Dante's Inferno.

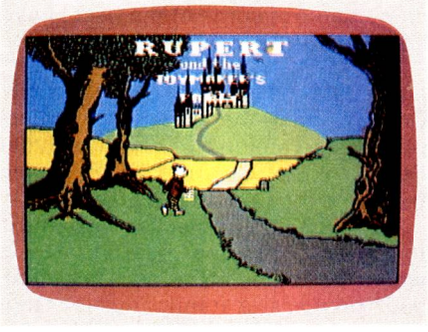
The game's loading screen gives you fair warning of what's to follow — it features a blood-stained severed head, flanked by a guillotine and gallows. You'd think after this things could only get better, but apart from the control selection screen it's probably the most tasteful part of the game.

In action, Go To Hell is much the same as any maze game, but with the addition of masses of gruesome graphics. How many games have you played where some of the things to avoid are a head being crushed like an egg beneath a hammer, or a skull being sawn in half? Even the things that fly at you, sapping your strength, take the form of mad monks, guillotines, axes and gravestones, plus the odd spider and pitchfork. Luckily, in true Hammer Horror style, you have your sack of trusty crosses at hand which, if thrown accurately, fend off any spook.

As well as saving you from certain death, hitting one of the enemies with a cross serves to replenish some of your lost energy, so allowing you to continue a little further.

Overall there are 50 screens in Go To Hell, all of which must be explored if you are going to find the seven sacred crucifixes which will prepare you for the final conflict with the devil himself.

Go To Hell is definitely different to the normal type of computer game. Admittedly some of the graphics are quite tasteless, but it is these which give the program its sense of morbid fascination. I recommend Go To Hell as a piece of novelty software, although I'm aware that other users might find the game offensive.



Party time

Title: Rupert and the Toymaker's Party
Computer: Commodore 64, Spectrum 48k
Supplier: Quicksilva
Format: Disk, cassette
Price: £7.99

The evergreen Rupert Bear has always kept up with technology. His first appearance was in the pages of the *Daily Express*, from where he later progressed into television. Now, 65 years on, the errant bear has been immortalised in an arcade game called Rupert and the Toymaker's Party.

In his comptuer debut, Rupert finds himself left behind by his friends on the way to the Toymaker's party. Happily all is not lost, as they left a trail of invitations pinned to the walls of the Toymaker's castle, marking the route to the venue where the festivities are taking place.

Rupert certainly has his work cut out to get to the eighth floor of the Toymaker's castle before his pals Algie and Bertie eat all the currant buns.

Each of the castle's eight levels consists of four screens, which Rupert must explore if he is to collect all the invitations that have been left for him.

But Rupert is a determined little soul, and not one to let a few toy soldiers, jumping jacks, trains and bees get to him. However much these troublesome beasties try to fluster Rupert, he deals with the situation by vaulting over the offending bodies. Gaps in the floor, too big to bound over, are easily negotiated by jumping aboard a toy bird or plane, which fly back and forth above Rupert's head. Both these actions cause a tune to be played, complimenting the excellent music which plays continuously throughout the game.

The graphics used in Rupert and the Toymaker are in keeping with the original character, right down to his checkered scarf and trousers. The only disappointing scene is the final one where Rupert joins his friends at the party. Apart from this, Rupert and the Toymaker's Party is a program for games players of all ages, but just because it's based around a children's character, don't think it's easy. END

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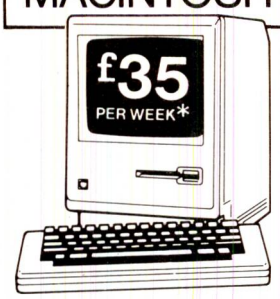
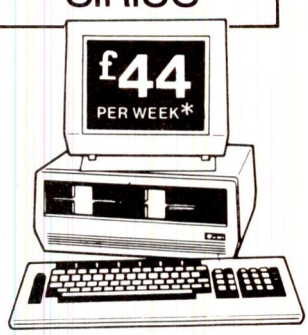


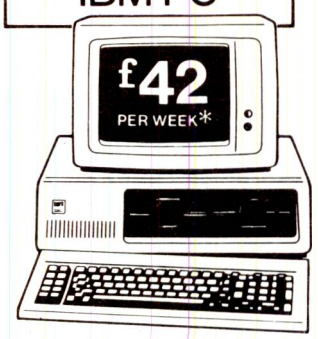
APRICOT



SIRIUS



IBM PC



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BIBLIOFILE

David Taylor wades through an impressive encyclopedia for Apple's impressive Mac and is told what's what in peripherals, in this month's review of computer literature.



Frankly, my dear...

Title: Apple Macintosh Encyclopedia
Authors: Gary Phillips & Donald J Scellato
Publisher: Chapman & Hall
Price: £12.95 (paperback)

Apple's Mac is a marvellous micro: sharp as they come (for the price) and so user-friendly it practically shakes hands and makes a pot of tea every time you power-up.

Were it not for the irritatingly *tock-tock* touch of its rather tatty Toytown keyboard, I'd certainly be happy to spend most of my own micro time mousing about with a Mac. So much of its latest software — MacPublisher, Music Works and most especially Jazz — is streets ahead of the field.

With an add-on Winchester (the ICE box, for example, a 512k Mac is now fast as well as versatile, and can easily give IBM XTs a hard time.

Few machines are quite as well-packaged as a Mac. The thing itself, plus peripherals like its Imagewriter and the much pricier but astonishing Laserwriter, are ergonomically top notch and astutely documented, too. Bear that fact in mind, together with the mouse's inherently simple point-and-do felicity, and you can soon start to wonder *who needs a book?*

I wondered quite a lot as I waded through this jam-packed encyclopedia. Lots of condensed information (at least for the standard 128k model) is all in there, but for every snippet you might actually need there are certain to be dozens of others which are either (a) absurdly obvious or (b) irrelevant.

Ask yourself, for example, whether you could get by without this: 'Power On — Turn the power switch to the ON position or otherwise supply electric current to a device.' Or how about this cryptic, almost poetic item? 'File, Erase (Microsoft BASIC) See KILL.'

To an extent, of course, all reference books suffer from such over-stuffing and are scarcely meant to be read cover to cover, any more than is a phone book. Now and again, it will perhaps be handy to reach for the Mac encyclopedia to get yourself out of a knot (and for your £12.95 you do get plenty of potential opportunities). It's accurate, but dull.

For would-be MacTutors, the unfortunate fact remains that operation of a Mac is so transparent. Hand-holding manuals or what-it-all-means primers are having a thinner time than they used to have, unscrambling DOS or annotating daunting software. This is a shame for authors as assiduous as Messrs Phillips and Scellato. Mac users, on the

other hand, might well not give much of a damn.

Holy cow!

Title: Business Worksheets for Lotus 1-2-3
Author: Jack Grushcow
Publisher: Reston (Prentice-Hall)
£20.30 (paperback)

We must, I think, sympathise with Mr Grushcow. Not just because he has a name like Grushcow, but because just as he comes out with a nifty idea for using 1-2-3, Lotus comes out with Symphony. Holy Grushcow, I bet Jack's mad.

Still, there are an awful lot of 1-2-3 disks out there. It started out as a best-seller for the IBM PC way back in 1982, and has been *the* spreadsheet (with database and Herculean graphics) to beat ever since.

Jack's idea is to use 1-2-3 to perform the standard business accounting tasks of general ledger, accounts receivable, accounts payable and payroll. You could save £££s, reckons Jack, as purpose-designed accountancy software doesn't as a rule come cheap. Also, the chances are that (if you're in business) you'll have bought 1-2-3 as a spreadsheet anyway.

What you may also do, I might add, is amaze your friends (or indeed the Inland Revenue), as 1-2-3 is neither intended nor designed for accountancy tasks. These by their nature involve recording umpteen transactions which will soon clog even fully-populated RAM (proper accountancy packages keep writing to disk, 1-2-3 uses memory), and will moreover soon clog the spreadsheet itself, slowing its calculations.

What is potentially worse, spreadsheets aren't meant to spot rogue entries the way error-checking accountancy packages are, nor do they automatically create an audit trail. Tyro ledger keepers or ham-fisted typists should not go near this book!

Mr Grushcow acknowledges the problems, but persists that he is saving you money, and at worst he is giving you an insight into what a decent accountancy package should have. If, at the end of this book, you conclude you'd better throw in the towel and splash out on purpose-made software, you'll by then be well-informed, says Jack.

I daresay he's right at that. Jack's ingenious method of setting up book-keeping worksheets within 1-2-3, despite the aforementioned limitations does work. It does give you a feel for what's what in accountancy software. It even gives you eyestrain setting it up, unless you send off for the model on disk.

What you *must* do is be *very* careful with your data input and be *very* certain this model is adequate for your needs. There's no sense saving £££s if you inadvertently lose track of still more £££s and perhaps go bust in the process!

An acquired taste

Title: Beat The Odds — Microcomputer Simulations of Casino Games
Author: Hans Sagan
Publisher: Hayden
Price: $7.95

Unless you can answer 'Yes' to these questions, I can't imagine you'll get much out of this:

1 Are you all-American?
2 Are you hooked on gambling?
3 Are you bored out of your mind?

Hans Sagan (any relation to Carl, I wonder, — the pop-eyed astro-physicist and hip sage who recently ego-tripped around the cosmos on TV?) has taken roulette, chemin-de-fer, craps, blackjack and trente-et-quarante, and rendered them into (Hewlett Packard) Basic routines. The result is a triumph of ingenuity, but it's a lot less fun than playing cards.

What you get is a quick run-through of each listed program to outline the game, showing you roughly how to bet and suggesting possible strategies. You have to answer prompts *en francais* for authentic atmosphere — a handy vocabulary is supplied. So, too, are a few sketchy notes for adjusting the Basic in the (highly likely) event your machine's dialect isn't HP2000, and then there's a mini-essay on probability theory.

I found it stupefying stuff. It's a bit of a mystery to me how anyone can stay awake playing trente-et-quarante, for example, live — never mind on a VDU. Ten times more fun, I'd suggest, to have a go with Infocom's Hitchhiker, or failing that to have a hand of Snap.

Stating the obvious

Title: Which Peripherals?
Author: Piers Letcher
Publisher: Chapman & Hall/Methuen
Price: £5.95 (paperback)

Very generalised, simple, often irritatingly patronising, is this: way under the heads of most *PCW* readers, I'd suggest. 'Without its peripherals,' begins Mr Letcher, 'your computer is useless. The television is a peripheral, and so too are your cassette recorder and keyboard.'

You can't argue with that. Indeed, I reckon most people who can tie their own shoelaces would be prepared to nod their heads. It's just that I suspect that many might also wince.

In due course it does get a bit nittier-grittier, but not much. We're whisked through the basic principles of storage devices, advised on choice of printers, and shown a range of joysticks and monitors. There's a section on first steps in communications ('The first piece of equipment that you will need, assuming that you are using the phone, is a modem').

I'd love to know what you need if you're thinking of using the parcel post, but there we are.

Speech synthesisers are introduced, graphics glossed upon, and some 'unusual add-ons' wheeled out: 'Robots are still a long way from the film versions, which have been around as long as fiction itself.'

If you can put up with this 'See-Jim-Run' style, then the basic gen on peripherals is here. For six quid.

Word power

Title: The Microcomputer Users Handbook 1985
Editors: Dennis Longley & Michael Shain
Publisher: Macmillan
Price: £24.95

It takes stamina not to skip or hop around this annual, a door-stopper of a paperback which does its level best to mention *everything* you might need to consider when setting up a modest system for business use — and often does so several times over. It's immensely comprehensive. Most, but not all of it is good.

It's essentially a reference to more than 160 pieces of desk-top hardware, to major software packages, to networking, to maintenance and support, but the industry overview sections are, not surprisingly, rather more absorbing.

The detail quality is patchy. The section on word processing, for example, regrettably drones on and on about the original WordStar, scarcely 1985's front-runner. Then again, there's a particularly weak section on communications, which I would have thought is *the* up-and-coming interest of the year for businessmen anxious to go rummaging around remote databases online or simply hook up to the inestimable Telecom Gold. A fat lot of use to give them sentences like: 'Communication may be said to be established between two devices when a signal transmitted from one is received and correctly interpreted by the other.' You don't say!

Still, for a quick précis on such posers as whether to go for the upstart Mac or the tried-and-tested IBM, for example, this book is undoubtedly helpful. It's sound on the whys, ifs, buts and whethers of determining which software you should assess for specific business needs, and perhaps above all it's a useful reference for supply contacts.

Useful for a business feeling its way forward towards sensible, cost-effective use of office micro systems, and a lot of words for the money! END



TJ'S WORKSHOP

Our monthly selection of hardware and software tips for the popular micros. If you have a favourite tip to pass on, send it to TJ's Workshop, PCW, 32-34 Broadwick Street, London W1A 2HG. Please keep your contributions concise and enclose a stamped addressed envelope if you want them returned. We will pay £5-£30 for any tips we publish. PCW can accept no responsibility for damage caused by using these tips, and readers should note that any hardware modifications may render the maker's guarantee invalid.

ADVANCE 86 BASIC-A PATCH

Strange as it may seem, the Microsoft Basic-A interpreter for 8088 and 8086 based machines is not a single product, but differs from machine to machine. Microsoft sells its interpreter to a large number of computer manufacturers, and each manufacturer configures it to suit its own machine. This can lead to inconsistencies.

When Basic-A is called on the IBM PC, the screen attributes are stored before loading Basic. This means that when you leave Basic-A, your set-up returns to what it was originally.

The implementation on the Advance 86 does not work this way. On entering and exiting Basic-A, the computer is set to 40-column mode. Switching to 80-column mode could be done using the SET command at system level or the WIDTH command in Basic, but for continuous editing, debugging and checking this becomes tedious and time-consuming. For example, if a Basic-A file is being edited using WordStar and is checked using the Run option, on return to WordStar, the screen is set to 40-column width which looks very odd.

Two small patches to Basic-A are provided to get around this problem. The first ensures that on entering Basic-A you go into 80-column mode, and the second ensures the same on exit.

Copy the files BASICA.EXE and DEBUG.COM onto a new disk; this is essential in case something goes wrong with the modifications. Now log into the disk drive containing the new disk. Rename the file BASICA. EXE as TEMP, as the DEBUG program will not write a file with the. EXE extension. Do this by typing:
RENAME BASICA. EXE TEMP (return)

Now call up DEBUG to alter the contents of TEMP. Type the sequence exactly as shown here (spaces are significant and should be included):
DEBUG TEMP (return)
E2139 50 (return)
E210D 31 D2 B4 01 88 26 5C 06 (return)
E2115 CD 17 B8 03 00 CD 10 (return)
W (return)
(A message is displayed saying 'Writing E800 bytes')
Q (return)

You should now see the system prompt of A> or B>. The next step is to rename the file TEMP to its original BASICA.EXE with the command:
RENAME TEMP BASICA.EXE (return)

Now test that the changes you have made work by typing BASICA. Basic should load and run in 80-column mode.

When you are sure that the first patch works, follow these steps to install the second patch to make the Advance 86 revert to 80-column mode after leaving Basic-A:
RENAME BASICA.EXE TEMP (return)
DEBUG TEMP (return)
E226C B0 02 90 90 90 (return)
W (return)
(A message is displayed saying 'Writing E800 bytes')
Q (return)

You should now see the system prompt of A> or B>. The value 02 refers to the 'colour burst' which should be disabled on some monochrome monitors, but if you are using a colour monitor, then change this term to 03 in the sequence to enable the colour burst.

Now rename the file:
RENAME TEMP BASICA.EXE (return)
and test the modified program.

John D Lee and Carl Phillips

BBC FREE MEMORY DISPLAY

This program displays a constant count of free memory on the top right-hand side of the display while running and editing Basic programs in mode 7. The type of message it will display is '25672 bytes free'; this will remain in position even as the screen is scrolled due to the value being constantly updated with the frame synch 50 times a second. The machine code is stored in the user-defined character memory area, and when the Basic program is run, it can be saved as a machine code file. A CALL &COO command will start the display.

The program works by constantly calculating HIMEM-TOP and displaying the result. It is useful as a check during program development to see how much memory is used as variables and arrays are created, especially with long programs where economy of memory usage is essential.

LP Durrant

```
 10 REM ********************************************************************
 20 REM * A PROGRAM TO O/P A CONSTANT COUNT OF FREE MEMORY IN MODE 7 *
 30 REM *                                                                  *
 40 REM *                  L.P.DURRANT -- MAY 1985                         *
 50 REM ********************************************************************
 60 *FX13,4
 70 FOR Addr%=&C00 TO &C81
 80   READ Data%:?Addr%=Data%:Sum%=Sum%+Data%
 90   NEXT Addr%
100 IF Sum% <> 13907 PRINT "Data error":END
110 REM PROGRAM F0 TO DISPLAY, F1 TO STOP DISPLAY
120 *KEYOCALL&C00!M
130 *KEY1*FX13,4!M
140 MODE7
150 PRINT''"Press F0 to start the display."
160 PRINT'"Press F1 to stop the display."'
170 END
180 DATA 169,110,133,116,169,12,133,117,169,26,141,32,2,169,12,141
190 DATA 33,2,169,14,162,4,32,244,255,96,173,85,3,201,7,240
200 DATA 1,96,24,173,80,3,105,20,133,114,173,81,3,105,0,133
210 DATA 115,56,165,6,229,18,133,112,165,7,229,19,133,113,160,19
220 DATA 177,116,145,114,136,192,8,208,247,32,98,12,24,105,48,145
230 DATA 114,136,165,112,5,113,208,241,169,135,145,114,136,169,140,145
240 DATA 114,96,162,16,169,0,6,112,38,113,42,201,10,144,4,233
250 DATA 10,230,112,202,208,240,96,32,66,121,116,101,115,32,102,114,101,10:
```

SPECTRUM TIPS

Here is a selection of tips for the ZX Spectrum.

PRINT (PEEK 23730+256* (PEEK 23731)) — (PEEK 23653+256* (PEEK 23654))
This prints the amount of free memory in bytes.

PRINT (PEEK 23627+256* (PEEK 23628)) — (PEEK 23635+256*(PEEK 23636))
This prints the amount of program memory in bytes.

PRINT USR 1000
This resets the machine with interesting effects.

RAND USR 5050
This completely crashes the Spectrum.

RAND USR 0
This completely clears the Spectrum, including RAM top and user-defined graphics.

1 DATA 243,6,192,33,0,64,205,178,14, 201
10 CLEAR 62999
20 FOR I=63000 TO 63009: READ A: POKE I,A: NEXT I
This program prints all the 24 lines of the Spectrum screen to the ZX printer, not just the usual 22. To use it type RAND USR 63,000, but ensure that a line 63000 exists.

9900 LET START=PEEK 23635+256*(PEEK 23636)
9905 INPUT "STEP SIZE:";STEP
9910 INPUT "FIRST LINE:";NUM
9915 IF ((PEEK(START+1)+256*(PEEK START)>=899 THEN STOP
9920 POKE START,INT(NUM/256):POKE START+,1NUM-INT((NUM/256)*256)
9925 LET START=START+PEEK(START+2)+PEEK (START+3)*256+4
9930 LETNUM=STEP+NUM

```
9935 GOTO 9915
```

This routine renumbers a program in the given steps, starting from the line number given, but it does *not* renumber GOTOs and GOSUBs.

The next routine is a 'fool-proof' input routine that allows input anywhere on the Spectrum screen.

```
9000 IF I$="ASL" THEN LET
  LWR=31:LET HGR=123
9005 IF I$="NUM" THEN LET
  LWR=47:LET HGR=58
9010 LET I$=""
9015 LET C=C-1:FOR F=1 TO
  LEN+1
9020 PRINT AT L,C+F
9025 LET A$=INKEY$: IF CODE
  A$>LWR AND CODE
  A$<HGR OR CODE A$=13
  OR CODE A$=12 THEN GO
  TO 9035
9030 GO TO 9025
9035 IF CODE A$=12 THEN GO
  TO 9065
9040 IF CODE A$=13 THEN
  PRINT AT L,C+F:"
  ":RETURN
9050 LET I$=I$+A$
9055 PRINT AT L,C+F;A$
9065 IF F=1 THEN GO TO 9025
9070 LET I$=I$(1 TO
  F-2):PRINT AT L,C+F;"
  ":LET F=F-2:NEXT F
```

The program will accept numeric or full-character sets.

There are four variables to set before the program is called:

LEN—length of input

L—line to accept input on

C—column to start on

I$—type of input. If I$="ASL" then all the letters, numbers and other symbols may be used. If I$="NUM" then only numbers will be read in. This has to be set up only once: after that, all the input will be of the same type.

The routine is started by GOSUB 9000 and stores the input string in I$.

Justin Moffit

ENTERPRISING TIPS

Enterprise users may find the following tips useful.

POKE 49144,45—machine will crash when reset is pressed.

SET 12,0—tape sound on.

SET 12,255—tape sound off.

SET 27,×—set border colour to colour ×.

SET 36,255; SET 37,255—turns on tape motor.

SET 36,0: SET 37,0—turns off tape motor.

The character set is stored in locations 46720 through 47871. The first 128 bytes describe the top row of pixels of each character in the font; the next 128 bytes describe the second row, and so on. There are nine rows in all.

48828—address of status line memory.

49148 to 51—page registers which define which four of the possible 256 pages are currently selected.

Andy Beckett

LYNX BOX-FILL ROUTINE

Description

The section of machine code below utilises a small, fully-relocatable routine to provide the Lynx with a 'box-fill' facility. The routine can be used in Basic as shown, or in a larger machine code program.

Assembly code

```
LD A,64h
LD (9004h),A
LD HL,9EAh
LD A,OAh
LD (9000h),A
LD A,OFFh
CALL 626Ch
INC HL
LD A,(9000h)
DEC A
LD (9000h),A
JR NZ,F1h
LD DE,16h
ADD HL,DE
LD A,(9004h)
DEC A
LD (9004h),A
JR NZ,DFh
RET
```

Alterations

Various parameters in the code may be altered to change the format of the output (Fig 1).

POKE LCTN (100)+1, Number of lines	Depth of box
POKE LCTN (100)+9, Number of bytes	Width of box }
POKE LCTN (100)+29,31—Number of bytes	Width of box }
DPOKE LCTN (100)+6, & Position	0000=top-left of screen 1F7F=bottom-right of screen
POKE &626B, Number	Colour to be protected
POKE &625B, Number or INK 0 to 7	Colour of box

Fig 1

The Basic routine is given in line 100 below, and should be included in any Basic program that uses the routine.

Basic routine

```
100 CODE 3E 20 32 04 90 21 01
    10 3E 04
    32 00 90 3E FF CD 60 62 23
    3A 00 90
    3D 32 00 90 20 F1 11 1C 00
    19 3A 04
    90 3D 32 04 90 20 DF C9
```

Mark Wayman

```
110 CLS
120 POKE LCTN(100)+1,100
130 POKE LCTN(100)+9,10
140 POKE LCTN(100)+29,10

150 DPOKE LCTN(100)+6,
  &09EA
160 FOR C=1 TO 7

170 INK C
180 CALL LCTN(100)
190 INK 7
200 PRINT @ 39,220; "—
  PRESS A KEY—";
210 LET G$=GET$

220 CLS
230 NEXT C
240 CLS
250 POKE LCTN(100)+1,32
260 POKE LCTN(100)+9,4
270 POKE LCTN(100)+29,28
280 DPOKE LCTN(100)+6,&1001
290 FOR X=1 TO 7
300 INK X
310 CALL LCTN(100)
320 DPOKE
  LCTN(100)+6,
  DPEEK(LCTN(100)+6)=4
330 NEXT X

340 PRINT @ 28,220; "—
  PRESS A KEY TO END—
  ";
350 LET G$=GET$

360 FOR B=0 TO 12 STEP
  4
370 OUT &0080,B
380 PAUSE 1000
390 NEXT B
```

Fig 2 Basic demonstration program

VIC ROUTINES

This routine doubles the height of Vic-20 characters.

```
5 REM LARGE LETTERS
10 FOR I=1 TO 1024
20 B=PEEK (Y+32768)
30 POKE 5120+X,B
40 POKE 5121+X,B
50 X=X+2: Y=Y+1
60 NEXT I
70 POKE 36867, 155
80 POKE 36869, 253
90 PRINT CHR$(147)
```

The next two programs are for scrolling the Vic's screen. POKE 36864,X controls horizontal positioning of the screen, and POKE 36865,X controls vertical. The screen is initially set at horizontal—12 and vertical—38.

```
5 REM LEFT/RIGHT
10 FOR A=12 TO 63
20 POKE 36864,A
30 FOR T=1 TO 100: NEXT T
40 NEXT A
50 FOR A=63 TO 12 STEP -1
60 POKE 36864,A
70 FOR T=1 TO 100: NEXT T
80 NEXT A
```

```
5 REM UP/DOWN
10 FOR A=38 TO 151
20 POKE 36865,A
30 FOR T=1 TO 100: NEXT T
40 NEXT A
50 FOR A=151 TO 38 STEP-1
60 POKE 36865,A
70 FOR T=1 TO 100: NEXT T
80 NEXT A
```

Other POKEs are:

POKE 774,34: POKE 775,253—warm start if LIST occurs.

POKE 774,116: POKE 775,196—syntax error if LIST occurs.

POKE 818,34: POKE 819,253—warm start if SAVE occurs.

POKE 818,116: POKE 819,196—syntax error if SAVE occurs.

POKE 816,34: POKE 817,253—warm start if LOAD occurs.

POKE 816,116: POKE 817,196—syntax error if LOAD occurs.

POKE 650,255—key repeat.

POKE 650,64—no key repeat.

POKE 198,0—disables keyboard.

POKE 198,10: POKE 631,131—auto-load.

Andrew Colclough

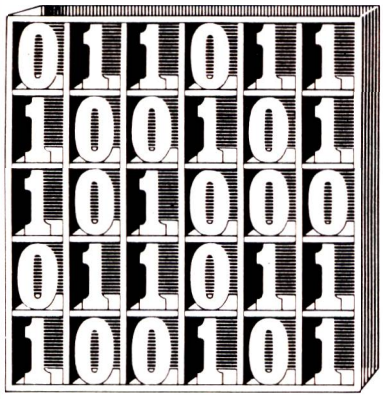
4807 CHAIN NETWORK CRASH RECOVERY

When a crash occurs on the CHAIN network, it is usually assumed that a user will have lost all unsaved work. This is not necessarily the case, and it is possible to recover programs, and so on. To do this, re-boot the network in the usual way, then go to the terminal to be rescued and type CTRL — SHIFT — 9, CTRL — B, C. When the prompt 'Server ID (hex)' appears, type RETURN. If the message 'successfully logged into server' comes up, type J103 which should appear as 'J>103' and all will be well.

Note that this procedure will not work on terminals which have been reset.

John Graham-Cumming

SUBSET



David Barrow presents more documented machine code routines and useful information for the assembly language programmer. If you have a good routine, an improvement or conversion of one already printed, or just a helpful programming hint, then send it in and share it with other programmers. Subroutines for any of the popular processors and computers are welcome but please include full documentation. All published code will be paid for. Send your contributions to SubSet, PCW, 32-34 Broadwick Street, London W1A 2HG.

ETERNAL TRIANGLE

Pascal (Datasheet 1) from John Hardman of Welling is a direct Z80 translation of the recursive 6502 Pascal's triangle routine from Robert Gardner-Medwin (*PCW*, April).

The usual description of Pascal's triangle is as a tabulation of the probabilities for x heads showing among y tossed coins. It is actually a table of binomial coefficients for expansions of $(b+a)^y$, calculated by the formula $C(x,y) = y! / (x!(y-x)!)$.

The coefficient formula uses both multiplication and division and can produce large intermediate values, so the algorithm in Pascal makes use of the triangle's structure to simplify the computation. Each cell value is formed by adding the two adjacent values on the preceding row.

Both Robert's original 6502 routine and John's Z80 translation return the incorrect value P(x,y) = 1 for x>y (see Fig 1).

```
:
:= PASCAL    Calculate Pascal triangle cell value.
:
:JOB         To calculate the value of a single cell in the
:            Pascal triangle (or coefficient of a binomial
:            expansion) by recursively calculating preceeding
:            cell values and adding.
:ACTION      (To calculate the Pascal number P(x,y) where x is
:            the column value and y is the row value, x and y are
:            repeatedly reduced until x=0 or x=y where P(x,y)=1.
:            The number of reductions gives the required value.)
:            IF x=0 OR x>=y:
:            THEN: [ P(x,y) = 1. ]
:            ELSE: [ Save current x,y.
:                    y = y - 1. Call PASCAL, compute P(x,y-1).
:                    Push current result.
:                    x = x - 1. Call PASCAL, compute P(x-1,y-1).
:                    Result = current result + stacked result.
:                    Restore x,y. ]
:
:CPU         Z80
:HARDWARE    None.
:SOFTWARE    None.
:
:INPUT       E = Pascal triangle cell column (x).
:            D = Pascal triangle cell row (y).
:OUTPUT      The cell value, P(X,Y), is in AHL.
:            P(X,Y) = Y! / (X! * (Y-X)!).
:            (If X=0 or X>=Y then result = 1.)
:            F is changed.
:            E and D are unchanged.
:ERRORS      Large input x or y values could cause overflow
:            of the 3-byte result variable.
:REG USE     A D E HL F
:STACK USE   x=0 or x>=y: 0.   0<x<y: 4 * (x + y - 1).
:RAM USE     None.
:LENGTH      26
:CYCLES      Not given.
:
:CLASS 2     -discreet      *interruptable     *promable
:-***--      *reentrant     -relocatable       -robust
:
:
PASCAL LD    HL,1        :Initiialise result in AHL to 1   21 01 00
       LD    A,E         :while testing input x value      7B
       OR    A           :for zero, if so exit immediately B7
       RET   Z           :with P(x,y) = 1.                 C8
:
       CP    D           :Compare x (in A) with y, then    BA
       LD    A,H         :clear A and exit immediately     7C
       RET   NC          :with P(x,y) = 1 if x>=y.         D0
:
       PUSH  DE          :Save current x,y.                D5
:
       DEC   D           :Compute P(x,y-1) by              15
       CALL  PASCAL      :recursive call to PASCAL.        CD lo hi
:
       PUSH  AF          :Save P(x,y-1) in AHL             F5
       PUSH  HL          :on stack.                        E5
:
       DEC   E           :Compute P(x-1,y-1) by            1D
       CALL  PASCAL      :recursive call to PASCAL.        CD lo hi
:
       POP   DE          :Recover low two bytes, then      D1
       ADD   HL,DE       :high byte, of P(x,y-1) and add   19
       POP   DE          :in to P(x-1,y-1) to give         D1
       ADC   A,D         :P(x,y) in AHL.                   8A
:
       POP   DE          :Restore x and y, then exit to    D1
       RET               :next level or end PASCAL.        C9
:
```

Columns (X):	0	1	2	3	4	5	6	7	8
Rows (Y): 0	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
2	1	2	1	1	1	1	1	1	1
3	1	3	3	1	1	1	1	1	1
4	1	4	6	4	1	1	1	1	1
5	1	5	10	10	5	1	1	1	1
6	1	6	15	20	15	6	1	1	1
7	1	7	21	35	35	21	7	1	1
8	1	8	28	56	70	56	28	8	1

Fig 1

BLAISE OF GLORY

Dissatisfied with the slow speed and heavy stack use of his 6502 Pascal, Robert Gardner-Medwin presents Blaise (Datasheet 2).

Pascal saves the partial result found for P(x,y−1) while recursing to compute P(x−1,y−1). The two values are then added to form P(x,y). Blaise differs by initially clearing the result variable and performing a pre-recursion test for input x>=y, returning the correct zero value if that is the case (Fig 2).

For legitimate triangle values, the improved routine needs to increment the partial result P whenever recursion reaches the lowest level (x=0 or x=y). Apart from correcting the error in Pascal the results are the same, but without the heavy stack requirements. Three bytes less on stack for every recursive call is a weighty consideration for 6502 with its single-page stack.

DATASHEET 1

```
:
:= PASCAL    Calculate Pascal triangle cell value.
:
:JOB         To calculate the value of a single cell in the
:            Pascal triangle (or coefficient of a binomial
:            expansion) by recursively calculating preceeding
:            cell values and adding.
:ACTION      (To calculate the Pascal number P(x,y) where x is
:            the column value and y is the row value, x and y are
:            repeatedly reduced until x=0 or x=y where P(x,y)=1.
:            The number of reductions gives the required value.)
:            IF x=0 OR x>=y:
:            THEN: [ P(x,y) = 1. ]
:            ELSE: [ Save current x,y.
:                    y = y - 1. Call PASCAL, compute P(x,y-1).
:                    Push current result.
:                    x = x - 1. Call PASCAL, compute P(x-1,y-1).
:                    Result = current result + stacked result.
:                    Restore x,y. ]
:
:CPU         Z80
:HARDWARE    None.
:SOFTWARE    None.
:
:INPUT       E = Pascal triangle cell column (x).
:            D = Pascal triangle cell row (y).
:OUTPUT      The cell value, P(X,Y), is in AHL.
:            P(X,Y) = Y! / (X! * (Y-X)!).
:            (If X=0 or X>=Y then result = 1.)
:            F is changed.
:            E and D are unchanged.
:ERRORS      Large input x or y values could cause overflow
:            of the 3-byte result variable.
:REG USE     A D E HL F
:STACK USE   x=0 or x>=y: 0.   0<x<y: 4 * (x + y - 1).
:RAM USE     None.
:LENGTH      26
:CYCLES      Not given.
:
:CLASS 2     -discreet      *interruptable     *promable
:-***--      *reentrant     -relocatable       -robust
:
:
PASCAL LD    HL,1        :Initiialise result in AHL to 1   21 01 00
       LD    A,E         :while testing input x value      7B
       OR    A           :for zero, if so exit immediately B7
       RET   Z           :with P(x,y) = 1.                 C8
:
       CP    D           :Compare x (in A) with y, then    BA
       LD    A,H         :clear A and exit immediately     7C
       RET   NC          :with P(x,y) = 1 if x>=y.         D0
:
       PUSH  DE          :Save current x,y.                D5
:
       DEC   D           :Compute P(x,y-1) by              15
       CALL  PASCAL      :recursive call to PASCAL.        CD lo hi
:
       PUSH  AF          :Save P(x,y-1) in AHL             F5
       PUSH  HL          :on stack.                        E5
:
       DEC   E           :Compute P(x-1,y-1) by            1D
       CALL  PASCAL      :recursive call to PASCAL.        CD lo hi
:
       POP   DE          :Recover low two bytes, then      D1
       ADD   HL,DE       :high byte, of P(x,y-1) and add   19
       POP   DE          :in to P(x-1,y-1) to give         D1
       ADC   A,D         :P(x,y) in AHL.                   8A
:
       POP   DE          :Restore x and y, then exit to    D1
       RET               :next level or end PASCAL.        C9
:
```

DATASHEET 2

```
:
:= BLAISE    Calculate Pascal triangle cell value.
:
:JOB         To calculate the value of a single cell in the
:            Pascal triangle (or coefficient of a binomial
:            expansion) by recursively calculating preceeding
:            cell values.
:ACTION      (To calculate the Pascal number P(x,y) where x is
:            the column value and y is the row value, x and y are
:            repeatedly reduced until x=0 or x=y where P(x,y)=1.
:            The number of reductions gives the required value.)
:            Result = 0.
:            IF x>y
:            THEN: [ P(x,y) = 0. ]
:            ELSE: [ IF x=0 OR x=y:
:                    THEN: [ P(x,y) = 1. Result = result + 1. ]
:                    ELSE: [ y = y - 1.
:                            Recurse, compute P(x,y-1).
:                            x = x - 1.
:                            Recurse, compute P(x-1,y-1).
:                            y = y + 1. x = x + 1. ] ]
:
:CPU         6502
:HARDWARE    None.
:SOFTWARE    Local subroutine PINC, to increment a 3-byte
:            variable in M1,2,3 (low order byte in M1).
:
:INPUT       X = Pascal triangle cell column.
:            Y = Pascal triangle cell row.
:OUTPUT      The cell value, P(X,Y), is in M1,2,3.
:            P(X,Y) = Y! / (X! * (Y-X)!).
:            (If X=0 or X=Y then P(X,Y) = 1.)
:            (If X>Y then P(X,Y) = 0.)
```

```
:            M0, P and A are changed.
:            X and Y are unchanged.
:ERRORS      Large input X or Y values could cause the Stack
:            Pointer to wraparound the 256-byte stack or an
:            overflow of the 3-byte result variable.
:REG USE     P A X Y
:STACK USE   X=0: 0.   0<X<Y: 2Y.   X>=Y: 0
:RAM USE     M0 M1 M2 M3
:LENGTH      45
:CYCLES      Not given.
:-------------------------------------------------------------
:CLASS 2      -discreet       *interruptable      *promable
:-***--       *reentrant      -relocatable        -robust
:=============================================================
:
BLAISE LDA   #0          :Initialise the three byte        A9 00
       STA   M1          :result variable M1,2,3 to        85 M1
       STA   M2          :return a default value of 0      85 M2
       STA   M3          :if triangle cell column          85 M3
       STX   M0          :value (x) is greater than        86 M0
       CPY   M0          :its row value (y), test for      C4 M0
       BCC   BLEND       :this and exit if so.             90 13
:
BLAREC TXA               :First test x value for zero,     8A
       BEQ   PINC        :if so, P(x,y) = 1.               F0 11
:
       STY   M0          :Else store y value in page       84 M0
       CPX   M0          :zero for test if x=y,            E4 M0
       BCS   PINC        :if so, P(x,y) = 1.               B0 0B
:
       DEY               :Else compute P(x,y-1) by a       88
       JSR   BLAREC      :recursive call.                  20 lo hi
:
       DEX               :Compute value at cell (x-1,y-1)  CA
       JSR   BLAREC      :by a recursive call.             20 lo hi
:
       INY               :Set x and y to index current     C8
       INX               :cell and exit either to compute  E8
BLEND  RTS               :next cell or exit routine.       60
:
PINC   INC   M1          :Either x=0 or x>=y. In both      E6 M1
       BNE   PINCH       :cases P(x,y) = 1 so increment    D0 06
       INC   M2          :result M1,2,3. Then exit this    E6 M2
       BNE   PINCH       :level to compute cell value at   D0 02
       INC   M3          :next level, or exit routine if   E6 M3
PINCH  RTS               :required cell value computed.    60
:=============================================================
```

Columns (X):	0	1	2	3	4	5	6	7	8
Rows (Y): 0	1	0	0	0	0	0	0	0	0
1	1	1	0	0	0	0	0	0	0
2	1	2	1	0	0	0	0	0	0
3	1	3	3	1	0	0	0	0	0
4	1	4	6	4	1	0	0	0	0
5	1	5	10	10	5	1	0	0	0
6	1	6	15	20	15	6	1	0	0
7	1	7	21	35	35	21	7	1	0
8	1	8	28	56	70	56	28	8	1

Fig 2

MORE SPEED, LESS STACK

A feature of Pascal's triangle is that P(1,y) = y. The importance of this is demonstrated in Fig 3 which shows that 18 recursive calls and 10 increments have to be made by Blaise, or 18 calls and nine additions by Pascal, to compute P(2,5).

The recursive calls in the lower section of Fig 3 are unnecessary if, instead of testing x=0, a test is made for x=1 and the current value of y is added to the partial result. Only six recursive calls, three simple additions and one increment are needed.

Further improvement is possible. If you look at Fig 2, you will see that the triangle reflects about 2x=y with the result that P(y−1,y) also has the value y. By replacing the x=y test by a test for x+1=y, P(2,5) can be calculated in as few as four recursive calls and three additions of y to the partial result.

Any method of restricting the number of recursive calls is obviously important when calculating P for large x or y, where the stack might otherwise overrun the memory allotted to it. But the method can also improve timing on the calculation of small values.

Blaise, for example, will perform 18 recursive calls and eight increments to find P(1,8), and 54 calls and 28 increments to find P(2,8). A routine using x=1 or x+1=y as its lowest level will return P(1,8) without recursion in only one addition, and P(2,8) in just 10 calls and six additions.

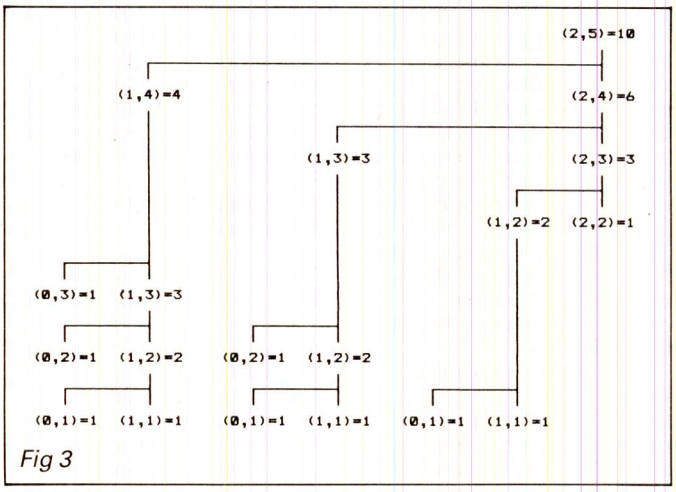


Fig 3

LIGHTNING STRIKES

No sooner had I completed the discourse in 'More speed, less stack' than a letter arrived from Andrew Simpson of Perth. After noting the possibility of the improvements as mentioned, which he estimates will reduce the execution time by a factor of 10, he writes:

'One need not stop there! For x=2 and x+2=y, the required increment is the sum 1 + 2 + . . . + (y−1), for which a simple decrementing loop suffices. This halves the running time again.

'Even then, for all but the smallest input values, the routine is just too slow, and implementing the coefficient formula is not all that difficult:

P(x,y) = y!/(x!(y−x)!) = y/1 * (y−1)/2 * . . . * (y−x+1)/x, 0<x<y.

'There are x number of terms to compute,but the identity, P(x,y) = P(y−x,y) may be used to reduce the number of terms when x>(y/2). Left-to-right evaluation generates the sequence P(1,y), P(2,y), . . . ,P(x,y), and the only large number involved is the developing result. This algorithm is fast, even in Basic, but I must leave it to the experts to come up with a lightning machine code version.'

Basic is notorious for its slow additions, so at what point does this algorithm become faster than the improved recursive method in machine code? No more 'Pascals' will be accepted unless they return a four-byte result with overflow flagged, and are documented with complete timing details.

Z80 COUNTLESS LOOPS

Ian Beardmore of Shefford in Bedfordshire regularly runs out of registers in his more complex Z80 routines, leaving himself nothing to count loops with. To save the bother of writing sophisticated stack swap operations or relegating all his variables to memory bytes, he uses a sequence of CALL instructions placed before the routine to simulate looping. This is commonly used for single repeats, such as the 6809 (Fig 4).

Assuming no registers are free to use as counters, Ian reckons that the method is as quick for counts up to 256 (single-byte count) and slightly faster for larger counts. The problems are an overly large increase in both code and stack bytes, and a loss of relocatability.

```
:=============================================================
:
LOOP16 CALL LOOP8       :This sequence of CALL instructions
LOOP8  CALL LOOP4       :is used for counts of 2^n. The number
LOOP4  CALL LOOP2       :of "loops" doubles for each CALL
LOOP2  CALL CODEA       :added to the sequence.
:
CODEA  .    .           :Actual code executed in
       .    .           :the simulated loop, RET causes either
       RET             :another iteration or final exit.
:
:
LOOP_7 CALL LOOP_2      :This sequence of CALL
LOOP_5 CALL LOOP_2      :instructions is used to
LOOP_3 CALL CODEB       :simulate odd count values.
LOOP_2 CALL CODEB       :
:
CODEB  .    .           :The actual routine code
       .    .           :iterated 2, 3, 5 or 7 times
       RET             :exiting or "looping".
:=============================================================
```

Fig 4

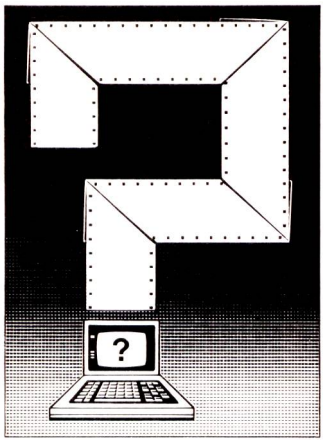
ITeC

Alan Tootill, the father of SubSet, is now manager of the new Stockport Information Technology Centre.

ITeCs aim to fulfill a multi-purpose role by, among other things, imparting practical skills in information technology to young people, increasing the general public's computer awareness, and providing services to industry and commerce. **END**

COMPUTER ANSWERS

Simon Goodwin takes his toolkit to your problems. The address to write to is Computer Answers, PCW, 32-34 Broadwick Street, London W1A 2HG.



Tandy and Apricot Cobol

About a year ago I had access to a Tandy Model 4 which has a Z80 processor and uses the CP/M operating system. I purchased a copy of the RMCobol compiler and a run-time diskette.

I have now purchased an Apricot PC. I knew that I would not be able to slot my RMCobol compiler diskette into my Apricot PC and use it efficiently, due to the different processors. Programs can be transferred between the different diskette sizes.

Can I use my RMCobol compiler to write and run Cobol programs on my Apricot PC? Can I use the programs written with the Tandy machine on the Apricot?
IM Bawa, Streatham, London

The disk for the Tandy contains a program which translates from Ryan-McFarland Cobol into Z80 machine code. Your Apricot expects programs written in 8086 machine code, which is very different from Z80 machine code.

Programs to convert Z80 code into 8086 code do exist. (Microsoft's Basic interpreter was translated using such a program) but the task is difficult. Translated programs are generally much slower and longer than those written in the correct code initially. The translator will not be able to cope if the original program contains references to hardware which is not present in the final machine.

Another problem with machine translation is that it makes error diagnosis very difficult. Imagine writing a book in English and then translating it into Greek, armed only with an English-Polish dictionary and a Polish-Greek dictionary. In this case, Z80 code is the equivalent of Polish. Errors multiply and become increasingly hard to correct if you have to go through an intermediate language.

The XLT86 code translator is available, but is really a product aimed at software houses rather than business users.

Rather than buy a translator for compiled programs, I'd advise you to buy a new Cobol compiler for your Apricot and recompile your original 'source' programs. A version of RMCobol is in the ACT catalogue of third-party sofware for the Apricot, but you may have to ring around a few dealers to obtain a copy.

ACT recommends two Cobol compilers — Microsoft Cobol and CIS Level 2 Cobol. Both of these are expensive but widely available. You should not have any major difficulty converting your RMCobol programs to suit the other compilers, although you may have to read the manuals quite carefully if you've used obscure features of the language.

The art of programming slowly

Recently I bought the first three volumes in the series *The Art of Computer Programming*. What has happened to the other four volumes in the series? Although the preface to the first volume suggests that the author finished writing all seven volumes in 1967, the third was only published in 1973. Do you know if and when the remaining volumes will be published?
GR Hjaltson, Reykavik, Iceland

The publisher Addison Wesley says that work on the series is still taking place, and it hopes to release volume four some time in 1986.

Donald Knuth, the author, seems to have become the victim of his own success with this series. The first brilliant and exceptionally comprehensive volumes have set a very high standard for the rest.

In 1967 the computer industry was barely 20 years old, and a comprehensive programming guide may have seemed feasible. Since then, computing has advanced at such a rate that it is difficult to keep a monthly magazine up-to-date, let alone a series of books. It's hard to see how Knuth can encapsulate the rest of computing knowledge in four volumes.

A clearer view

I work as a journalist using a BBC Micro and the View word processor. I have a standard 80-column monitor. View has many facilities that I value, but it lacks a display of pagination while working on a document. There is a screen facility that can reveal the paging of a document when it has been completed, but it is a very cumbersome command, especially with long documents.

What is the answer? Are there any monitors with an A4 format? I have seen such a monitor but it was integral to a £10,000 system for high-resolution graphics work — beyond my pocket!
D Pickup, Low Fell, Tyne and Wear

Very few low-cost word processors display page breaks as text is entered. They are quite difficult to process properly, as they are affected in subtle ways by alterations to headers and footers at either end of the page, and the insertion and deletion of text. Psion's Quill is probably the cheapest word processor which allows continuous text entry with automatic display of page breaks, but it uses about 120k of memory on the Sinclair QL so there's little chance that it will be converted to run on the 32k BBC Micro!

If you need to get page breaks right first time, you should look at the page-oriented word processors for the BBC Micro. These accept text page-by-page, rather than in a continuous stream. Such programs encourage you to format your document as you edit it (rather than later) — if you do a lot of creative writing, you will probably find this a chore.

There are three page-orientated word processors for the BBC Micro: Beebpen (Braintech (01) 997 8986), Edword (Clwyd Technics (035) 283 751) and Scribe (Merlin Computer Products (0792) 467980). All three are supplied on ROM.

In answer to your second question, it won't help you to connect an A4-sized screen as that won't alter the number of lines which the BBC Micro's display electronics can generate. You will only have 20-odd lines displayed at any one time but with a big margin at the top and bottom of the display!

To show the 70 lines of text that make up a full A4 page, you need special electronics to generate the extra lines. It's not really feasible to add this to the Beeb, and you would still have to make major changes to your software before the extra lines could be used. The page-orientated word processors I have listed only show you part of a page at a time, although they do indicate page boundaries as text is entered.

Electron interface

Is there a disk interface for the Acorn Electron that uses standard 5¼in drives? Does Acorn's Plus 3 only run 3½in drives? Will the disk interfaces for the BBC Micro work on the Electron? Is there any other fast data drive on the market? Is it possible to swop the Atari-style joystick plug so that the Quickshot 2 joystick will fit the analogue joystick port on the Acorn Plus 1?
T Oldreive, Gowdall, N Humberside

Cumana ((0483) 503121) has a disk interface compatible with 5¼in and 3½in drives — it costs £150 (not including the drive) and plugs into the Acorn Plus 1 interface. Unfortunately it doesn't use Acorn's format, although it comes with software to

convert unprotected disks of both sizes.

Pace ((0274) 729306) is also working on a 5¼in disk interface for the Electron, but it is not available at the time of writing due to a shortage of the 8271 disk controller chips. The Plus 3 is only designed to work with 3½in disks, although it could work with a larger drive via an appropriate cable.

You can't use the BBC Micro disk interface with the Electron as the requisite sockets and signals don't exist on the Electron circuit board.

I have seen adverts for 'fast drives' for the Electron, but not any working hardware. I'd advise you to buy 'proper' disk drives.

The Quickshot joystick only generates simple digital signals (up, down, left, right and fire) whereas Acorn joysticks produce a gradual (up-a-bit, left-a-bit) analogue signal. You can use an adaptor to connect the Quickshot to the analogue port, but you should be aware that this type of joystick will only give crude 'all or nothing' control. If you've already got the Plus 1, C-tech Computers ((061) 366 7794) can help, otherwise you should buy a digital joystick interface. These are available from First Byte Computers ((0332) 365280).

Keyboard confusion

I have recently purchased an add-on keyboard (not Sinclair's) for my 48k Spectrum computer, and find it very much easier to use than the original rubber keys, particularly when using the word processor (Tasword). However, when I use Basic, the original multiple key functions still operate.

Can I change the computer so that commands can be typed in properly, rather than using extend mode, and so on? Is it possible to simplify the sequence when typing special symbols? At present, I have to press four keys just to get a square bracket.
G Sumpter, Rossendale, Lancs

The Spectrum's 'keyword entry' scheme worked well on the ZX-80, where it first appeared, but it has now grown unwieldy. The idea was to reduce the number of presses needed for a given character (and to make automatic syntax checking easier), but it sometimes has the reverse effect on the Spectrum.

The scheme is built into the computer's ROM, but it is possible to override it with software. A program called MegaBasic will solve the keyword problem, and add several dozen new commands to ZX Basic. It occupies about 19k of memory, leaving you with only 22k for programs and data. The program allows user-defined keys, so you should be able to reduce the number of presses needed for square brackets to two. MegaBasic is available from *Your Spectrum* ((01) 631 1433).

Alternatively you could dig out an old copy of *Your Computer* (June 1984) which contains a short machine code program to allow keywords typed in full. The program takes 230 bytes and offers no other features, but it works.

Standard links

Why isn't there a modulator that will let a tape recorder be hung onto the serial port of a micro, either to receive or transmit? All my micros have a serial port of one type or another, so I could transfer the data between the machines without having to worry about compatibility. Surely someone could work out the electronics and *PCW* could publish it as a project. After all, it would be compatible with all machines.
P Hickman, Kingston, Surrey

In theory this is possible, but in practice it is fraught with difficulty. The snag is that there are many ways of wiring so-called 'compatible' equipment together. You must take account of the 'handshaking' (the way machines warn each other that they are busy) and a wide variety of machine-specific quirks. If everything is set correctly, you can get two computers to talk to one another, but, if anything is wrong, the system probably won't work at all.

Many computers are sold without the technical information needed for you to make a connection. Often this hides the fact that a 'standard RS232' interface is almost totally non-standard — it might drive a printer, but you shouldn't necessarily expect it to do anything else. Built-in RS232 interfaces on home computers are worst in this respect.

If you want to connect Sinclair computers together, you're best advised to ignore the RS232 and use the built-in network. However, the Spectrum and QL use different characters to mark the end of lines — the Spectrum uses the usual CHR$(13) while the QL follows the Unix convention and expects CHR$(10). If you've some programming ability, it can often be worth connecting small computers via game ports rather than an RS232, POKEing data back and forth.

Atari enquiries

Could you tell me if there is any point in buying a modem for my Atari home computer? There does not seem to be any opportunity for Atari users to access networks like Prestel.

I am considering buying an Atari 520ST with disk drive and monitor. I am especially interested in integrated programs, such as Jazz on the Apple Macintosh. Will any such programs be included in the price of the ST, and will the graphics be up to the standard of the Macintosh?
I Fairbairn, Chislehurst, Kent

There are several bulletin board services open to Atari users; these are small information services run (mostly) by hobbyists. At least three services cater specifically for Atari users: BABBS in Bath (0225) 23276, which operates at night (9pm-8am) and at weekends; MBBS in Mitcham (01) 640 2617, which can be contacted on Thursdays and Sundays between 10am and 8pm; and WABBS in Worthing (0903) 42013, which is a 24-hour ring-back service (let the phone ring once to signal that you want to access the service, and then call again with your modem connected. All these services work at 300 baud.

You will need a modem and some means of connecting it to your Atari. Modems expect an RS232 signal from the computer, but the Atari does not have an RS232 interface as standard. If you have one of the rare 850 interface units you can connect a modem to it directly, but this won't give you access to the Prestel service because the 850 can't transmit and receive concurrently at two different speeds.

Miracle Technology recently announced a Prestel/modem adaptor for Atari users; it costs about £60 (not including the modem). Details from Silica Shop on (01) 309 1111.

At the time of writing, Atari plans to include some business software with the ST, but of course these plans might change. You should have GEM (Graphics Environment Manager) bolted on to TOS (a version of the CP/M 68k operating system), BOS (Business Operating System), the languages Logo and Basic, and GEM Write and GEM Paint. I don't think that packages such as this will fit in the memory of early STs, although they should be available when the operating system has been copied into ROM. At present much of the ST's 512k of memory is occupied by the operating system.

The medium-resolution display of the ST has less dots than that of the Macintosh, but each may be in one of four colours. The high-resolution black and white display should be marginally better than that of the Mac, but it doesn't seem to work at all on machines delivered up to the time of writing. This problem should have been cleared up by the time you read this.

Zilog Z800 revisited-new chip expected

In *PCW* July I answered a question about the Zilog Z800 processor, pointing out that it was four years late and details were still not forthcoming from the manufacturer. Subsequently, Zilog UK has published a new *Data Book* which includes 70 pages of notes on the processor. There are still no instruction timings because the chip has not been manufactured yet, but Zilog expects to produce a prototype later this year. If all goes well, sample chips should be available in 1986.

The new chip should be compatible with most Z80 software, but you can't just plug it into a Z80 socket as it uses Intel-style multiplexed address and data buses.

The *cogniscenti* will be interested to hear that the chip will feature fast cache memory, timers, a UART and various 24-bit bus controllers. There are many new instructions, including full 16 × 16 bit multiplication and division. For information contact Zilog UK on (0628) 39200. END

Connection confusion

Peter Tootill pleads for standardisation of connectors, and looks at moves in this direction from the Public Services Working Party and the CCTA.

One of the main problems with the RS232 or V24 standard is the connector. The normal one is the 25-way D type, which is expensive and bulky. Several modem and computer manufacturers have now started to use DIN connectors, but there is no real standardisation.

The Government's Public Services Working Party in association with the Central Computer and Telecommunications Agency (CCTA) has now taken on this standardisation. Indeed, it has gone further by proposing to abandon the archaic voltage levels of the RS232 standard (+3 to +24 volts for logic 0, or on, −3 to −24 volts for logic 1, or off). With modern ICs used in micros, especially portable micros working on a five-volt supply, these levels are very difficult to provide.

The new standard (called S5/8, for serial five-volt, eight-pin) proposes an eight-pin DIN connector (Fig 1), and

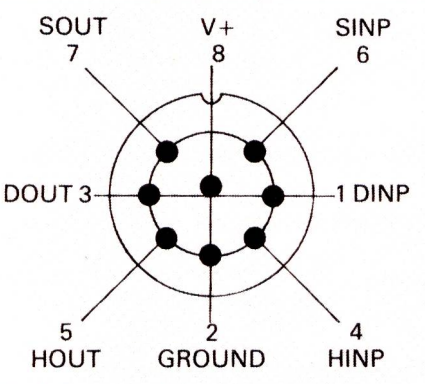


Fig 1 Proposed pin connections

uses HCMOS voltage levels (that is, approximately +5 volts for on and zero volts for off). The advantage of the eight-pin connector is that the socket will accept three, five and seven-pin plugs as well as eight in applications where only some of the signals are required. The actual signals proposed, together with their pins and also the approximate RS232 equivalents, are listed in Fig 2.

Connector leads using five-pin DIN plugs will be suitable for most applications, and these are widely available for about £2.

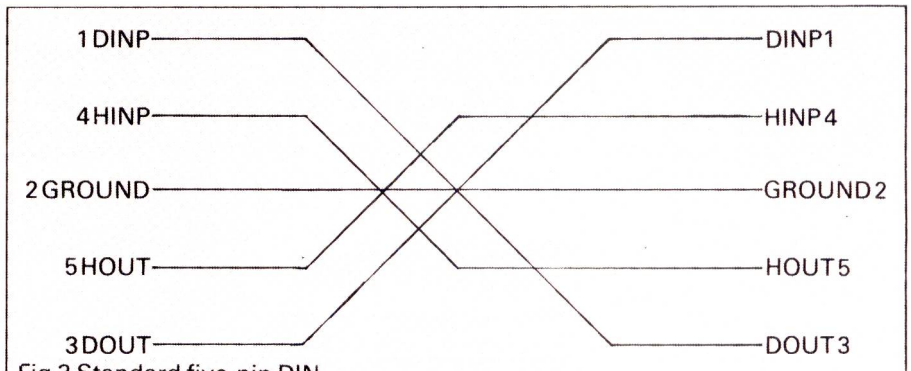


Fig 3 Standard five-pin DIN

The only shortcoming of this standard is that it is light on control signals. If a computer is connected to an auto-answer modem that can handle two different baud rates, you will need at least two if not three control lines from the modem to the computer. These would be carrier detect, speed select and perhaps ring indicator if CCITT 108/1 working is used. (This is where the modem tells the computer that the phone is ringing, and lets the computer decide whether to answer or not. This method can be used for systems which are running at certain times or using the ring-back method). In addition, a status signal informing the computer that the modem is ready for action is required. No doubt these problems can be overcome, but again there needs to be standardisation or we'll be worse off than we are now.

It is proposed that the standard would replace the Centronics interface for printers, too. A cheap adaptor (costing no more than the normal Centronics printer cable) would be able to convert the signals from your micro to the printer. It would be powered by the five-volt line available on pin eight of the connector.

The standard has already been adopted for the Liberator (see pages 174-175), and will be submitted to the British Standards Institute for adoption as a British Standard.

For more information, contact Andrew Hardie or Dennis Morley at the Public Services Working Party, c/o Room 213, River Walk House, 157-161 Millbank, London SW1P 4RT.

Terminal software

Some time ago I asked readers to send in details of terminal programs for micros. Some of the packages mentioned here are professionally produced, while others are written and sold by amateurs. I haven't tried any of them, so no endorsement is implied by inclusion.

Under £10

Spectrum: Prestel and V23 BBS prog-

Pin no	S5/8 name	Description	RS232/V24 equivalent name/description
1	DINP	Data input	Transmit data (TD)
2	Ground		Signal ground
3	DOUT	Data output	Receive data (RD)
4	HINP	Handshake inp	Data terminal ready (DTR)
5	HOUT	Handshake out	Clear to send (CTS)
6	SINP	Status inp	Ready to send (RTS)
7	SOUT	Status out	Data set ready (DSR)
8	V+	+5 volt source	N/A

Fig 2 Proposed signals and RS232/V24 equivalents

ram, microdrive and cassette storage supported. £5.95 from Stephen Adams, 1 Leswin Road, London N16 7NL. Tel: (01) 254 1869.

Sharp MZ-80K (also MZ-700 & MZ-80-A). Fairly comprehensive spec, including Xon-Xoff, XModem. Ivan Andrews, (01) 267 8534 (or via TBBS London (01) 348 9400).

Atari: Prestel terminal program, £10, from Jon Sanders, 24 Greenacres, Birdham, Chichester PO20 7HL (or via SBBS).

£10-£50

Comstar: BBC Micro, very comprehensive specification including XModem, Xon-Xoff, Prestel, and so on. £39.95 from Pace, 92 New Cross Street, Bradford BD5 8BS. Tel (0274) 429306.

£50-£100

Comms QX-10: Epson QX-10 and PX-8. Fairly comprehensive spec including XModem, Xon-XOff, predefined messages, £85+VAT from Sevenoaks Specialised Business Systems, 51 Castle Drive, Sevenoaks, Kent TN15 6BR. Tel (09592) 2585.

PrEDITor: BBC Micro, Prestel terminal/editor, also standard terminal features, supports disk and tape. £60 from MarlS, 145 Weston Road, Runcorn, Cheshire WA7 4LQ. Tel: Runcorn 73538 or Formby 77095.

Over £100

Assist: IBM, ACT, DEC, CP/M. Includes Xon/Xoff, function keys, translation tables, text Prestel, and so on. £195 from Userlink (see next item)

IT (Information Transfer): IBM, CP/M, VAX 11/750. Specifically designed for high-speed searching of online databases. Includes automatic formulation and even automatic execution of searches, extensive help system for novices. £395 from Userlink Systems Ltd, Mansion House Chambers, High Street, Stockport, Cheshire SK1 1EG. Tel (061) 429 8232.

Crosstalk: CP/M, CP/M-86, MS-DOS. Includes auto-dial, error-checking file transfer, terminal emulation, and so on. Published by Microstuf, available from most dealers.

Easyterm: IBM, Apple II, 11e, III to Honeywell mainframe or mini. Synchronous and asynchronous versions. From £150-£750. Micro Core Ltd, 5 Broomfield Road, Chelmsford, Essex CM1 1SY.

Commodore: 3032, 4032, 8032, 8096. £150 from Zuccarelli Labs Ltd, 50 Hungerford Rd, London N7 9LP. Telecom Gold 81:JAM001.

SWAP: various systems including ACT, BBC, Rair, ICL, RML 380Z, and many more. Micro-to-micro file transfer program. £135 from Mercator Computer Systems Ltd, 3 Whiteladies Road, Clifton, Bristol BS8 1NU. Tel: (0272) 731 079.

Price unknown

Chameleon: Atari. Includes standard terminal. VT52 and ADM-3A modes. From Atari Program Exchange.

NEC ARC: DEC VT100/52. Tektronix 4010 and Honeywell VIP7801 terminal emulation. From American Computers and Engineers Ltd, 241a West George St, Glasgow G2 4QE. Tel: (041) 248 2427.

Other contacts

Computer Communications, 163 Longford Road, Cannock, Staffs WS11 3LG. Tel: (0534) 77640.

Chameleon Software Ltd, 106a Bedford Rd, Wootton, Beds MK43 9JB. Tel (0234) 7665068 (Unix systems).

User groups are another good source of terminal programs: for example, there is the XModem/UKM7 series from the CP/M User Group.

Dialling Code Decoder

Readers often ask for the locations of BBSs to be published as well as the dial code. I have recently discovered a useful BT publication called *Dialling Code Decoder*. It lists all the UK dialling codes in numerical order, covering not just the main code, but also the sub-areas. Therefore you know that while (0596) is Keswick, a number starting with (0596) 81 is Basenthwaite Lake, (0696) 85 is Buttermere, and so on. It also gives a breakdown of the major cities.

The cost is £2.50, plus postage, from your local BT sales office or from the publishers, The Telecommunications Press, 9 Queen Anne's Gate, London SW1H 9BY. END

UK free networks

Bulletin Board	Phone Number	Notes
Aberdeen ITEC	(0224) 641585	V.23
BABBS-Bath	(0225) 23276	300/300 baud rate; 9pm-8am weekdays, 9pm-noon weekends; Atari-based system, ring-back system
BABBS-Felixstowe	(0394) 276306	300/300 baud rate; 24 hours daily; Apple users' group
BABBS TWO-Basildon	(0268) 778956	300/300 baud rate; 24 hours daily; Apple users' group with special area for queries to Apple UK
Basildon ITeC	(0268) 22177	Prestel type service
	(0268) 25122	Atari based 300 baud. 24 hour
BASUE	(01) 373 6337	24 hour
Blandford Board TBBS	(0258) 54494)	300/300 baud rate; 24 hours daily
CABB TBBS	(01) 631 3076	300/300 baud rate; 24 hours daily + 1200/75
CBBS SW	(0392) 53116	300/300 baud rate; 24 hours daily
CBBS Surrey (Woking)	(04862) 25174	1200/75 and 300/300 baud rates; 24 hours daily; jokes, jobs, reviews, news
Chatham (Kent)	(0634) 815805	6pm/9am daily + weekends 7 bits, even parity; sales and wants — cars, houses, computers
CNOL Lancaster TBBS	(0524) 60399	300/300 baud rate; 24 hours daily; Clinical Notes Online service, mainly for medical users; works in conjunction with a database on the Datastar network
Computers Incorporated Newcastle (CBBS)	(0207) 543555	300/300 baud rate; 24 hours daily; primarily business-oriented
Forum 80 Hull	(0482) 859169	300/300 baud rate; 5-11.30pm weekdays, noon-11.30pm Sundays, Bell 103 standard, midnight-8am daily; international electronic mail, library for up/downloading
Forum 80 SPA	(0926) 39871	300/300 baud rate; 11pm-midnight daily; TRS-80 and Genie users' group
Forum 80 Wembley	(01) 902 2546	300/300 baud rate; 7-10pm weekdays, midday-10pm weekdays; electronic mail, library for down loading; ring and ask for Forum 80
Fido Compulink	(06286) 63571	24 hour
Fido Fastnet	(051) 260 5607	10pm-8am BELL 103/212a tones only at present
Fido Fore TBBS	(01) 301 4110	Fido 1am-8am
Hackney BBS	(01) 985 3322	V.23 Password: PUBLIC
Hamnet Hull	(0482) 497150	300/300 baud rate; 6pm-8am daily
Livingstone, Scotland	(0506) 38526	Atari, 24 hours daily
London Underground	(01) 863 0198	24 hours V.21/V.23 (Viewdata coming soon) BBC Based (colour for BBC users)
Liverpool Mailbox TBBS	(051) 4288924	300/300 baud rate; 24 hours daily; sponsored by INMAC; electronic mail, program downloading, TRS-80 information; messages for *PCW* can be left on the board and will normally be read by us within 24 hours

TRANSACTION FILE

Your chance to buy, sell or swap equipment.

● TANDY TRS-80 Mod-III. 48k twin 40-track drives, £550. Lineprinter VIII, £100. Twin 40-track d/d external drives, half height, £175. Twin 80-track d/d external drives, £150. Tel: (028373) 3574.

● EPSON MX80FT with Centronics and RS232 interfaces fitted. Complete in original box, £175 ono. Tel: Billingshurst, Sussex (040) 381 2883.

● SEIKOSHA GP80A printer, £85. Tel: Michael Patton on Accrington (0254) 383598 (eves).

● COMMODORE 8032 business micro. Plus 8050 twin disk drive with Visicalc and Wordcraft, all for £550. Tel: 01-499 5342 (day) or 01-651 1777 (eves).

● OLIVETTI M21 256k, twin disks. Only 3 months old. Parmlec printer cable; MS-DOS; GW-Basic, £1,750 ono. Tel: 01-777 5734.

● SHARP MZ80K. Used only by one adult learning Basic programming. Perfect condition, £200 ono. Tel: (09326) 2612 (Cobham, Surrey).

● TRS80 Model III. Twin disk 48k, Superscripsit, Visicalc, Profile Plus, Cobol, Bascom, LDos, Edas, modem, disks and much more! Also BBCB and disks. Tel: 041-776 5252 (day) or Lennoxtown 310003 (eves).

● INTEL One Megabit bubble memory prototype kit, unused. Complete with all applications info, and disk with 8080/Z80 Driver Source Code. Currently over £400. First £150 secures. Tel: (0670) 829215.

● SHARP MZ-80K. Complete system, VGC twin floppies, P3 printer, IO box, Basic, Pascal, Fortran, m/code, Forth, games, programmes, database, Wordpro, Calc, business packages. Sensible offers please over £550. Tel: (0563) 28635.

● APRICOT Portable 256k. 720 disk drive, LCD display, software included. As new £1,500. Tel: (0232) 612018 (eves). Ask for Barbara.

● KAGA 12in colour monitor, £275 ono. Epson FX80 printer, hardly used, £275 ono. Cumana single sided 40 track disk drive, £110 ono. Tel: 01-221 6378.

● AST Combo, plus IBM card. 256k RAM, Serial, Parallel, clock. Boxed with manual, £150. Also latest Supercalc two (still sealed), and dust covers for SIRIUS. Half list prices. Tel: (0670) 829215.

● KAGA VISION III high resolution RGB colour monitor. Three inputs to suit wide range of computers, £275. Tel: 01-994 2938 (eves).

● OSBORNE 1 Double-density, 52-column plus DBase II, Lisp, Paperbase and Bibliofile Scientific Databases, games, etc, £650 ono. Tel: (0223) 355957 (after 6pm).

● APPLE II plus 64k, disc drive (Dos 3.3), Hitachi 9in monitor, lower case adaptor. ALL manuals, Pascal, over 80 disks, £450 ono. Tel: Tony on 01-578 7704.

● WANTED: OSBORNE 1, 80 column double density. Tel: (0792) 402367 (eves) or 205678 ext 4220 (day). 178 Mayals Road, Swansea, SA3 5HF.

● EPSON HX-20, 32k, microcassette, external display controller, 'Intext' wp/comms on ROM, spreadsheet, database, other software, books, leads, users group newsletters etc, etc, £420. Tel: (0636) 76928 (eves), can deliver.

● CBM 8032, 960k. 8050 dual disk drive, Wordcraft software, demo disk, manuals, etc. Current models, little used. Cost £2,120, accept £1,000 ono or may split. Tel: Tiverton (0884) 820513.

● EPSON QX-10 with word processing and graphics software. Going abroad, must sell. Totally reliable, cheap at £900. Tel: Tony on Hemel (0442) 55112.

● CBM 64. 1541 disk, MPS801 printer, cassette, joystick. Easyscript, Multiplan, Superbase, Hobbit, Decathlon. Manuals and other books, £450. Tel: Jacombs, Cheltenham (0242) 33635 (eves/weekends).

● SHARP PC 1500 Computer. 8k RAM, printer, as new, offers please. Tel: Morecambe (0524) 415510.

● BBC (B) with DFS, 6502sp, speech processor and APTC board. Also RGB monitor, 40l disk drive. Also a 40/80T DS drive, software, disks, books, mags, £600, will split. Tel: (0992) 465000.

● APRICOT PC: Sales and Purchase Ledgers, £50 each. Supercalc 2, £75. All original and very little used with full manuals. Tel: 01-387 0325.

● APPLE II+/IIe: Parallel and Serial printer cards, £25 each. 80 col. card for IIe, £35. Apple III: SOS system software, £50. All Apple's own brand, new and unused. Tel: 01-387 0325.

● PRINTER, £60. Commodore 1520 print/plot, good working order, replaced by dot matrix. Tel: (07357) 2119. 9 Nursery Gardens, Reading, Berks.

● GENIE I. Bionic ROM, expansion box, disk drive, monitor, business and game software, full instruction manuals, £300 ono. Tel: Huddersfield (0484) 657038. May be able to deliver.

● APPLE II EUROPLUS 64k, 2 Apple disc drives, DOS 3.3, Videx 80 col. and printer cards, Hitachi monitor, lots of software, £500 for quick sale. Tel: Bristol 603252.

● BBC B COMPUTER. Disk drive, tape recorder, Prism modem, Sideways ROM board with Beebmon, Work Station, Beebcalc, Pascal and Micronet. Bargain, £500. Tel: Borough Green (0732) 885278 (eves/weekends).

● APPLE SILENTYPE PRINTER. Including interface, large quantities of paper supplied, Hitachi black and white monitor, 9in screen. Also Appleclock and two Parallel printer interfaces. Will separate, offers. Tel: Crewe 582044.

● FOR SALE: Sharp PC1500 pocket computer, CE 150 printer plotter, CE 152 data recorder. All excellent condition. Plus Microl, Sharp, Tandy software with manuals. Offers please. Tel: Newark (052285) 293.

● BBC Model B, OS1.2, Disk interface, Basic, ATPL Sideways ROM board with 16k Sideways RAM, manuals, leads, etc. Excellent condition, £225. Tel: Mr Cardy on 01-583 6666 ext 4157 (day).

● SHARP MZ80k. Dual disk drives, with I/O box, complete with Centronics and RS232 cards. Including cables, manual and software. Good condition, £250 ono. Tel: (0926) 814678.

● SHARP MZ-80A. Perfect condition. Books, tapes, owners manual, £225 ono. Commodore 8050, dual drives with leads, offers please. WANTED: Atari 850 interface and Atari 800 computer. Tel: Mike on (0532) 491366.

● TANDY TRS-80 Model 1 Level 2. Expansion interface, 48k, plus RS-232 and lower-case mod. Twin disk drives with assembler, word processors, Basic compiler, communications software, £300 ono. Tel: Tenbury, Worcs (0584) 810015.

● DATA GENERAL ONE (portable). Additional memory boards, 128k each. Two available. Cost £525, what offers? Tel: Mr Kirby on 01-938 2166 (office).

● DATA GENERAL ONE. The ultimate lap held 512k RAM, full size screen, 2×760k internal drives, external (IBM) drive. Fully IBM compatible. Cost new £5,000+, full software. Offers around £3,000. Tel: Mr Kirby on 01-938 2166.

● SINCLAIR QL. Absolutely as new, C/W bundled software and 4 blank micro cartridges. A real bargain, £230 ono. Genuine reason for sale. Also Amstrad DMP1, unused, £130 ono. Tel: (0203) 316599.

● LYNX 48k. Manual, software, user mags, dust cover, £75. Tel: Luton (0582) 872164 (after 6pm).

● APPLE IIe. Disk drives with controller, extended auxiliary card, DMP with PKASO, interface, monitor, Snapshot, 128k RAMcard, Applewriter, Pascal 1.2, toolkit, approx 70 disks, £1,200 ono. Tel: 01-226 8624 (after 6pm).

● BBC B, Acorn DNFS with double sided 400k Viglen drive, Solidisk 32k S/ways RAM and s/ware. Beebug toolkit, b/w monitor, joysticks, games, discs, mags, etc, £550. Tel: Robert on 01-748 0837 (eves).

● PCW BACK NUMBERS. Including first five ever! May-Sept '78, April '80, June-Dec '81, Jan '82-Nov '84. Total 48 issues, £25 the lot. Tel: 01-373 6303 (around noon).

● DRAGON disk drive + disks. Plenty of software on disk and tape. Condition as new, hardly used. Can sell separately, only £175 ono. Tel: S. Durbin on Maidstone, Kent (0622) 45258.

● ALL ITEMS BELOW BRAND NEW. BASF Qualimetric disks, per ten: sssd £13, ssdd £15, dsdd £18. BBC B/D with CS200PSU drive, £499. Apple disk drive £80. Sanyo green screen monitor, £60. 5.25in disk drive cleaning kit, £6. Fischer robot with BBC interface, £50. BASF/Scotch computer cassettes, £3 for ten. Speech 64, £15. Curran microslots, £5. Electron joystick interface, £15. Protek switchable Spectrum interface, £10. Wizard BBC Joy ROM, £7. Protek BBC joystick, £6. Harrier joystick, £4. Prism BBC modem, £50. S100 16k RAM board, £30. Current issue genuine games on cassette, ten for £15. Tarbel S100 disk controller, £50. For details tel: Simon on (0661) 843449.

● CBM 4032 with 4040 twin drives. One cassette drive and manuals, £350 the lot. Also CBM 2001, offers. Tel: 01-240 9453.

● NEC PC8201A. Portable computer 32k, extras, cost £600+. Swap QL, BBC-B + disk, other, or cash. Chase electronic organ (double keyboard), unused gift, retails £600. Swap computer or cash. Tel: 061-205 1868 (eves).

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All Transaction File ads must be submitted by readers on this form or a photocopy of this form. Maximum 30 words. Print one word per box, very clearly. Name, address and/or telephone number must be included in the 30 words. All ads must be accompanied by a flat fee of £2.50. Make cheques or POs payable to *Personal Computer World*. Ads accepted from private readers only. Ads cannot be repeated (unless sent in on another form) and we cannot guarantee to print an ad in any specific issue. Please help our typesetter to help you by printing your ad very clearly. Send your completed form to: Transaction File, *PCW*, 32-34 Broadwick Street, London W1A 2HG.

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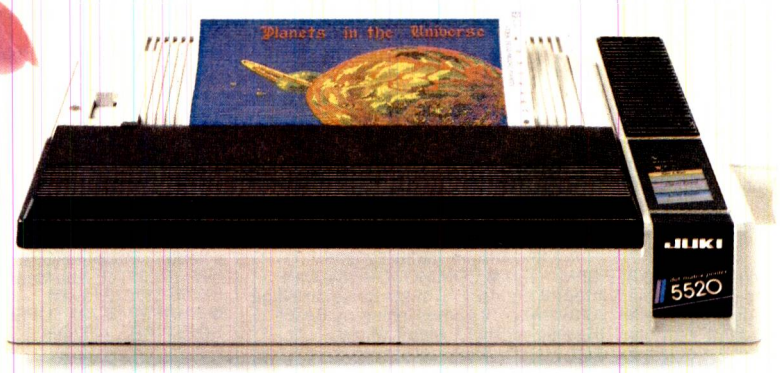

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TRANSACTION FILE

● CBM64 software. Super Huey £5.50, Jump Jet £4.50, Glider Pilot £4, Flight Path £4, Matrix £2, Football Manager £3.50, Flight Simulator (Anger) £3. Aztec Centronics interface £5. Tel: (0736) 752982.

● SPECTRUM 48k + microdrive + interface 2 + joystick + programmable interface + tape deck, over £200 of software, £215 ono. Memotech MTX-500 + 32k memory expansion + tape deck, £115 ono. Tel: Blackpool (0253) 403994.

● WANTED: SIRIUS 1, 256k RAM with integral or external 10 meg. Hard disk, dot matrix graphics printer required, preferably Epson FX80. Tel: Bucks (02804) 7882.

● OPEN UNIVERSITY COURSE. Structured programming with UCSD Pascal, unused. Cost £65, quick sale wanted, therefore £35. Tel: Bracknell 420247 (eves).

● APPLE IIE. X2 disk drives, monitor, cards: parallel printer; microsoft Z80 (cpm); extended 80 col (128k). Software; Multiplan; Applewriter; Quickfile; Pascal; Typing Tutor. All manuals, 25 disks, £950, can deliver, London, Manchester, West Country. Tel: (039281) 297.

● WREN PORTABLE CPM Plus micro, unused, integral modem autodialler, software included. Wordstar DBasell, Sage, Accounts, Perfect Writer, Filer, Calc, communications BBC Basic, MBasic interpreter and compiler worth £3,000, accept £1,200 ono. Tel: Clive on (0438) 310029.

● DISK SOFTWARE — original CBM 64. Multiplan, Superbase, etc. WANTED: Privately, IBM PC or true compatible. Tel: (0491) 39497.

● CBM 2001/3000. Basic 2 — ROMs £20, toolkit £20. Basic 4 — ROMs £30, toolkit £25. 2040 1.2 — ROMs £15. 4040 Command-O £25. C2N cassettes £28. All unused. Tel: (0304) 375663.

● BBC B OS 1.2 + Acorn DFS + Shugart disk drive + 50 unused disks, Acorn graphic printer, + ATPL ROM board with Wordwise, Disc Doctor, toolkit, 1,000+ of extensive software, books + extras, £999. Nordmende 14in colour VDU, £99. Tel: 01-892 6575.

● BBC-B 32k SWR, 40/80 ddds, Wordwise + View, Lisp, Micro-Prolog, ISO-Pascal, Forth, BCPL, graphics, DiskDoc, Maths Packs, Elite, Vu file, Beebcalc. Copy all advanced vg, all Beebugs + more. Worth £2,000+, offers £900+. R. Davis, 187 O.B.R. LU2 7EH. Upgrading to VAX 11/750.

● TANDY TRS80 model 4 128k. Integral disk drives and Tandy DMP 110 printer. Both 15 months old, very good condition, only used 2/3 hours a week, £550 ono. Tel: Roper (0625) 520705.

● COMMODORE 64, C2N deck, Simons Basic cartridge, 19 games including Beach Head, Manic Miner, Quickshot. Joystick, manuals, cost £350, £200 wanted. Write: Richard Harvey, 7 Brantwood Road, Droitwich, Worcestershire, WR9 7RR.

● TANDY TRS-80 Model 1 Level 2. Expansion interface, 48k, 2 disk drives, tape deck, printer, instruction courses, software and games, £300 ono. Tel: (0524) 823959.

● BBC-B 1.2OS. Epson MX80 F/T printer. Both perfect, virtually unused, £500 the pair. Would sell printer separately if wanted. Tel: Alan Gibbs on 01-568 9698.

● WANTED: ACORN ATOM, Forth language ROM or tape. Preferably with manual and any other Forth books or listings. Tel: (0203) 419885 (after 1630 hrs).

● APPLE II SOFTWARE. All nearly new with full documentation. Ascii Express Professional, £70. Data Highway, £40. Apple Pascal Pack, £100. The Last One, £100. Reasonable offers will be considered. Tel: 01-854 5854.

● APPLE II SOFTWARE. Apple Mechanic, Type Faces, Typing Tutor, Hi-res Architectural Design, Phaser Fire, £10 each. David's Midnight Magic, E-Z Draw, GPLE, £20 each. All originals, will accept £80 for the lot. Tel: 01-854 5854.

● SHARP MZ80B 64k. Built-in tape, plus P6 printer, various utilities and wordpro programmes. Plus Sharp Basic. Good business/scientific machine. Offers over £700. Tel: Aberdeen (0224) 637073 (eves).

● SHARP MZ-700 SUPER SOFTWARE. Utilities: Converter, PA-MON, assembler, dis-assembler. Languages: Basic Expander, toolkit + versions, Pascal, machine code. Games: machine code classics, arcade, adventure, board. Basic games + utilities. Books. Tel: (0359) 30484.

● MZ 700 SHARP PRINTER PLOTTER. Brand new, with eight pens, new paper roll, including cassette of software. Worth £130, sell for only £100. Other software books available. Tel: (0359) 30484 (after 6pm).

● AMSTRAD CPC464 computer. With colour monitor, and over £100 worth software. Only 2 months old, fully guaranteed, boxed as new. Need to sell, so only £260. Tel: Leatherhead (0372) 373331.

● MULTITECH MPF-III 64k. Fully Apple II+ compatible. Z-80, 80-column, sound & Centronics cards. Twin drives, joystick, detachable IBM-style keyboard, Apple Dos, CP/M, Wordstar suite, Fortran, games, etc, etc, £600. Tel: Gt Bentley (0206) 251054.

● SPECTRUM+ FOR SALE. In good condition, 42 popular games, cassette recorder, on/off switch, cassette rack, light pen, joystick. Bargain, £120 ono. Tel: 01-948 6566.

● TANDY TRS-80 Model III, 48k, twin drive, printer. TRS-80 DMP 200 with stand. Programmes Stock Control, Invoicing, Purchases, Sales, Ledgers, Disks and stationery storage units. Game £450. Tel: Portsmouth (0705) 254617/267754.

● SUPERBRAIN QD FOR SALE. Good condition and in daily use. Offers around £550 considered. Tel: Swansea 884085 (anytime for details).

● VOLKER CRAIG TERMINAL. Full keyboard, function keys, numeric pad, clean, little used, £195. Tel: 061-829 1479 (day) or 061-928 0130 (eves).

● PAST ISSUES of PCW, Practical Computing and Electronics Today International. All very good condition. PCW 1980-1984. PC 1979-1983. ETI 1976-1984. Any offers. Tel: 01-445 4281.

● APPLE IIE. 3 disk drives, system saver, tabs, sales, stock. Quickfile, word processing packages, £900 ono. 5¼in single sideddiscs in presentation boxes of 10, £10 per box. Tel: Kettering (0536) 511874.

● SHARP MZ80K. 48k, RS232 interface, Parallel interface, lots of software, inc mach/code, MZ80A Basic, £450 ono. Will consider splitting. Tel: Dave on (0274) 562107, Bradford, W.Yorks. Carriage arranged at cost.

● BBC-B Computer. 40/80 disk drive, Zenith monitor, AMX mouse, extension ROM board, Wordwise, Spell check, graphics, joysticks, £120 + software, other extras, £600 the lot. Tel: Leighton Buzzard (0525) 373909.

● BBC Model B. Excellent condition, with joysticks, new Acorn data recorder, 11 games including Elite, Killer Gorilla, Snapper, 20 Beebug magazines, £350 ono. Tel: (0495) 310345 (5pm-7pm).

● APPLE IIE. Twin drives, amber screen Z80 card, Zappler printer card, 80 col 64k extended card. Only 3 months old, all manuals plus lots of software. Over £4,800 in value, £1,600 ono. Tel: (0303) 66448.

MICROCHESS

The Hungarian Vizugyi Sports Club's youth team takes on the Super Constellation in this match. Kevin O'Connell watches from the side lines.

The Hungarian Chess Federation is one of the most active national chess federations in the organisation of computer chess events, particularly matches between human and computer teams. A match, played in January, resulted in a resounding 61/2-31/2 win for the machines in the 10 board match against a strong youth team of the Vizugyi Sport Club. The game which follows was played on second board in this match.

White: L. Jakobetz. Black: Super Constellation. Vienna Opening.

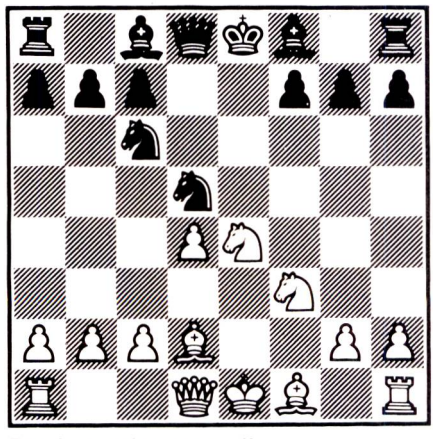
1	e2-e4	e7-e5
2	Nbl-c3	Nb8-c6
3	f2-f4	

(This line of the Vienna Opening was very popular in the late nineteenth century, therefore it is reasonable to assume that late twentieth century chess programs (and their programmers) will know comparatively little about it.)

3	. . .	e5xf4
4	Ngl-f3	Ng8-e7
5	d2-d4	d7-d5
6	Bclxf4	

(However, the program has followed the theoretical line and it is the human who now deviates from the known 6 e4xd5 Ne7xd5 7 Nc3xd5 Qd8xd5 8 Bclxf4 with just a small advantage for White.)

6	. . .	d5xe4
7	Nc3xe4	Ne7-d5



Black stands very well

8	Bf4-d2?	

(8 Bf4-g5 should have been played, although then Black stands very well after 8 . . . Bf8-e7.)

(Now Black wins a pawn by a little tactic.)

8	. . .	Nc6xd4!
9	Nf3xd4	Qd8-h4+
10	Ne4-g3	Qh4xd4
11	Qdl-e2+	Bf8-e7
12	c2-c3	Qd4-b6
13	0-0-0	Bc8-e6
14	Qe2-b5+	Qb6xb5
15	Bflxb5+	c7-c6
16	Bb5-d3	0-0

(Black has completed its development and has a sound extra pawn.)

17	Bd3-f5	Be7-h4!
18	Bf5xe6	f7xe6

(Isolated pawns are often weaknesses that can be exploited by the opponent, but this is a very strong passed pawn.)

19	Ng3-e4	Bh4-e7
20	Bd2-g5	Be7xg5
21	Ne4xg5	e6-e5

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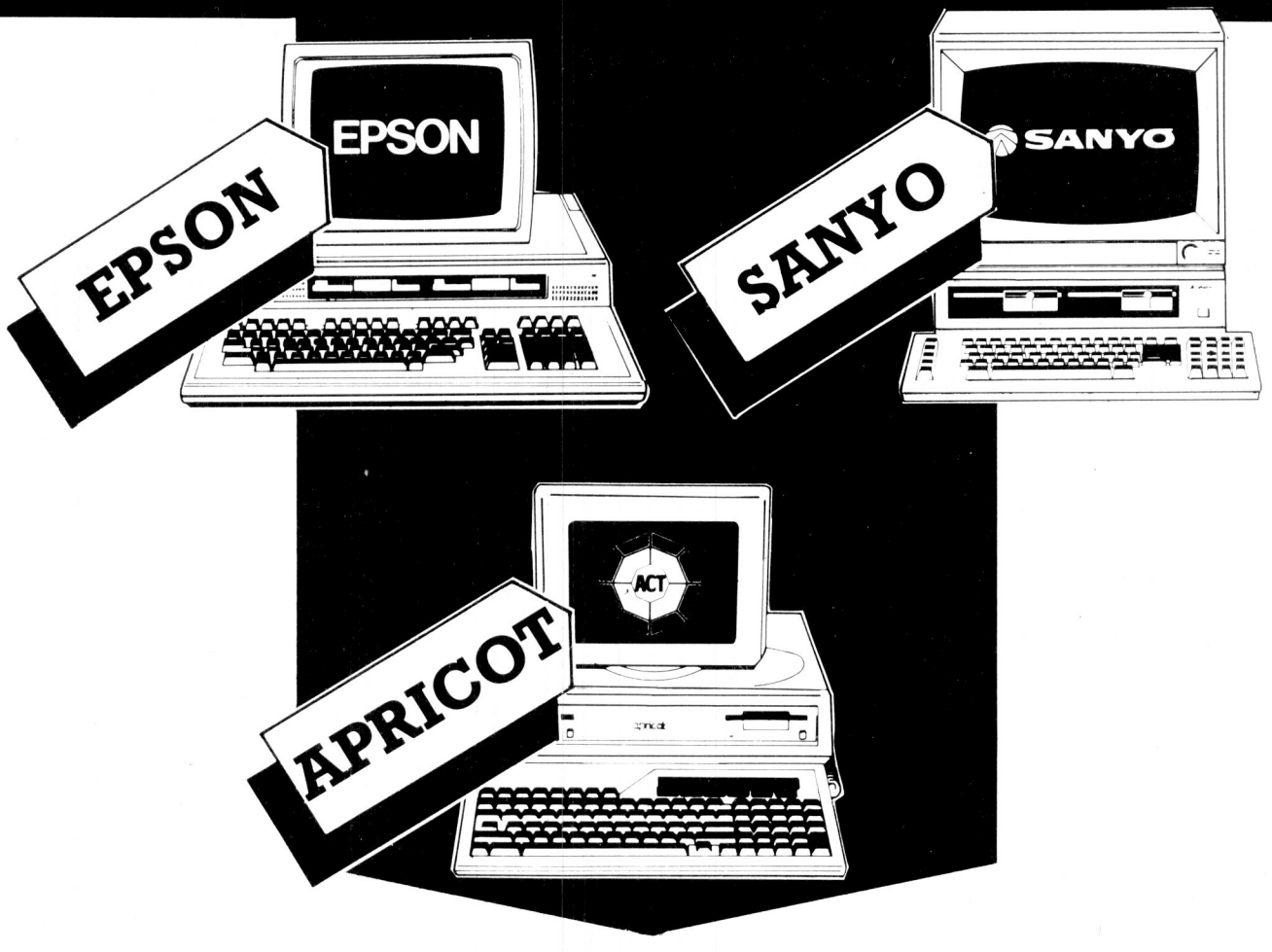

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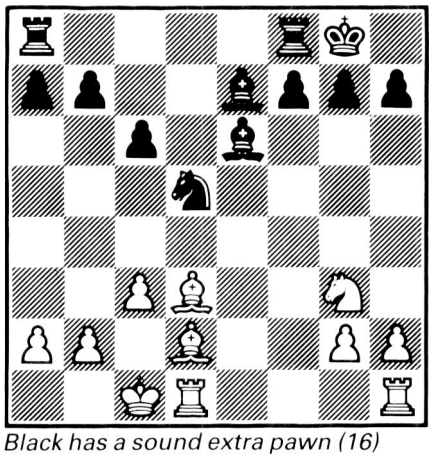
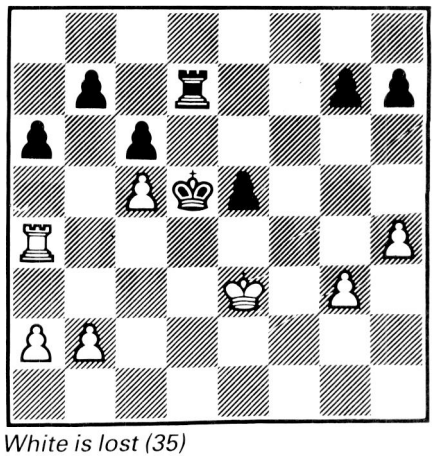
22 Rhl-el Rf8-f2
(Active rooks are very important in endgames.)
23 Rdl-d2
(If 23 Relxe5 Fr2xg2 is good for Black.)



Black has a sound extra pawn (16)

23 . . . Rf2xd2
24 Kclxd2 Ra8-e8
25 c3-c4 Nd5-f6
26 Ng5-e4 Nf6xe4+
27 Relxe4 Kg8-f7
28 Kd2-e3
(White has established a blockade on the e4 square and is trying to make life as difficult as possible for Black.)
28 . . . Kf7-g6
29 Re4-g4+ Kg6-f6
30 c4-c5?!
(This is highly dubious — opening a path for the Black king to penetrate White's half of the board via the d5 square.)



White is lost (35)

30 . . . Re8-e7
31 Rg4-a4 a7-a6
32 h2-h4 Kf6-e6
33 Ke3-e4 Re7-f7
34 g2-g3 Rf7-d7
35 Ke4-e3
(35 Ra4-b4, to restrain the Black rook by tying it to the defence of the b-pawn is a better try.)
35 . . . Ke6-d5
(The position looks fairly quiet, but White is lost.)
36 Ra4-e4
(If 36 . . . Kd5xc5 37 Re4xe5+.)
36 . . . Rd7-f7!
37 b2-b4
(The last chance worth trying was 37 b2-b3 (37 . . . Rf7-fl 38 Re4-c4) and Black would still have some hard work to do. Now everything is simple.)
37 . . . h7-h5
(Taking away the g4 square from White's rook.)
38 g3-g4
(There are no good moves.)
38 . . . Rf7-fl
(Threatening 39 . . . Rfl-el+.)
39 Ke3-e2 Kd5xe4
40 Ke2xfl Ke4-d3
(White resigns (0-1.))

(All of White's queen-side pawns are doomed assuming, that is, that Black's e-pawn does not queen first (for example 41 g4xh5 Kd3-d2! and the e-pawn marches straight down to el.)

NUMBERS COUNT

Mike Mudge delves into Exponential Diophantine Equations and reveals a winner for Problems with Primes.

Exponential Diophantine Equations require the minimum of mathematical background; interesting results are readily found using simple search techniques. Theoretical results, using techniques of modular arithmetic are incomplete, however, because of the close relationship of the subject of Exponential Diophantine Equations to Character Theory of Finite Groups, it is currently an active research area.

Mathematical background

0) a,b,c,d,e and f are to denote non-negative integers. 0,1,2,3, . . .

1) x^a where a is greater than zero means the product of a-factors each equal to x. For example $3^4 = 3 \times 3 \times 3 \times 3 = 81$. $x^0 = 1$ by definition, whatever the value of x, this definition is made to guarantee consistency with the laws of indices which result from the above definition. For example $(x^a)(x^b) = x^{a+b}$ also $(x^a)^b = x^{ab}$.

2) A Diophantine Equation (after Diophantus of Alexandria, *circa* the third century of the Christian era) is one which is to be solved in integers, in general both negative and non-negative.

E Dubois and G Rhin (1976) together with H P Schlickewei (1977) have established that the equation: $w^a \pm x^b \pm y^c \pm z^d = 0$ has only a finite number of solutions for a,b,c and d when w,x,y and z are distinct prime numbers (given).

The problem

We shall confine our attention to the Exponential Diophantine Equation $1 + w^a = x^b y^c + w^d x^e y^f$ and in particular to the case where w,x and y are consecutive prime numbers in some order.

Disregard the trivial solution (a,b,c,d,e,f) = (a,0,0,a,0,0) which results immediately from the fact that $x^0 = 1$ for any x.

Case 1 w,x and y are the primes 2,3 and 5 in some order.

Order A w = 2, x = 3 and y = 5.

We wish to find non-trivial solutions of the equation:
$1 + 2^a = 3^b 5^c + 2^d 3^e 5^f$.

There are known to be 31 such solutions of which some are given here (a,b,c,d,e,f) = (3,0,1,2,0,0); (5,0,2,3,0,0); (6,0,2,3,0,1); (7,0,3,2,0,0); (10,0,4,4,0,2)

Determine the other 26 non-trivial solutions.

Order B w=3, x=2 and y=5.

We wish to find non-trivial solutions of the equation: $1+3^a=2^b5^c+2^d3^e5^f$.

There are known to be 24 such solutions of which some are given here (a,b,c,d,e,f) = (2,0,1,0,0,1); (3,0,2,0,1,0); (2,3,0,1,0,0); (8,8,2,1,4,0);

Determine the other 20 non-trivial solutions.

Order C w=5, x=2 and y=3.

We wish to find non-trivial solutions of the equation: $1+5^a=2^b3^c+2^d3^e5^f$.

There are known to be 20 such solutions of which some are given here (a,b,c,d,e,f) = (1,0,1,0,1,0); (3,0,4,0,2,1); (2,3,0,1,2,0); (5,10,1,1,3,0);

Determine the other 16 non-trivial solutions.

Case 2 w,x and y are three other consecutive primes in some order. How many solutions are there? What are they?

There is plenty of scope here using (w,x,y) = (3,5,7) or (5,7,11) or something much more ambitious such as (12911,12917,12919).

Readers are invited to submit their program listings, together with hardware descriptions, run times, any comments and of course the output relating to the above problem.

These results will be judged for accuracy, originality and efficiency (not necessarily in that order), and a prize will be awarded to the 'best' entry received at 'Square Acre', Stourbridge Road, Penn, Nr Wolverhampton, Staffs, WV4 5NF. Tel: (0902) 892141 by 1 December 1985.

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END ZONE

NUMBERS COUNT

Please note that submissions can only be returned if a suitable stamped addressed envelope is provided. Expanded reviews of previous problems together with, subject to the approval of the contributor, copies of detailed programs from the prize winning entry may also be requested.

Prize winner March

Problems with Primes contained a sequence of unfortunate typographical errors, which certainly discouraged some readers. The longest known left truncatable prime (in the sense of Angell and Godwin) is believed to be 357686312646216567629137 since . . . 137, 37, 7 are prime. The corresponding result for right truncatable primes is 73939133 since . . . 739, 73, 7 are prime.

These results are both for base 10. Readers interested in the extension to other number bases are referred to the article by Angell and Godwin in *Mathematics of Computation* Volume 31, Page 256, 1977 while those interested in the introduction of the smallest odd prime as 1 instead of the conventional 3, also in the truncation from both ends, are referred to Keith Devlin, *The Guardian*, 8 November 1984.

For interest and curiosity this month's prize winner is D W Richardson of Preston, Lancashire.

LEISURE LINES

Brain-teasers from J J Clessa

Quickie

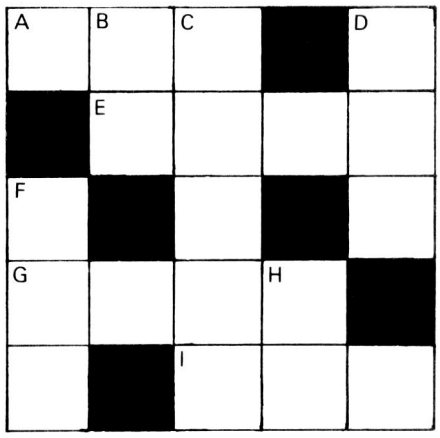
A golden oldie this month, no prizes no answers. A water lily is growing in the centre of a circular pond. It doubles its size every day and on 16 June 1985 it exactly fills the pond. On what date did it half-fill the pond?

Prize Puzzle

The idea for this month's puzzle comes from Graham Gales of Bristol. A man and his horse ran 10 times around a rectangular field. The horse ran almost twice as fast as the man. Can you complete the cross number puzzle in which all numbers are in Octal rotation. (By the way, one hand equals four inches)

Across

A Horse's running time in seconds (rounded).
E Perimeter of field in feet.
G Diagonal of field in hands.
I Man's running time in seconds (rounded).



Down

B Horse's speed in mph.
C Area of field in square feet.
D Distance to nearest foot that man has completed of his sixth lap, when the horse finishes.
F Width of field in feet.
H Man's speed in mph.

Answers on postcards please to *PCW* Prize Puzzle, September Leisure Lines, 32-34 Broadwick Street, London W1A 2HG. Entries to arrive not later than 30 September 1985.

June Prize Puzzle

'Find three positive numbers in arithmetical progression whose product is 11.'

This was described as 'short and sweet'. However I should have asked for rational solutions only, since there are an infinite number of irrational answers — the most obvious being that each number equals the cube root of 11.

The majority of answers were rational, but irrational solutions were allowed to qualify for the prize. Even with rational solutions, the wording of the question leaves ambiguity. I should have also said 'base 10' numbers only since: $1 \times 2 \times 3$ in base 5 = 11.

This month's winner is Chris Bingley of Twyford, Berks — your prize should be with you shortly. The winning answer: 11/6, 9/4, 8/3.

DIARY DATA

Readers are strongly advised to check details with exhibition organisers before making arrangements, in order to avoid wasted journeys due to cancellations, printer's errors, and so on.

London	(Imperial College), INT Software Engineering Exbn & Conf Contact: Conf Services, (01) 240 1871	28-30 Aug
London	(Olympia), Personal Computer World Show. Contact: Montbuild Ltd, (01) 486 1951	4-8 Sept
Sheffield	National Community Computing Conf. Contact: RTI, (0632) 616581	13-14 Sept
Manchester	(Belle Vue), INFO North (Information Technology & Office Automation Exbn). Contact: BED Exbns Ltd, (01) 647 1001	17-19 Sept
London	(Forum Hotel), Third Int Conf on Networks & Electronic Office Systems. Contact: R Larry, (01) 388 3071	17-19 Sept
Berlin	CAMP 85 Computer Graphics. Contact: Spectrum Communications Ltd, (01) 749 3061	24-27 Sept
London	(Olympia), IBM System User Show. Contact: EMAP Int Exbns, (01) 837 3699	25-27 Sept
Manchester	(UMIST), Electron & BBC Micro User Show. Contact: Mike Cowley (061) 456 8383	27-29 Sept

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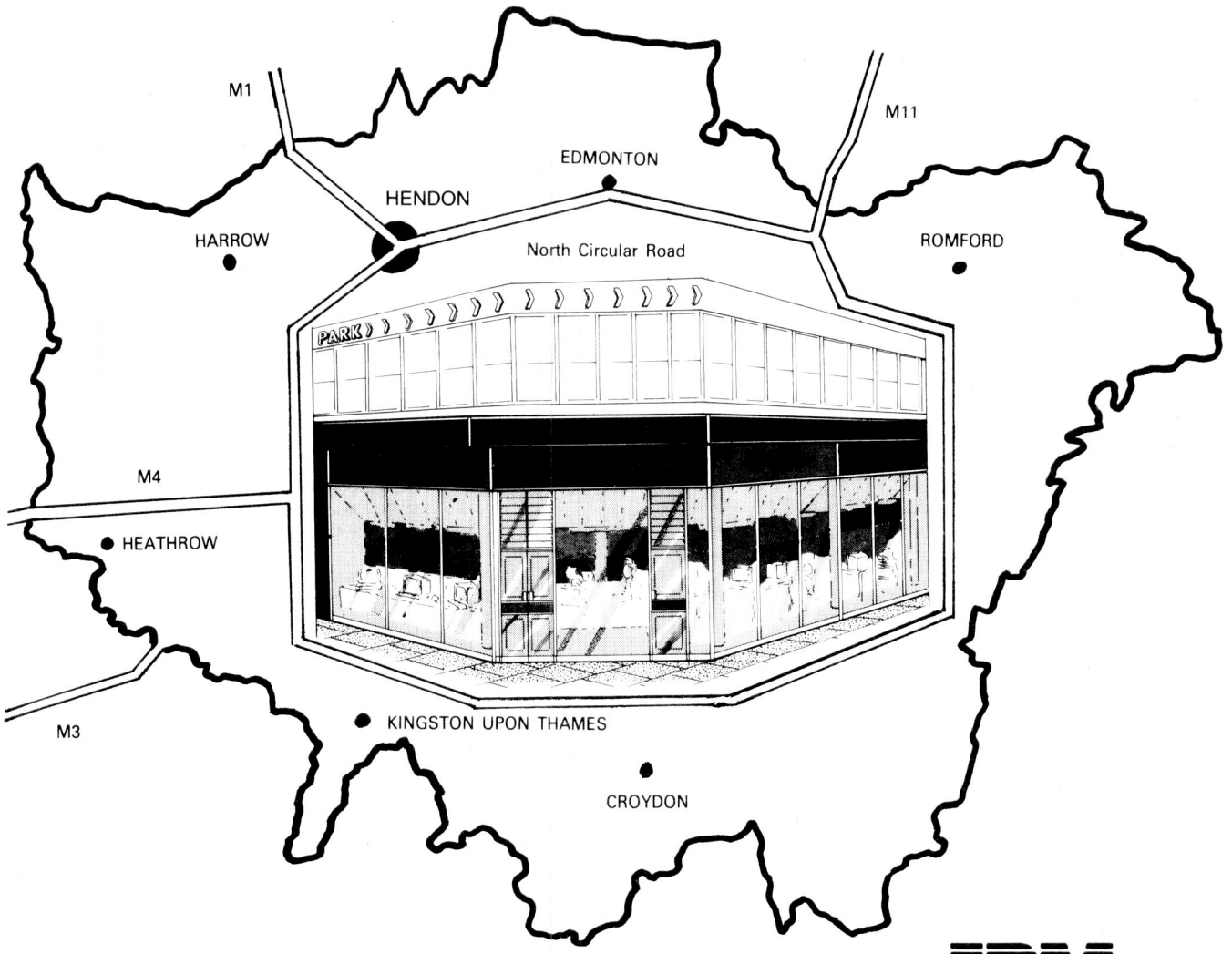

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If you have an idea for a feature write, with a brief synopsis, outlining the proposed structure and content. If your article is already written, then send it in for consideration. Remember to put your name and address on both the covering letter and the manuscript — along with a daytime phone number if possible. Manuscripts should be typed or printed out (dot matrix output is fine), in double-line spacing with ample margins top and bottom and on each side.

Any accompanying program listings should be supplied on disk or cassette, ideally with a printout as well. We'll try to return all submissions sent in with a suitable sae, but make sure you keep a copy of everything you submit as well for reference.

Bear in mind that it's worth taking a look at the Back Issues advertisement to see what sort of things we have already published — after all there's no point in reinventing the wheel. And please be sure to tell us if you've contacted another magazine (perish the thought): it would be very awkward if the same article appeared elsewhere. Frankly, we're more likely to accept something which has been offered exclusively to us.

Finally, we do pay for published work — the rate is £65 per 1000 words, and payment usually follows about four-six weeks after publication.

ACC NEWS

Rupert Steele casts his eye over the Midlands in this month's round-up of club news.

A good place to find other micro enthusiasts is a computer club, and there is almost certainly one in your area. Computer clubs vary considerably, but there are several key types:

Local clubs — enthusiasts with a variety of machines get together to swap ideas about general computing topics. These clubs are good if you are thinking of getting a new micro, as you may well be able to meet present owners of your intended purchase — who will know its defects!

Local machine-based clubs — these clubs are still based on meetings, but there will be concentration on a particular machine, so that specific software can be discussed (but *not*, of course, illicitly copied). These clubs often grow into fully fledged local clubs, with machine specific sub-groups.

National or regional user groups — these are almost always based on a particular machine or software topic. The user group will operate through a newsletter (typically four-six issues per year), posted out to the members. Some of these are run on a semi-professional basis, or as small businesses.

Pseudo-clubs — some manufacturers/retailers use the word 'club' to describe their selling operations, in the same way (for example) as book or record 'clubs'.

The ACC maintains a national database of all the computer clubs it knows exist. If you would like details of your club to appear on the list, or want details of a computer club near you, then contact the ACC (see addresses below).

If you are thinking of starting a computer club, the ACC has an information pack (the Club Information Kit) which is full of advice and tips to help you get going.

Club news

This month, I'm focusing on the Midlands. Chris Parry writes, from Stratford-on-Avon, about the Stratford Computer Club, which caters for all micros and meets on the second Wednesday of each month. His address is 15 Kipling Road, Stratford-on-Avon, Warks, CV37 7JZ.

Moving into Staffordshire, Andrew Cope has written to me as Chairman of the Mixed Bytes Computer Club. His address is Hall Farm, New Road, Dilhorne, Stoke on Trent, ST10 2PQ. The club meets every other Thursday at Dilhorne Recreation Centre, New Road, Dilhorne. Members' machines at meetings include Commodore 64/Vics, Spectrums/QLs, BBC, Dragons and Oric. The club is in the process of building a robot.

Also in Staffordshire is Computer Town, Burton. This is run by Chris Woodford of 31 Hopley Road, Anslow, Burton-on-Trent, Staffs, DE13 9PY. The group meets monthly at Burton-on-Trent Information Technology Centre, with a mixture of members' equipment and the BBC micros resident at the ITEC. Services provided by the group include a brochure library (400 items), a magazine library (212 items) and a book library (30 items). There is an occasional newsletter and discount voucher schemes. For more information, write to Chris or call him on (0283) 32615.

Neil Croft is the treasurer of the Rotherham Amateur Micro Club. It meets on the second and fourth Wednesday of the month at the 'Traveller's Rest', Masborough, Rotherham. The club is open to all aged 16 or over and visitors are charged 25p. Membership fees are £1 unwaged, £2 waged with weekly subs of 25p and 50p respectively. Members get a 10 per cent discount on all software purchased at a local computer shop. Neil's address is 10 Penshurst Close, Oakhill, Rotherham, S Yorks, S65 1TR.

The Maltby TI Users Club now has 25 members and is growing each month. It produces a monthly newsletter for those with Texas Instrument TI99/4A micros, offers hardware discounts of 10 per cent (and 20 per cent off cassette software) from most of the leading TI dealers, and holds monthly meetings. Contact Mark Lee, (Secretary, Maltby TI-99/4A users club), 89 Rotherham Road, Maltby, S66 8LZ.

P A Clark is the secretary of the Christian Micro Users Association. It hopes to link together a large number of Christian Micro users and to promote the use of micros in Church activities. For more details, send a large SAE to Christian Micro Users Association, c/o 6 Walkley Street, Sheffield, S6 3RG.

Craig Boardman is the secretary of Crewe Computer Users Club, c/o Oakley Centre, Crewe, Cheshire. The club has been running for four years and is planning to expand. So why not drop Craig a line if you live in Crewe?

And finally, Paul Thompson writes to me as secretary of the Micro Computer Club. For further details write to Ashfield House, 1 Foster Avenue, Silsden, Keighley, W Yorks, BD20 9LE.

For a mention in this column, to notify the ACC of a new or existing club, or to obtain club address labels: Rupert Steele, 12 Philbeach Gardens, LONDON, SW5 9DY.

For any other enquiry, including the address of your local club: John Bone, ACC Chairman, 2 Claremont Place, Gateshead, Tyne and Wear NE9 1TL or call (091) 477 0036.

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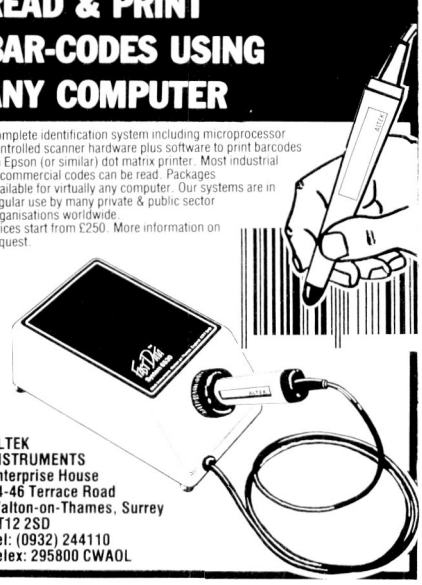

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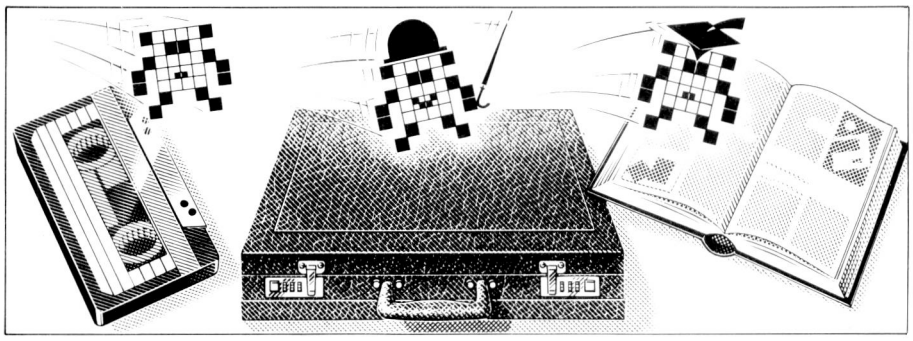

Nick Walker selects the best of reader's programs — for details on submitting your own, see the end of this section.

'By Gum!', BBC users have a good time of it this month with GUM, a graphics utility monitor by Brian Butterworth. This program is a Mac-alike aid for disk users, making the DFS user-friendly. The graphics are reminiscent of Weatherwise by the same author in *PCW*, May.

Continuing in this serious vein, there are disk-based databases for the Memotech and the Atari.

Commodore 64 users have a renumber utility that fits into a small space of unused memory, and will renumber all parts of a program including GOSUBs, and so on. For the QL there is a utility to make using your microdrives a delight.

King Kong would not be happy about our game for the Spectrum, Not Another Kong!, which involves stealing his bananas.

Games

Scientific/mathematic

Business

Toolkit/utilities

Educational/Computer Aided Learning

Program of the Month
BBC Graphics Utilities Monitor
by Brian Butterworth

This program provides a user-friendly method of manipulating disk files, using windows and icons. The style is very similar to Brian Butterworth's recent program Weatherwise (*PCW*, May). To use it, type in the two programs and save them onto disk as directed. Then to run the program, type CHAIN "GUM".

When it is running, move the pointer using the cursor keys and select an option by pressing RETURN. Firstly, select a disk drive by positioning the pointer over the disk symbol showing the drive number you want, and press RETURN. A window will open showing all the files on the disk. If you select one of these, a window giving information about the file will open at the bottom of the screen. Simultaneously, various menu options will appear at the top of the screen, and are outlined below:

DELETE — this will delete the selected file if you then select YES. If you select NO, the program will exit from the option.

COPY — this copies the selected file from the current drive to another. Select a destination drive to copy to, or the current one to cancel the command.

DUMP — this dumps the contents of a file to a window on the screen in decimal. RETURN will halt the process.

PRINT — prints the text in a file on-screen in a window. RETURN will cancel it.

EXTRA — this produces a pull-down menu containing another set of commands. These are: NEWLOAD, which changes the LOAD address; NEWEXEC, which changes the execution address; CHAIN, which CHAINs the selected file; RUN, which *RUNs it; LOCK and UNLOCK, which lock and unlock the selected file; RENAME, which renames it; and CLEAR, which

takes you back to the main menu.

To change disk drive, select the new drive. The calculator symbol brings up a simple calculator which is operated by the keys; press RETURN to get rid of it.

The book symbol changes the selected directory. This is $ normally, but can be changed.

```
   10*|******* GRAPHICS UTILITIES MONITOR *******
   20*|
   30*|
   40*|  Part one:  SAVE as "GUM"
   50*|
   60*|
   70VDU23,224,170,85,170,85,170,85,170,85
   80VDU23,225,0,60,102,102,126,102,102,0
   90VDU23,226,0,124,102,124,102,102,124,0
  100VDU23,227,0,60,102,96,96,102,60,0
  110VDU23,228,0,124,102,102,102,102,124,0
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  130VDU23,230,0,126,96,124,96,96,96,0
  140VDU23,231,0,60,102,96,110,102,60,0
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  200VDU23,237,0,102,126,126,126,102,102,0
  210VDU23,238,0,102,118,126,126,110,102,0
  220VDU23,239,0,60,102,102,102,102,60,0
  230VDU23,240,0,124,102,102,124,96,96,0
  240VDU23,241,0,60,102,102,102,106,52,0
  250VDU23,242,0,124,102,102,124,108,102,0
  260VDU23,243,0,62,96,124,62,6,124,0
  270VDU23,244,0,126,24,24,24,24,24,0
  280VDU23,245,0,102,102,102,102,102,60,0
  290VDU23,246,0,102,102,102,102,60,24,0
  300VDU23,247,0,102,102,126,126,126,102,0
  310VDU23,248,0,102,60,24,24,60,102,0
  320VDU23,249,0,102,102,60,24,24,24,0
  330VDU23,250,0,126,14,28,56,112,126,0
  340VDU23,251,0,60,102,6,28,24,24,0
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  380DATA&5060,7F405F505F405B5B405B5B405B5B407FF80BE82BE8086B6808686808686808F8
  390DATA&50C0,FF40C043D053C040C050D040C040FF55FE0302BB027B02030203020302030FE55
  400DATA&5220,00FEB2FF80BF80BF80BF8080808080FF00000000FF01C101C101C101010101FF00
  410DATA&5260,00003F2020202021202121212030F00000000FC0404040484048484848404FC0000
  420DATA&5600,00406070787C7E7F786C4C06060303000000000000000000000000000000000000
  430DATA&5620,C0E0F0F8FCFEFFFFFFFEFE4F0F0707030000000000000080B000000000B08000
  440:
  450:
  460:
  470MODE4
  480HIMEM=&5000
  490FORR%=0TO5
  500READA%,A$
  510FORD%=0TO31
  520A%?D%=EVAL("&"+MID$(A$,1+D%*2,2))
  530NEXT
  540NEXT
  550:
  560:
  570:
  580CHAIN"GUM2"
```

```
   10 *|******* GRAPHICS UTILITIES MONITOR *******
   20 *|
   30 *|
   40 *|  Part two:  SAVE as "GUM2"
   50 *|
   60 *|
   70 *FX200,1
   80 *TV0,1
   90 MODE4:VDU23;&200A;0;0;0;0;0;0;
  100 PROCwindow(6,16,33,14)
  110 PRINT
  120 PROCtext(" GRAPHICS UTILITIES MONITOR")
  130 *DR.0
  140 *DIR$
  150 TIME=0:REPEATUNTILTIME>200
  160 @%=10
  170 HIMEM=&5000
  180 DIMD$(32),BUFF%&200:ST%=0:DR%=-1
  190 CF%=0
  200 :
  210 :
  220 :
  230 PROCinitcode
  240 PROCscreen
  250 PROCsetpo(48,49)
  260 ONERRORPROCwindow(8,22,37,20):REPORT:REPEATUNTILINKEY-74:PROCreadcat(DR%):
PROCcatdisp
  270 REPEATPROCmove
  280   PROCselect
  290   PROCnewdir
  300   UNTILDR%>-1
  310 REPEAT
  320   PROCselfile
  330   UNTIL0
  340 :
  350 :
  360 :
  370 END
  380 :
  390 :
  400 :
  410 DEFPROCdesk
  420 VDU26,20
  430 VDU23;&200A;0;0;0;0;
  440 CLS
  450 VDU19,7,0;0;
  460 VDU23,128,&55AA;&55AA;&55AA;&55AA;
  470 FORR%=0TO30
  480   PRINTSTRING$(40,CHR$128);
  490   NEXT
  500 VDU5
```

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PROGRAM FILE

```
510 MOVE0,31
520 PRINTSTRING$(40,CHR$128);
530 VDU4
540 VDU19,0,7;0;0;
550 ENDPROC
560 :
570 :
580 :
590 DEFPROCwindow(LX%,BY%,RX%,TY%)
600 GCOL0,129
610 FORR%=-4TO0STEP4
620   VDU29,-R%;R%;
630   VDU24,LX%*32-4;1023-(BY%+1)*32;RX%*32+32;1023-(TY%)*32+4;:CLG
640   VDU28,LX%,BY%,RX%,TY%
650   NEXT:CLS
660 GCOL0,128
670 ENDPROC
680 :
690 :
700 :
710 DEFPROCicon(N%,X%,Y%)
720 LOCALO%
730 N%=N%*32+&5000
740 FORO%=252TO255
750   VDU23,O%
760   FORD%=0TO7
770     VDU?N%:N%=N%+1
780     NEXT
790   NEXT
800 VDU31,X%,Y%,252,254,8,8,10,253,255
810 ENDPROC
820 :
830 :
840 :
850 DEFPROCinverse(X%,Y%,X2%,Y2%)
860 VDU24,0;0;1279;1023;
870 LOCALA%,B%,C%,D%
880 A%=32*X%-4:C%=32*(X2%+X%)
890 B%=1024-32*Y%
900 D%=1024-32*(Y%+Y2%)-4
910 GCOL4,3
920 MOVEA%,B%:MOVEC%,B%
930 PLOT85,A%,D%:PLOT85,C%,D%
940 MOVEC%,B%:MOVEA%,D%
950 PLOT85,C%,B%
960 ENDPROC
970 :
980 :
990 :
1000 DEFPROCinitcode
1010 DIMU%1024,S%32,E%32,F%32
1020 FORPASS=0TO2STEP2
1030   P%=U%
1040   [OPTPASS
1050   LDA&71:ASLA:ASLA:CLC:ADC&71
1060   STA&72:LDA#0:STA&73
1070   ASL&72:ROL&73
1080   ASL&72:ROL&73
1090   ASL&72:ROL&73
1100   LDA&72:CLC:ADC&70:STA&72
1110   LDA&73:ADC#0:STA&73
1120   ASL&72:ROL&73
1130   ASL&72:ROL&73
1140   ASL&72:ROL&73
1150   LDA&73:CLC:ADC#&58
1160   STA&73
1170   LDA&72:CLC:ADC#320 MOD256
1180   STA&74
1190   LDA&73:ADC#320 DIV256
1200   STA&75
1210   LDY#15:.loop1
1220   LDA(&72),Y:STAS%,Y
1230   LDA(&74),Y:STAS%+16,Y
1240   DEY:BPLloop1
1250   :
1260   :
1270   :
1280   LDY#15:.loop2
1290   LDAS%,Y:ANDE%,Y:ORAF%,Y:STA(&72),Y
1300   LDAS%+16,Y:ANDE%+16,Y:ORAF%+16,Y:STA(&74),Y
1310   DEY:BPLloop2
1320   RTS
1330   :
1340   .blank
1350   LDY#15:.loop3
1360   LDAS%,Y:STA(&72),Y
1370   LDAS%+16,Y:STA(&74),Y
1380   DEY:BPLloop3
1390   RTS
1400   ]NEXT
1410 OLWE%=-1:F1%=F%:E1%=E%
1420 !&70=&404
1430 ENDPROC
1440 :
1450 :
1460 :
1470 DEFPROCsetpo(M%,I%)
1480 F%=F1%:E%=E1%
1490 FORR%=0TO31:E%?R%=-1EOR?(R%+&5000+32*I%):F%?R%=?(R%+&5000+32*M%)
1500   NEXT
1510 FORR%=0TO7STEP4:O%='(R%+E%+8):'(R%+E%+8)='(R%+E%+16):'(R%+E%+16)=0%
1520   O%='(R%+F%+8):'(R%+F%+8)='(R%+F%+16):'(R%+F%+16)=0%
1530   NEXT
1540 ENDPROC
1550 :
1560 :
1570 :
1580 DEFPROCmove
1590 LOCALT%
1600 CALLU%
1610 REPEAT
1620   T%=?&70
1630   Y%=?&71
1640   IFINKEY(-26):T%=T%-1
1650   IFINKEY(-122):T%=T%+1
1660   IFINKEY(-42):Y%=Y%+1
1670   IFINKEY(-58):Y%=Y%-1
1680   IFINKEY(-1):TIME=0:REPEATUNTILTIME>2
1690   IFT%<0:T%=0
1700   IFT%>39:T%=39
1710   IFY%>31:Y%=31
1720   IFY%<0:Y%=0
```

PROGRAM FILE

```
1730   IF(T%<>?&70)OR(Y%<>?&71)THENCALLblank:?&70=T%:?&71=Y%:CALLU%
1740   UNTILINKEY-74
1750 X%=?&70
1760 Y%=?&71
1770 CALLblank
1780 *FX4,2
1790 ENDPROC
1800 :
1810 :
1820 :
1830 DEFPROCtext(A$)
1840 LOCALY%,D%
1850 FORY%=1TOLENA$
1860   D%=ASCMID$(A$,Y%,1)
1870   IFD%<64VDUD%:ELSEVDU128+(D%AND&1F)
1880   NEXT
1890 ENDPROC
1900 :
1910 :
1920 :
1930 DEFPROCscreen
1940 PROCdesk
1950 PROCicon(6,2,25)
1960 PROCwindow(1,1,38,1)
1970 PROCwindow(1,22,4,3)
1980 PROCicon(3,1,17)
1990 LOCALR%
2000 FORR%=0TO3
2010   PROCicon(19,1,R%*4+1)
2020   VDU5:MOVE80,832-R%*128:PRINT;R%;:VDU4
2030   NEXT
2040 PROCwindow(20,16,35,14)
2050 PRINT:PROCtext("  SELECT DRIVE")
2060 ENDPROC
2070 :
2080 :
2090 :
2100 DEFPROCselect
2110 IF(X%>0)AND(X%<5)AND(Y%<19)AND(Y%>3):ELSEENDPROC
2120 IFDR%<>-1:PROCinverse(2,DR%*4+4,2,3)
2130 DR%=(Y%-4)DIV4
2140 SE%=0
2150 PROCinverse(2,DR%*4+4,2,3)
2160 PROCreadcat(DR%)
2170 PROCcatdisp
2180 ENDPROC
2190 :
2200 :
2210 :
2220 DEFPROCreadcat(DRIVE%)
2230 IFDRIVE%<0THENENDPROC
2240 LOCALD$,E$,R%
2250 FORR%=0TO31:D$(R%)="":NEXT
2260 VDU3
2270 PROCoscli("DRIVE "+STR$DRIVE%)
2280 *FX15
2290 LOCALA%,X%,Y%
2300 A%=8:X%=BUFF%MOD256:Y%=BUFF%DIV256
2310 BUFF%!1=BUFF%+&100:BUFF%!5=31
2320 BUFF%!9=0
2330 CALL&FFD1
2340 A%=BUFF%+&100
2350 IFBUFF%?5=31THENnofile%=0:ENDPROC
2360 FORnofile%=1TO31-BUFF%?5
2370   D$=FNread(A%+1,?A%-1):A%=A%+1+?A%
2380   REPEATIFRIGHT$(D$,1)=" "THENE$=LEFT$(D$,LEND$-1):D$=E$
2390     UNTILRIGHT$(D$,1)<>" "
2400   D$(nofile%)=D$
2410   NEXT
2420 nofile%=31-BUFF%?5
2430 CF%=0:ST%=0
2440 VDU26:PRINTTAB(0,27);STRING$(160,CHR$128);
2450 VDU26,10,9:PRINTSPC(34);:PROCtext("QUIT")
2460 ENDPROC
2470 :
2480 :
2490 :
2500 DEFFNread(ADD%,NO%)
2510 LOCALA$,B%
2520 FORB%=ADD%TOADD%+NO%
2530   A$=A$+CHR$(?B%)
2540   NEXT
2550 =A$
2560 :
2570 :
2580 :
2590 DEFPROCcatdisp
2600 IFDR%<0:ENDPROC
2610 VDU26:LOCALR%:FORR%=3TO9:PRINTTAB(18,R%);STRING$(13,CHR$128);:NEXT
2620 PROCwindow(7,26,38,10)
2630 IFnofile%=0:ENDPROC
2640 FORG%=ST%*16TO(ST%*16)+15
2650   X%=(G%AND3)*8:Y%=((G%AND15)DIV4)*4+1
2660   IFD$(G%+1)<>"":PROCicon(17,X%+3,Y%):VDU5,25,4,32*(X%+11)-16*LEND$(G%+1):
1023-32*(Y%+12);:PRINTD$(G%+1):VDU4
2670   NEXT
2680 IFnofile%>16:PROCwindow(19,8,27,6):PRINT:PROCtext(" OTHERS")
2690 ENDPROC
2700 :
2710 :
2720 :
2730 DEFPROCselfile
2740 PROCmove
2750 IF(X%>0)AND(X%<5)AND(Y%<23)AND(Y%>19)PROCinverse(2,20,2,2):PROCcalc:PROCin
verse(2,20,2,2):ENDPROC
2760 IF(X%>18)AND(X%<29)AND(Y%<10)AND(Y%>5)ANDnofile%>16:PROCinverse(19,6,9,3):
ST%=ST%EOR1:PROCcatdisp:ENDPROC
2770 IF(X%>6)AND(X%<40)AND(Y%<27)AND(Y%>9)THENPROCopenfile((X%-7)DIV8,(Y%-10)DI
V4):ENDPROC
2780 PROCselect
2790 PROCnewdir
2800 PROCruler(X%)
2810 ENDPROC
2820 :
2830 :
2840 :
2850 DEFPROCcalc
2860 *FX15
2870 LOCALR%,P%,A$
2880 PROCwindow(10,24,21,11)
2890 PROCwindow(11,14,20,14)
2900 VDU26,28,10,24,23,11,30,10:PROCtext(" calculator")
```


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PROGRAM FILE

```
2910 A$="789/456*123-0.=+"
2920 FORP%=0TO3:FORR%=0TO3
2930      PROCicon(44,R%*2+2,P%*2+5)
2940      VDU5:MOVE64*R%+400,495-64*P%:PRINTMID$(A$,R%+P%*4+1,1);:VDU4
2950      NEXT:NEXT
2960 PROCinp
2970 PROCcatdisp
2980 ENDPROC
2990 :
3000 :
3010 :
3020 DEFPROCopenfile(X%,Y%)
3030 LOCALN%,H%:H%=TRUE
3040 N%=Y%*4+X%+1+16*ST%
3050 IFN%>nofile%:ENDPROC
3060 CF%=N%
3070 PROCinverse(X%*8+7,Y%*4+11,8,3)
3080 DEFPROCupdate:LOCALH%:H%=FALSE:N%=CF%:IFN%<1THENENDPROC
3090 PROCwindow(1,29,38,28)
3100 PROCicon(17,1,0)
3110 VDU11
3120 PROCtext(" FILENAME   LOAD      EXEC     LOCK")
3130 PRINTTAB(4,1);D$(N%);
3140 PROCfileinfo:PRINTTAB(13,1);FNp(load%);TAB(23,1);FNp(exec%);TAB(34,1);CHR$
(78-11*lock%);
3150 IFH%PROCinverse(X%*8+7,Y%*4+11,8,3)
3160 VDU26,10,9:PROCtext("DELETE  COPY  DUMP  EXTRA  PRINT  QUIT")
3170 ENDPROC
3180 :
3190 :
3200 :
3210 DEFPROCnewdir
3220 IF(X%>1)AND(X%<5)AND(Y%>24)AND(Y%<27):ELSEENDPROC
3230 PROCwindow(8,14,30,12)
3240 PRINT:PROCtext(" SELECT DIRECTORY:")
3250 *FX15,1
3260 E$=GET$
3270 OSCLI"DIR "+E$
3280 PRINTE$;
3290 PROCreadcat(DR%):PROCcatdisp
3300 ENDPROC
3310 :
3320 :
3330 :
3340 DEFPROCfileinfo
3350 LOCALX%,Y%,A%
3360 'BUFF%=BUFF%+256
3370 $(BUFF%+256)=D$(N%)
3380 A%=5:X%=BUFF%MOD256:Y%=BUFF%DIV256
3390 CALL&FFDD
3400 load%=BUFF%'2
3410 exec%=BUFF%'6
3420 length%=BUFF%'&A
3430 lock%=(BUFF%?&E)<>0
3440 ENDPROC
3450 :
3460 :
3470 :
3480 DEFFNp(A%)
3490 =RIGHT$("00000000"+STR$~A%,8)
3500 :
3510 :
3520 :
3530 DEFPROCruler(A%)
3540 IFY%>2THENENDPROC
3550 LOCALACN%
3560 IFFNlimit(1,7):ACN%=1
3570 IFFNlimit(8,13):ACN%=2
3580 IFFNlimit(14,19):ACN%=3
3590 IFFNlimit(20,26):ACN%=4
3600 IFFNlimit(27,33):ACN%=5
3610 IFFNlimit(34,40):ACN%=6
3620 IFACN%=0THENENDPROC
3630 IFACN%<>6ANDCF%=0THENENDPROC
3640 PROCinverse(st%,1,ln%,1)
3650 IFACN%=1THENPROCdelete
3660 IFACN%=2THENPROCcopy
3670 IFACN%=3THENPROCdump
3680 IFACN%=4THENPROCextras
3690 IFACN%=5THENPROClist
3700 IFACN%=6THENPROCquit
3710 PROCinverse(st%,1,ln%,1)
3720 PROCupdate
3730 IFCF%<1THENPROCwindow(1,1,38,1):VDU26,10,9:PRINTSPC(34);:PROCtext("QUIT")
3740 PROCcatdisp
3750 ENDPROC
3760 :
3770 :
3780 :
3790 DEFFNlimit(S%,T%)
3800 IFACN%<1THENst%=S%:ln%=T%-S%+1
3810 IF(A%>=S%)AND(A%<=T%):=-1
3820 =0
3830 :
3840 :
3850 :
3860 DEFPROCdelete
3870 LOCALyes%
3880 PROCwindow(20,20,36,15)
3890 PRINT
3900 PROCtext(" DELETE "+STR$length%)
3910 PRINT:PROCtext(" BYTE FILE")
3920 PRINT':PROCtext(" YES   NO")
3930 REPEAT
3940   PROCmove
3950   UNTIL(Y%>17)AND(Y%<20)AND(X%>20)AND(X%<31)
3960 IF(X%<26)THENyes%=TRUE
3970 IFyes%PROCinverse(21,19,3,1)
3980 IFyes%PROCoscli("ACCESS "+D$(CF%))
3990 IFyes%PROCoscli("DELETE "+D$(CF%))
4000 IFyes%PROCreadcat(DR%)
4010 ENDPROC
4020 :
4030 :
4040 :
4050 DEFPROCoscli(A$)
4060 LOCALX%,Y%
4070 $BUFF%=A$:X%=BUFF%MOD256:Y%=BUFF%DIV256
4080 CALL&FFF7
4090 ENDPROC
4100 :
4110 :
4120 :
```

PROGRAM FILE

```
4130 DEFPROCquit
4140 PROCwindow(10,16,37,16)
4150 PROCtext("QUIT - ARE YOU SURE  (Y/N)")
4160 REPEAT
4170   *FX15
4180   A$=GET$
4190   UNTILINSTR("YN",A$)
4200 IFA$="Y":VDU22,7:END
4210 ENDPROC
4220 :
4230 :
4240 :
4250 DEFPROClist
4260 CLOSE#0
4270 PROCwindow(7,26,38,10)
4280 LOCALF%,G%,Z%:G%=1
4290 F%=OPENIN(D$(CF%))
4300 @%=4:PRINT0;" ";
4310 REPEAT
4320   Z%=BGET#F%
4330   IFZ%=13THENPRINT'G%" ";:G%=G%+1
4340   IFZ%<31THENZ%=0
4350   VDUZ%
4360   UNTILEOF#F%ORINKEY(-74)
4370 CLOSE#0:PRINT':PROCtext(" PRESS RETURN")
4380 *FX15
4390 REPEATUNTILGET=13
4400 ENDPROC
4410 :
4420 :
4430 :
4440 DEFPROCdump
4450 CLOSE#0
4460 PROCwindow(7,26,38,10)
4470 LOCALF%,G%,Z%:
4480 F%=OPENIN(D$(CF%))
4490 REPEAT
4500   IF(PTR#F%MOD5)=0THEN@%=5:PRINT'PTR#F%;":";
4510   @%=4:PRINTBGET#F%;
4520   UNTILEOF#F%ORINKEY(-74)
4530 CLOSE#0:PRINT':PROCtext(" PRESS RETURN")
4540 *FX15
4550 REPEATUNTILGET=13
4560 ENDPROC
4570 :
4580 :
4590 :
4600 DEFPROCcopy
4610 PROCwindow(10,18,37,16):PRINT:PROCtext(" select drive")
4620 REPEAT
4630   PROCmove
4640   UNTIL(X%>0)AND(X%<5)AND(Y%<19)AND(Y%>3)
4650 ND%=(Y%-4)DIV4
4660 IFND%=DR%:ENDPROC
4670 PROCwindow(10,22,37,16)
4680 PRINT':PROCtext(" copying from drive "+STR$DR%+" to"):PRINT':PROCtext(" dr
ive "+STR$ND%)
4690 FORD%=0TO11
4700   PROCinverse(2,ND%*4+4,2,3)
4710   TIME=0:REPEATUNTILTIME>10
4720   NEXT
4730 X%=OPENIN(D$(CF%))
4740 D%=OPENOUT(":"+STR$ND%+"."+D$(CF%))
4750 REPEAT
4760   BPUT#D%,BGET#X%
4770   UNTILEOF#X%
4780 CLOSE#0:PROCcorrect(":"+STR$ND%+"."+D$(CF%),load%,exec%,lock%)
4790 ENDPROC
4800 :
4810 :
4820 :
4830 DEFPROCcorrect(A$,load%,exec%,lock%)
4840 LOCALX%,Y%,A%
4850 $(BUFF%+256)=A$
4860 'BUFF%=(BUFF%+256)
4870 BUFF%!2=load%
4880 BUFF%!6=exec%
4890 BUFF%!&E=lock%
4900 A%=1:X%=BUFF%MOD256:Y%=BUFF%DIV256:CALL&FFDD
4910 ENDPROC
4920 :
4930 :
4940 :
4950 DEFPROCextras
4960 PROCwindow(20,20,29,4)
4970 RESTORE5130
4980 FORR%=0TO7:READA$:PRINTTAB(1,R%*2+1);:PROCtext(A$):NEXT
4990 REPEAT
5000   PROCmove
5010   UNTIL(X%>20)AND(X%<29)AND(Y%>3)AND(Y%<20)
5020 NR%=(Y%-4)DIV2:PROCinverse(21,NR%*2+5,8,1)
5030 IFNR%=7THENENDPROC
5040 TIME=0:REPEATUNTILTIME>100
5050 IFNR%=0:PROCoscli("ACCESS "+D$(CF%)+" L")
5060 IFNR%=1:PROCoscli("ACCESS "+D$(CF%))
5070 IFNR%=2:load%=FNinput("enter new load address"):PROCcorrect(D$(CF%),load%,
exec%,lock%)
5080 IFNR%=3:exec%=FNinput("enter new exec address"):PROCcorrect(D$(CF%),load%,
exec%,lock%)
5090 IFNR%=4:VDU22,7:CHAIND$(CF%)
5100 IFNR%=5:VDU22,7:PROCoscli("RUN "+D$(CF%))
5110 IFNR%=6:PROCrename
5120 ENDPROC
5130 DATALOCK,UNLOCK,NEW LOAD,NEW EXEC,CHAIN,RUN,RENAME,CLEAR
5140 :
5150 :
5160 :
5170 DEFFNinput(A$)
5180 PROCwindow(10,25,35,20)
5190 *FX15
5200 LOCALT$,K$
5210 PRINT:PROCtext(" "+A$)
5220 REPEAT
5230   REPEAT
5240     K$=GET$
5250     UNTILINSTR("0123456789ABCDEF"+CHR$13+CHR$127,K$)
5260   IFINSTR("0123456789ABCDEF",K$)ANDLENT$<8THENT$=T$+K$
5270   IFK$=CHR$127:T$=LEFT$(T$,LEN(T$)-1)
5280   PRINTTAB(2,3);:PROCtext(T$+" ")
5290   UNTILK$=CHR$13
5300 =EVAL("&"+T$)
5310 :
5320 :
```


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PROGRAM FILE

```
5330 :
5340 DEFPROCinp
5350 *FX15
5360 LOCALI$,S$,total,L$:L$="+"
5370 VDU28,11,15,24,14
5380 REPEATVDU30
5390   IF(LENSTR$total)>10ANDI$=""ANDINSTR(STR$total,".")>9:I$="E"
5400   @%=&A0A:IFtotal<.1ANDtotal<>0THEN@%=&2080A
5410   IFI$="":PRINTtotal;:ELSEPRINTRIGHT$("          "+I$,10);
5420   REPEAT
5430     S$=GET$:IFI$="E"ANDS$<>"C"THENS$="?"
5440     UNTILINSTR("+-*/=C0123456789."+CHR$127+CHR$13,S$)
5450   IFINSTR("+-*/=",S$)ANDLENI$>0ANDL$<>"":total=EVAL(STR$total+L$+I$):I$=""
:L$=S$:IFL$="=":L$=""
5460   IFINSTR("+-*/",S$)ANDLENI$>0ANDL$="":total=VAL(I$):I$="":L$=S$:IFL$="=":
L$=""
5470   IFINSTR("0123456789.",S$)ANDLENI$<10:I$=I$+S$
5480   IFS$=CHR$127ANDLENI$>0:I$=LEFT$(I$,LENI$-1)
5490   IFS$="C"THENtotal=0:I$="":L$=""
5500   UNTILS$=CHR$13
5510 ENDPROC
5520 :
5530 :
5540 :
5550 DEFPROCrename
5560 LOCALI$,R$,D%
5570 *FX15
5580 PROCwindow(10,20,35,17)
5590 PRINT
5600 PROCtext(" enter new name")
5610 I$=""
5620 REPEATPRINTTAB(1,3);:PROCtext("""+I$+""" ")
5630   R$=GET$
5640   IFR$=CHR$127:I$=LEFT$(I$,LENI$-1):R$=""
5650   IFR$>" "ANDLENI$<7:I$=I$+R$
5660   UNTILLENI$>0ANDR$=CHR$13
5670 FORD%=1TOnofile%:IFD$(D%)=I$:I$=""
5680   NEXT
5690 IFI$="":ENDPROC
5700 PROCoscli("RENAME "+D$(CF%)+" "+I$)
5710 PROCreadcat(DR%)
5720 ENDPROC
```

Atari Database

by Martin Bann

This is a database for an Atari disk-based system with a minimum of 48k of memory. It is menu-driven and very user-friendly. The program comes in two parts. The first contains information about the database, and sets up machine code routines for sorting, searching and loading data. The second program is the database, and has the following functions:

CREATE — allows you to design the layout for the database.
ADD — lets you add new records to the database.
PUT — saves the current database to disk.
GET — loads a database file from the disk.
DISK — gives a directory of the disk.
SORT — sorts a file on a single field.
FIND — searches for any item, for example, a single letter, within a file.
PRINT — prints a selected range of records on the screen or a printer.
SPLIT — allows you to split a sorted file into two sections, if it grows too large to hold in memory.

To use, type in the two programs separately and save them onto the same disk as DBASEDAT.BAS and DBASE.BAS respectively. Then type RUN "D1:DBASEDAT.BAS".

```
10 REM Program name :- D:DBASEDAT.BAS
20 REM
30 REM This program must be run before       D:DBASE.BAS can be used.
40 REM
45 REM NOTE :- All ITALICS are to be typed in as INVERSE CHARACTERS
46 REM SYMBOL :- ) is <ESC> <CONTROL CLEAR>
47 REM <<<DO NOT REPEAT DO NOT TYPE IN THE REM STATEMENTS.
48 REM AS THIS WILL REDUCE THE NUMBER OF RECORDS YOU CAN HAVE>>>
50 OPEN #1,4,0,"K:":POKE 82,1:GRAPHICS 0:SETCOLOR 2,100,4:POKE 752,1:D=0
60 ? :? " This program will allow you to create  a database that can be used to
 store"
70 ? "  any data you like. Min 48K memory.":? :? " It has the following limitati
ons :-"
80 ? :? " 1 - maximum record width of 254 char."
90 ? " 2 - maximum header name of 300 char."
100 ? " 3 - maximum printer width, depends on       your type of printer."
110 ? " 4 - maximum of 15 fields."
120 ? " 5 - can only sort 1 field at one time"
130 ? " 6 - no control characters allowed as        data. (can be changed)"
140 ? " 7 - maximum number of records depends       on your record width."
150 ? :? " ie  with a record width of 100 char.       you can have 150 records.
"
160 ? :? "       press <RETURN> when ready";:GET #1,KEY
200 ? ")   This program was designed by :-"
210 POSITION 14,2:? "MARTIN BANN"




255 ? :? "P.S. pressing <ESC> at any of the [--]       prompts will exit you from
 that      input routine."
260 ? :? " make sure you have a blank DOS disk."
270 FOR T=1536 TO 1784
280 READ A:POKE T,A:D=D+A:NEXT T
290 IF D<>38593 THEN ? "ERROR IN DATA, PLEASE CHECK":END
300 ? :? " press <RETURN> to load 'D:DBASE.BAS' ";
310 GET #1,KEY:RUN "D:DBASE.BAS":END
10000 DATA 104,201,4,240,38,201,5,240,115,162,32,104,157,69,3,104,157,68,3,104
10010 DATA 157,73,3,104,157,72,3,32,86,228,132,208,189,72,3,133,212,189,73,3
10020 DATA 133,213,96,104,133,204,104,133,203,104,133,206,104,133,205,104,133,20
8,104,133
10030 DATA 207,104,104,133,211,230,207,208,2,230,208,160,0,177,203,209,205,208,1
4,200
10040 DATA 196,211,208,245,165,210,133,213,165,209,133,212,96,230,203,208,2,230,
204,230
10050 DATA 209,208,2,230,210,165,210,197,208,208,216,165,209,197,207,208,210,169
0,133
10060 DATA 212,133,213,96,104,133,214,104,133,213,104,133,204,104,133,203,104,13
3,208,104
```

PROGRAM FILE

```
10070 DATA 133,207,104,104,133,215,104,104,133,217,165,207,133,205,165,208,133,2
06,165,214
10080 DATA 133,212,133,210,165,213,133,211,24,101,203,133,209,165,210,101,204,13
3,210,166
10090 DATA 217,164,215,136,177,211,209,209,240,25,176,2,144,25,134,216,160,0,177
,211
10100 DATA 170,177,209,145,211,138,145,209,200,196,203,208,241,240,4,200,202,208
,221,198
10110 DATA 205,165,205,208,6,166,206,240,11,198,206,165,210,133,212,165,209,24,1
44,182
10120 DATA 165,216,240,4,134,216,208,158,96

1 REM ********************************
2 REM * PROGRAM NAME :-D1:DBASE.BAS *
3 REM * BY :- MARTIN BANN  18-02-85 *
4 REM *                             *
5 REM * RUN D1:DBASEDAT.BAS before  *
6 REM * using this program.         *
7 REM ********************************
8 GOTO 15000
9 REM * KEYBOARD INPUT ROUTINE
10 TEMP$="":X1=N1:X2=N1:Z=N1:Y1=PEEK(84)
20 POSITION N0,Y1:? "[";DASH$(N1,MAXLEN);"]";:POSITION X1,Y1
30 GET #N1,KEY
40 IF (KEY<32 OR KEY>94) AND KEY<>27 AND KEY<>N155 AND KEY<>126 THEN 160
50 IF KEY=27 THEN TEMP$=E$:RETURN
60 IF KEY=N155 AND Z>N1 THEN TEMP$=TEMP$(N1,Z-N1):RETURN
70 IF KEY=N155 THEN 160
80 IF KEY<>126 THEN 120
90 IF X1=N1 AND X2=N1 THEN 160
95 IF X1<>N1 THEN 110
100 IF X2=N4 OR X2=7 THEN Y1=Y1-N1:X1=N39:X2=X2-N1:Z=Z-N1:POSITION X1,Y1:? "-";C
HR$(254):POSITION X1,Y1:GOTO N30
105 Y1=Y1-N1:X1=N39:X2=X2-N1:Z=Z-N1:POSITION X1,Y1:? "-":POSITION X1,Y1:GOTO N30
110 X1=X1-N1:Z=Z-N1:POSITION X1,Y1:? "-":POSITION X1,Y1:GOTO N30
120 IF Z=MAXLEN+N1 THEN 160
125 IF X1<>N39 THEN 145
130 IF X2=N3 OR X2=N6 THEN POSITION X1,Y1:? CHR$(KEY);CHR$(254):GOTO 140
135 POSITION X1,Y1:? CHR$(KEY)
140 TEMP$(Z,Z)=CHR$(KEY):Z=Z+N1:X1=N1:Y1=Y1+N1:X2=X2+N1:GOTO N30
145 POSITION X1,Y1:? CHR$(KEY):TEMP$(Z,Z)=CHR$(KEY):Z=Z+N1:X1=X1+N1:GOTO N30
160 SOUND N0,50,N10,N10:FOR DELAY=N1 TO N200:NEXT DELAY:SOUND N0,N0,N0,N0:GOTO N
30
199 REM * CLEAR A SELECTED PART OF THE SCREEN
200 FOR CLEAR=COUNT TO N22:POSITION N0,CLEAR:? SPACE$(N1,N38):NEXT CLEAR:RETURN
220 ? ")":? B$:? :? "You have to CREATE - LOAD a file first."
230 FOR DELAY=N1 TO 1500:NEXT DELAY:GOTO MENU
999 REM * ADDING OF RECORDS
1000 IF F1<>N1 THEN 220
1020 IF LEN(DAT$)+RDAT(N17)>LE THEN 1240
1025 START=N0:TEMP=N5
1030 FOR T=N1 TO RDAT(N16):GOSUB 1900:? FIELD$(TEMP,TEMP+FDAT(T)-N1)
1040 TEMP=TEMP+FDAT(T)+N5:? :MAXLEN=RDAT(T):GOSUB KEYINPUT
1050 IF TEMP$<>E$ THEN 1080
1055 IF DAT$="" THEN 1070
1060 START=LEN(DAT$)-START:DAT$(START)=DAT$(START,START):IF LEN(DAT$)>N1 THEN F2
=N1
1070 POP :GOTO MENU
1080 START=START+RDAT(T)
1090 IF LEN(TEMP$)<>MAXLEN THEN TEMP$(LEN(TEMP$)+N1)=SPACE$(N1,MAXLEN-LEN(TEMP$)
)
1100 DAT$(LEN(DAT$)+N1)=TEMP$:NEXT T
1109 REM * CHECK IF RECORD IS CORRECT
1110 ? ")          RECORD ENTRY CHECK":?
1120 START=LEN(DAT$)-RDAT(N17)+N1
1130 FOR T=N1 TO RDAT(N16):? DAT$(START,START+RDAT(T)-N1):START=START+RDAT(T):NE
XT T
1140 POSITION N4,N22:? "is above record correct <Y or N>";:GET #N1,KEY
1150 IF KEY=N89 THEN 1200
1160 IF KEY<>N78 THEN 1140
1170 COUNT=N21:GOSUB SCLEAR:POSITION N1,N22:? B$;"please re-enter data for above
 record"
1180 FOR DELAY=N1 TO N500:NEXT DELAY:START=START-RDAT(N17)-N1:IF START=N0 THEN D
AT$="":GOTO 1025
1190 DAT$(START)=DAT$(START,START):GOTO 1025
1200 ? ")":POSITION N1,N10:? R$:? "                RECORD ADDED                ":? R$:
REM * ALL IN INVERSE
1230 FOR DELAY=N1 TO N255:NEXT DELAY:GOTO 1020
1239 REM * FILE FULL MESSAGE
1240 ? B$;") FILE FULL -no more records can be        added to this file."
1250 ? :? "Try splitting the file into two parts, and then use each part seperat
ely."
1260 ? :? "       press <RETURN> when ready":GET #N1,KEY:GOTO MENU
1900 ? ")            ADDING RECORDS"
1910 ? :? " file name       : "¡FILE$
1920 ? " records to go  : "¡INT((LE-(LEN(DAT$)-START))/RDAT(N17))
1930 ? :? " Press <ESC> to finish adding records":? R$
1950 ? :? " Please enter data for field number "¡T:? :?
1960 RETURN
1999 REM * FIND/PRINT/MODIFY/DELETE  MENU
2000 IF F2<>N1 THEN 220
2020 ? ")":? :? :? "   Do you wish the printout to go to          SCREEN or PRINT
ER <S or P>"¡
2030 GET #N1,KEY
2040 IF KEY=N80 THEN PRT=N1:GOTO 2075
2050 IF KEY=N83 THEN PRT=N0:GOTO 2130
2055 GOTO 2030
2059 REM * CHECK IF PRINTER SWITCHED ON
2060 ? ")        PRINTER NOT SWITCHED ON":? :? "       press <RETURN> when ready":
GET #N1,KEY:GOTO 2020
2075 TRAP 2060:LPRINT
2080 ? ")":? :? :? "    Do you have a 40 column printer          <Y or N>"¡
2090 GET #N1,KEY
2100 IF KEY=N89 THEN PRT40=N1:GOTO 2130
2110 IF KEY=N78 THEN PRT40=N0:GOTO 2130
2120 GOTO 2090
2130 ? ")":POSITION N1,N6:TEMP4=N0:F3=N0
2140 ? "    <P> PRINT whole file"
2150 ? :? "    <S> PRINT SELECTED part of file"
2160 ? :? "    <F> FIND a particular item"
2170 ? :? "    <M> MODIFY a record"
2175 ? :? "    <D> DELETE a record"
2180 ? :? "    <E> EXIT to main menu"
2190 ? :? :? "       PLEASE ENTER YOUR CHOICE"
2200 GET #N1,KEY
2210 IF KEY=N70 OR KEY=77 OR KEY=68 THEN 3000
```


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PROGRAM FILE

```
2220 IF KEY=69 THEN GOTO MENU
2240 IF KEY=N80 THEN 2270
2250 IF KEY=N83 THEN 2600
2260 GOTO 2200
2269 REM * CHECK FOR DIFFERENT PRINT FORMATS
2270 IF PLEN<=N40 THEN PRTCOL=N40:GOTO 2310
2280 IF PRT40=N1 OR PRT=N0 THEN PRTCOL=N40:GOTO 4700
2290 IF PLEN>N132 THEN PRTCOL=N80:GOTO 4700
2300 IF PLEN<=N80 THEN PRTCOL=N80:GOTO 2310
2305 PRTCOL=N132:LPRINT CHR$(N15):REM * SET PRINTER TO 132 COLUMNS
2309 REM * CUSTOM PRINT ROUTINE-COLUMN PRINT
2310 IF F3=N1 THEN ? ")":GOTO 2420
2320 ? ")":POSITION N15,N2:? FILE$:? :? DASH$(N1,N38):?
2330 IF PRT=N1 THEN TEMP=(PRTCOL-N8)/N2:LPRINT SPACE$(N1,TEMP);FILE$:LPRINT :LPR
INT DASH$(N1,PRTCOL):LPRINT
2340 TEMP1=N5:TEMP$=""
2350 FOR T=N1 TO RDAT(N16)
2360 IF PRTCOL<>N40 THEN ? FIELD$(TEMP1,TEMP1+FDAT(T)-N1)
2370 TEMP$(LEN(TEMP$)+N1)=FIELD$(TEMP1,TEMP1+FDAT(T)-N1):TEMP1=TEMP1+FDAT(T)+N5
2380 IF FDAT(T)<RDAT(T) THEN TEMP$(LEN(TEMP$)+N1)=SPACE$(N1,RDAT(T)-FDAT(T))
2390 TEMP$(LEN(TEMP$)+N1)=" ":NEXT T:IF PRTCOL=N40 THEN ? TEMP$
2400 ? :? DASH$(N1,N38):? :IF PRT=N1 THEN LPRINT TEMP$:LPRINT :LPRINT DASH$(N1,P
RTCOL):LPRINT
2420 IF TEMP4=N0 THEN START=N1:FINISH=(LEN(DAT$)/RDAT(N17)):RSTART=N1:TEMP=N1
2430 IF TEMP4=N1 THEN RSTART=((START-N1)*RDAT(N17))+N1
2440 FOR T1=START TO FINISH:TEMP$=""
2450 FOR T2=N1 TO RDAT(N16)
2460 IF PRTCOL<>N40 THEN ? DAT$(RSTART,RSTART+RDAT(T2)-N1)
2470 TEMP$(LEN(TEMP$)+N1)=DAT$(RSTART,RSTART+RDAT(T2)-N1)
2480 IF RDAT(T2)<FDAT(T2) THEN TEMP$(LEN(TEMP$)+N1)=SPACE$(N1,FDAT(T2)-RDAT(T2))
2490 TEMP$(LEN(TEMP$)+N1)=" ":RSTART=RSTART+RDAT(T2)
2500 NEXT T2:IF PRTCOL=N40 THEN ? TEMP$
2510 IF PRT=N1 THEN LPRINT TEMP$
2520 IF PEEK(N764)=28 THEN POP :GOTO 2550
2530 IF PEEK(N764)=33 THEN 2520
2540 NEXT T1
2550 IF PRT=N1 AND F3<>N1 THEN LPRINT :LPRINT DASH$(N1,PRTCOL)
2560 IF PRTCOL=N132 THEN LPRINT CHR$(N18):REM * RESET PRINTER TO NORMAL
2565 IF F3=N1 THEN RSTART=RSTART-RDAT(N17):F3=N0:GOTO 3010
2570 ? DASH$(N1,N38):GOTO 2020
2599 REM * SELECTED PRINT
2600 GOSUB 3800:TEMP=INT(X/RDAT(N17)):TEMP=TEMP*RDAT(N17)+N1
2610 GOSUB 3800:TEMP1=INT(X/RDAT(N17)):TEMP1=TEMP1*RDAT(N17)+N1
2620 IF TEMP>TEMP1 THEN 2640
2630 START=((TEMP-N1)/RDAT(N17))+N1:FINISH=((TEMP1-N1)/RDAT(N17))+N1:TEMP4=N1:GO
TO 2270
2640 START=((TEMP1-N1)/RDAT(N17))+N1:FINISH=((TEMP-N1)/RDAT(N17))+N1:TEMP4=N1:GO
TO 2270
2999 REM * FIND/PRINT/MODIFY/DELETE ROUTINES
3000 GOSUB 3800
3005 TEMP=INT(X/RDAT(N17)):RSTART=TEMP*RDAT(N17)+N1
3010 TEMP=INT(RSTART/RDAT(N17))+N1:? ")Record # ";TEMP:?
3015 FOR T=N1 TO RDAT(N16)
3020 ? DAT$(RSTART,RSTART+RDAT(T)-N1)
3030 RSTART=RSTART+RDAT(T):NEXT T
3040 POSITION N3,N20:? "Print Mod Del Exit Next  #  +  - ";:GET #N1,KEY
3050 IF KEY=45 AND RSTART<N2*RDAT(N17) THEN 3220
3060 IF KEY=45 THEN RSTART=(RSTART-(N2*RDAT(N17))):GOTO 3010
3070 IF KEY=43 AND RSTART-N1=LEN(DAT$) THEN 3210
3080 IF KEY=43 THEN 3010
3090 IF KEY=68 THEN 3400
3100 IF KEY=N80 AND PRT=N1 THEN START=TEMP:FINISH=START:TEMP4=N1:F3=N1:GOTO 2270
3110 IF KEY=N80 THEN 3200
3120 IF KEY=69 THEN 2020
3130 IF KEY=77 THEN 3600
3140 IF KEY=78 THEN 3500
3150 IF KEY=N35 THEN 3300
3160 SOUND N0,N150,N10,N8:FOR DELAY=N1 TO N70:NEXT DELAY:SOUND N0,N0,N0,N0:POSIT
ION N12,N22:? "invalid key"
3170 FOR DELAY=N1 TO N200:NEXT DELAY:COUNT=N21:GOSUB SCLEAR:GOTO 3040
3199 REM * ERROR MESSAGES
3200 POSITION N6,N22:? "printer option not selected":GOTO 3250
3210 POSITION N5,N22:? "you are at the end of the file":GOTO 3250
3220 POSITION N4,N22:? "you are at the start of the file":GOTO 3250
3230 POSITION N9,N22:? "invalid record number":GOTO 3250
3240 POSITION N6,N22:? "no more items can be found"
3250 SOUND N0,N150,N10,N10:FOR DELAY=N1 TO N70:NEXT DELAY:SOUND N0,N0,N0,N0
3260 FOR DELAY=N1 TO N200:NEXT DELAY:RSTART=RSTART-RDAT(N17):GOTO 3010
3299 REM * GOTO A SPECIFIC RECORD #
3300 COUNT=N20:GOSUB SCLEAR:POSITION N12,N20
3310 TRAP 3230:? "Goto record  # ":? :INPUT TEMP
3320 IF TEMP<N1 OR TEMP>LEN(DAT$)/RDAT(N17) THEN 3230
3330 START=(TEMP*RDAT(N17)+N1)-RDAT(N17)
3350 RSTART=START:GOTO 3010
3399 REM * DELETION OF A RECORD
3400 COUNT=N20:GOSUB SCLEAR:POSITION N6,N22:? B$;"DELETE this record <Y or N>";:
GET #N1,KEY
3420 IF KEY=N78 THEN RSTART=RSTART-RDAT(N17):GOTO 3010
3430 IF KEY<>N89 THEN 3400
3435 IF LEN(DAT$)=RDAT(N17) THEN ? B$;") FILE NOW EMPTY":FOR DELAY=N1 TO N200:NE
XT DELAY:DAT$="":F2=N0:GOTO MENU
3440 IF RSTART-N1=LEN(DAT$) THEN RSTART=RSTART-RDAT(N17):GOTO 3460
3450 DAT$(RSTART-RDAT(N17),LEN(DAT$)-RDAT(N17))=DAT$(RSTART,LEN(DAT$))
3460 DAT$(LEN(DAT$)-RDAT(N17))=DAT$(LEN(DAT$)-RDAT(N17),LEN(DAT$)-RDAT(N17))
3470 ? ")":POSITION N1,N10:? R$:? "          RECORD DELETED          ":? R$:
REM * ALL IN INVERSE
3490 RSTART=RSTART-RDAT(N17):FOR DELAY=N1 TO N500:NEXT DELAY:GOTO 3010
3499 REM * NEXT OCCURANCE OF AN ITEM SEARCH
3500 IF RSTART>LEN(DAT$) THEN 3240
3510 POKE 209,N1:POKE 210,N0:X=USR(1536,ADR(DAT$)+RSTART,ADR(TEMP$),LEN(DAT$)-RS
TART,LEN(TEMP$))
3520 IF X=N0 THEN 3240
3530 X=X+RSTART-N1:GOTO 3005
3599 REM * MODIFICATION OF A RECORD
3600 TEMP=N5:SPACE$="":START=RSTART-RDAT(N17)
3605 FOR T=N1 TO RDAT(N16):? ")":? "enter new data for :-":? :? FIELD$(TEMP,TEMP
+FDAT(T)-N1):? :?
3610 ? "previous data is :-":? :? DAT$(START,START+RDAT(T)-N1):TEMP=TEMP+FDAT(T)
+N5:? :?
3620 MAXLEN=RDAT(T):GOSUB KEYINPUT:IF TEMP$<>E$ THEN 3650
3640 ? ")":? :? :? " record NOT modified ":POP :GOTO 3720
3650 IF LEN(TEMP$)<>MAXLEN THEN TEMP$(LEN(TEMP$)+N1)=" ":GOTO 3650
3660 SPACE$(LEN(SPACE$)+N1)=TEMP$:START=START+RDAT(T)
3670 NEXT T:DAT$(RSTART-RDAT(N17),RSTART)=SPACE$
3690 ? ")":POSITION N1,N10:? R$:? "          RECORD MODIFIED          ":? R$:
REM * ALL IN INVERSE
3720 SPACE$=" ":SPACE$(N255)=" ":SPACE$(N2)=SPACE$:RSTART=RSTART-RDAT(N17)
3730 FOR DELAY=N1 TO N200:NEXT DELAY:GOTO 3010
3799 REM * SEARCH FOR A PARTICULAR ITEM
3800 ? ")  Enter data to search for          ie letter, word, sentence, etc
":? :?
3810 ? "  press ESC to goto menu":? :?
```

```
3820 MAXLEN=RDAT(N17):GOSUB KEYINPUT:IF TEMP$=E$ THEN 2020
3830 POKE 209,N1:POKE 210,N0:X=USR(1536,ADR(DAT$),ADR(TEMP$),LEN(DAT$),LEN(TEMP$
))
3840 IF X<>N0 THEN X=X-N1:RETURN
3850 POSITION N3,N18:? "Item not found, please try again."
3860 ? :? "       press <RETURN> when ready":GET #N1,KEY:GOTO 3800
4699 REM * NON CUSTOM PRINT ROUTINE
4700 ? ")":? :? :? " Field names will only be printed at      the beginning of th
e file."
4710 ? " All records will then be printed in      that order."
4720 ? :? :? " Press     <ESC>     to exit to menu."
4730 ? :? " press <SPACE BAR> to HALT printing":? :? "      any other key to cont
inue."
4739 REM * IF F3=1 THEN DO NOT PRINT FIELD HEADINGS
4740 ? :? :? :? "       press <RETURN> when ready":GET #N1,KEY:IF F3=N1 THEN ? ")
":? :GOTO 4840
4750 ? ")":POSITION N15,N2:? FILE$:? :? DASH$(N1,N38):?
4760 IF PRT=N1 THEN TEMP=(PRTCOL-N8)/N2:LPRINT SPACE$(N1,TEMP);FILE$:LPRINT DASH
$(N1,PRTCOL):LPRINT
4770 TEMP=N5:FOR T=N1 TO RDAT(N16)
4780 ? FIELD$(TEMP,TEMP+FDAT(T)-N1)
4790 IF PRT=N1 THEN LPRINT FIELD$(TEMP,TEMP+FDAT(T)-N1)
4800 TEMP=TEMP+FDAT(T)+N5:NEXT T
4810 ? :? DASH$(N1,N38):? :? :IF PRT=N1 THEN LPRINT :LPRINT DASH$(N1,PRTCOL):LPR
INT :LPRINT :LPRINT
4820 FOR DELAY=N1 TO N200:NEXT DELAY
4830 IF TEMP4=N0 THEN START=N1:FINISH=(LEN(DAT$)/RDAT(N17)):RSTART=N1
4840 IF TEMP4=N1 THEN RSTART=((START-N1)*RDAT(N17))+N1
4850 FOR T1=START TO FINISH:FOR T2=N1 TO RDAT(N16)
4860 ? DAT$(RSTART,RSTART+RDAT(T2)-N1)
4870 IF PRT=N1 THEN LPRINT DAT$(RSTART,RSTART+RDAT(T2)-N1)
4880 RSTART=RSTART+RDAT(T2):NEXT T2:?
4900 IF PRT=N1 THEN LPRINT
4910 IF PEEK(N764)=28 THEN POP :GOTO 4940
4920 IF PEEK(N764)=33 THEN 4910
4930 NEXT T1
4939 REM * IF F3=1 THEN WE CAME FROM PRINT FUNCTION AT LINE 3040
4940 IF F3=N1 THEN RSTART=RSTART-RDAT(N17):F3=N0:GOTO 3010
4950 ? DASH$(N1,N38):IF PRT=N1 THEN LPRINT DASH$(N1,PRTCOL)
4960 POKE N764,N255:? :? "       press <RETURN> when ready":GET #N1,KEY
4970 GOTO 2020
4999 REM * SORT ROUTINE
5000 IF F2<>N1 THEN 220
5010 IF LEN(DAT$)=RDAT(N17) THEN ? B$;") Can only SORT 2 or more records.":GOTO
5090
5020 GOSUB 5300:START=N1:? ") Please wait..."
5040 FOR T=N1 TO TEMP:START=START+RDAT(T):NEXT T:START=START-RDAT(T-N1)
5050 X=USR(1536,ADR(DAT$),RDAT(N17),INT(LEN(DAT$)/RDAT(N17)-N1),START,RDAT(TEMP)
):POKE 82,N1
5060 ? ")":POSITION N1,N10:? R$:? "              FIELD SORTED              ":? R$:
REM * ALL IN INVERSE
5090 FOR DELAY=N1 TO N255:NEXT DELAY:GOTO MENU
5299 REM * PRINT FIELD # AND HEADINGS
5300 POKE N82,N0:? ")":? "FIELD            FIELD NAME"
5310 ? DASH$(N1,N39):TEMP=N5:TEMP1=N2
5320 FOR T=N1 TO RDAT(N16):IF T=N10 THEN TEMP1=N1
5330 ? SPACE$(N1,TEMP1);T;" ";FIELD$(TEMP,TEMP+FDAT(T)-N1)
5340 TEMP=TEMP+FDAT(T)+N5:NEXT T
5350 TRAP 5380:POSITION N3,N21:? "Enter field number to be sorted"
5360 ? "       Ø to exit ";:INPUT TEMP:IF TEMP=N0 THEN POP :GOTO MENU
5370 IF TEMP>N0 AND TEMP<=RDAT(N16) THEN RETURN
5380 COUNT=N21:GOSUB SCLEAR:POSITION N12,N22:? B$;"invalid number"
5390 FOR DELAY=N1 TO N200:NEXT DELAY:COUNT=N21:GOSUB SCLEAR:GOTO 5350
5499 REM * SPLIT A FILE INTO TWO PARTS
5500 IF F2<>N1 THEN 220
5530 ? ")":? :? :? " Please ensure that the field, where     you want to select
the point at        which to split the "
5540 ? "file, is sorted.":? :? " Then use the FIND function to decide     the rec
ord number to split from."
5550 ? :? " The record number you choose will be     the starting record number f
or the     second file."
5560 ? :? " Do you have the record # <Y or N>";:GET #N1,KEY
5570 IF KEY=N78 THEN GOTO MENU
5580 IF KEY<>N89 THEN 5530
5590 ? ")":? :? " Please enter record number :-":? :? :MAXLEN=N3:GOSUB KEYINPUT:
IF TEMP$=E$ THEN GOTO MENU
5600 TRAP 5900:TEMP=VAL(TEMP$):POKE 243,128:POKE 244,N5:IF TEMP<N2 OR TEMP>LEN(D
AT$)/RDAT(N17) THEN 5900
5610 TEMP=TEMP-N1:START=(TEMP*RDAT(N17)+N1):? ")":? :? :? " File in use :-";FILE
$:TEMP2=LEN(DAT$)
5620 FOR T=N2 TO N1 STEP -N1
5630 ? :? :? :? " Please enter a DOS file name for part   ";T;" of program":? :?
 " Do not include D1: or .EXT":? :?
5640 MAXLEN=N8:GOSUB KEYINPUT:IF TEMP$=E$ THEN POP :GOTO MENU
5650 FILE$=TEMP$:TEMP4=N1:GOSUB 7060
5660 TEMP2=START-N1:START=N1:? ")":NEXT T
5670 ? ")Both parts of the file have been saved  to disk.":? :? "You can Know go
 to main menu and "
5680 ? " select which file you wish to use.....":? :? "       press <RETURN> when
 ready"
5690 GET #N1,KEY:RUN
5900 POSITION N15,N22:? B$;"INVALID KEY":FOR DELAY=N1 TO N200:NEXT DELAY:GOTO 55
90
5999 REM * CREATE A NEW DATABASE
6000 ? ")     Do you wish to create a new              database    <Y or N> ";:
GET #N1,KEY
6010 IF KEY=N78 THEN GOTO MENU
6020 IF KEY<>N89 THEN 6000
6029 REM * IF LEN(DAT$))Ø THEN FILE ALREADY IN USE
6030 IF LEN(DAT$)=N0 THEN 6080
6040 ? B$;")Creating a new file will DELETE current file :-":? :? FILE$
6050 ? :? "SAVE current file first <Y or N>";:GET #N1,KEY
6060 IF KEY=N89 THEN GOTO MENU
6070 IF KEY<>N78 THEN 6050
6080 ? :? ") Please enter a DOS file name":? " Do not include D1: or .EXT":? :?
6100 F1=N0:F2=N0:MAXLEN=N8:GOSUB KEYINPUT:IF TEMP$=E$ THEN GOTO MENU
6110 FILE$=TEMP$
6120 FIELD$="****":RLEN=N0:FLEN=N4:PLEN=N0:DAT$="":GOSUB 6900
6130 FOR T=N1 TO N15
6140 POSITION N3,N10:? "Enter a name for field heading #";T:? :?
6150 MAXLEN=N35:GOSUB KEYINPUT:IF TEMP$=E$ AND T>N1 THEN T=T-N1:POP :GOTO 6300
6160 IF TEMP$=E$ THEN ? ") Database NOT created":FOR DELAY=N1 TO N200:NEXT DELAY
:POP :GOTO MENU
6170 TEMP1=LEN(TEMP$):IF TEMP1+FLEN+N5>380 THEN 6800
6180 FLEN=FLEN+TEMP1+N5
6190 FIELD$(LEN(FIELD$)+N1)=TEMP$:FIELD$(LEN(FIELD$)+N1)="*****"
6200 POSITION N0,N15:? "   Enter maximum number of characters          required
for above field":? ¢?
6215 MAXLEN=N3:GOSUB KEYINPUT:IF TEMP$=E$ THEN 6200
6220 FOR T2=N1 TO LEN(TEMP$):IF TEMP$(T2,T2)<"Ø" OR TEMP$(T2,T2)>"9" THEN POP :G
OTO 6830
6225 NEXT T2:IF TEMP$(N1,N1)="Ø" THEN 6830
```


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PROGRAM FILE

```
6230 TEMP=RLEN+VAL(TEMP$):TEMP2=VAL(TEMP$):POKE 243,128:POKE 244,N5
6240 IF TEMP=RLEN THEN 6820
6250 IF TEMP>254 THEN 6810
6255 RLEN=TEMP
6260 IF TEMP1<TEMP2 THEN PLEN=PLEN+TEMP2+N1:GOTO 6275
6270 PLEN=PLEN+TEMP1+N1
6275 TEMP1=LEN(TEMP$):TEMP$="000":TEMP$(N4-TEMP1,N3)=STR$(TEMP2)
6280 FIELD$(LEN(FIELD$)-N3,LEN(FIELD$)-N1)=TEMP$
6285 IF RLEN=254 THEN POP :GOTO 6300
6290 GOSUB 6900:GOSUB 6700:NEXT T:T=T-N1
6299 REM * CHECK FIELD NAMES AND RECORD WIDTHS
6300 FIELD$(N2,N3)=STR$(T):TEMP1=N5:TEMP2=N5:T=N1
6310 FOR T=N1 TO VAL(FIELD$(N2,N3)):POKE 243,128:POKE 244,N5
6320 TEMP2=TEMP2+N1:IF FIELD$(TEMP2,TEMP2)<>"*" THEN 6320
6330 ? ")":? :? "       Field heading number ";T:? :? DASH$(N1,N38)
6340 FOR Z=TEMP1 TO TEMP2-N1:? CHR$(ASC(FIELD$(Z,Z))+128);:NEXT Z
6360 ? :? :? "  field length = ";FIELD$(TEMP2+N1,TEMP2+N3):TEMP1=TEMP2+N5:TEMP2=
TEMP1-N1
6370 GOSUB 6380:NEXT T:F1=N1:GOTO 9500
6380 ? DASH$(N1,N38):POSITION 7,N20:? "Is the above information
  correct <Y or N> ";
6390 GET #N1,KEY
6400 IF KEY=N89 THEN RETURN
6410 IF KEY<>N78 THEN 6390
6420 POP :POSITION N6,N22:? B$;"Please re-enter field data":FOR DELAY=N1 TO N200
:NEXT DELAY:GOTO 6120
6700 Y1=PEEK(84)
6710 TEMP$=STR$(RLEN):POSITION N21-LEN(TEMP$),N3:? RLEN
6720 TEMP$=STR$(FLEN):POSITION N21-LEN(TEMP$),N4:? FLEN
6730 TEMP$=STR$(PLEN):POSITION N21-LEN(TEMP$),N5:? PLEN
6740 POKE 84,Y1:RETURN
6800 POSITION N8,N21:? B$;"Heading length too long":POSITION N10,N22:? "Re-enter
 field name"
6805 FOR DELAY=N1 TO N200:NEXT DELAY:COUNT=N10:GOSUB SCLEAR:GOTO 6140
6810 POSITION N6,N21:? "Length of field is too long":GOTO 6830
6820 POSITION N5,N21:? "ZERO field length not allowed"
6830 POSITION N9,N22:? "re-enter field length"
6840 SOUND N0,N150,N10,N10:FOR DELAY=N1 TO N40:NEXT DELAY:SOUND N0,N0,N0,N0
6850 FOR DELAY=N1 TO N200:NEXT DELAY:COUNT=N15:GOSUB SCLEAR:GOTO 6200
6900 ? ")       CREATING A NEW DATABASE"
6910 ? :? "FILE NAME       : ";FILE$
6920 ? "record  length : 000   max length: 254"
6930 ? "heading length : 000   max length: 380"
6940 ? "printer length : 000   max 40,80,132"
6950 ? :? "Press ESC to finish creating database":? R$:RETURN
6999 REM * SAVE A FILE TO DISK
7000 IF F2<>N1 THEN 220
7020 ? ")       Do you wish to save a file                    to DISK <Y or N>";
7030 GET #N1,KEY
7040 IF KEY=N78 THEN GOTO MENU
7050 IF KEY<>N89 THEN 7030
7060 ? ")       SAVING A FILE TO DISK"
7070 ? :? " FILE NAME: ";FILE$:? :? R$
7090 ? :? "   Place a data disk into drive  #1"
7100 ? :? "      press <RETURN> when ready"
7110 GET #N1,KEY
7120 TEMP$="D1:":TEMP$(LEN(TEMP$)+N1)=FILE$:TEMP$(LEN(TEMP$)+N1)=".INF":FILE$=TE
MP$
7130 GOSUB 7600:IF TEMP=N2 THEN GOSUB 7500
7140 ? ")":POSITION N1,N10:? R$:? "          SAVING FILE TO DISK           ":? R$:
REM * ALL IN INVERSE
7170 TRAP 7700:OPEN #N2,N8,N0,FILE$:? #N2;FIELD$:CLOSE #N2:XIO 35,#N2,N0,N0,FILE
$
7180 FILE$(LEN(FILE$)-N3,LEN(FILE$))=".DAT":IF TEMP=N2 THEN GOSUB 7560
7190 OPEN #N2,N8,N0,FILE$:IF TEMP4=N0 THEN ? #N2;DAT$:GOTO 7200
7195 ? #N2;DAT$(START,TEMP2)
7200 CLOSE #N2:XIO 35,#N2,N0,N0,FILE$
7210 ? ")":POSITION N1,N10:? B$;R$:? "          SAVING COMPLETED           ":?
R$:REM * ALL IN INVERSE
7240 FOR DELAY=N1 TO N200:NEXT DELAY
7249 REM * IF TEMP4=1 THEN WE CAME FROM SPLIT ROUTINE
7250 FILE$=FILE$(N4,LEN(FILE$)-N4):IF TEMP4=N1 THEN RETURN
7260 GOTO MENU
7499 REM * FILE ALREADY EXISTS, DELETE OLD FILE??
7500 ? :? :? B$;"       FILE ALREADY EXISTS."
7510 ? :? "Do you want to DELETE old file <Y or N>";
7520 GET #N1,KEY
7530 IF KEY=N89 THEN 7560
7540 IF KEY<>N78 THEN 7520
7550 ? :? :? " Place another DOS disk into drive #1":? :? "      Press <RETURN>
when ready"
7555 GET #N1,KEY:POP :? ")":GOTO 7130
7560 XIO 36,#N2,N0,N0,FILE$:RETURN
7598 REM * CHECK DISK DIRECTORY TO SEE IF FILE ALREADY EXISTS
7599 REM * COULD BE FATAL IF WE DELETE WRONG FILE!!!!
7600 OPEN #N2,N6,N0,"D1:*.*":TRAP 7650
7610 INPUT #N2,TEMP$
7620 IF FILE$(N4,LEN(FILE$)-N4)=TEMP$(N3,N3+(LEN(FILE$)-N8)) THEN CLOSE #N2:TEMP
=N2:RETURN
7630 GOTO 7610
7650 CLOSE #N2:TEMP=N1:RETURN
7700 CLOSE #N2:? :? B$;"    DISK FULL or WRITE PROTECTED":FILE$=FILE$(N4,LEN(FIL
E$)-N4)
7710 ? :? :? "      Press <RETURN> when ready":GET #N1,KEY:GOTO MENU
7999 REM * LOAD A FILE FROM DISK
8000 ? ")      Do you wish to load a file                    from DISC <Y or N>";
8010 GET #N1,KEY
8020 IF KEY=N78 THEN GOTO MENU
8030 IF KEY<>N89 THEN 8000
8040 IF LEN(DAT$)=N0 THEN 8090
8050 ? B$;")Loading a new file will DELETE current file :-":? :? FILE$
8060 ? :? "SAVE current file first <Y or N>";:GET #N1,KEY
8070 IF KEY=N89 THEN GOTO MENU
8080 IF KEY<>N78 THEN 8060
8090 DAT$="":TEMP$="":FILE$="":FIELD$="":DAT$=" ":DAT$(LE)=" ":DAT$(N2)=DAT$:F1=
N0:F2=N0
8100 ? ")       LOADING A FILE FROM DISK"
8110 ? :? :? "Enter name of file to load":? "Do not include D1: or .EXT":? :?
8115 MAXLEN=N8:GOSUB KEYINPUT:IF TEMP$=E$ THEN DAT$="":GOTO MENU
8120 ? :? :? :? "    Place DOS disk into drive  #1"
8130 ? :? "      Press <RETURN> when ready":GET #N1,KEY
8140 ? ")":POSITION N1,N10:? R$:? "          LOADING FILE           ":? R$:
REM * ALL IN INVERSE
8170 FILE$="D1:":FILE$(LEN(FILE$)+N1)=TEMP$:FILE$(LEN(FILE$)+N1)=".INF"
8180 TRAP 8600:OPEN #N2,N4,N0,FILE$:TRAP 8200
8190 GET #N2,TEMP:IF TEMP=N155 THEN CLOSE #N2:GOTO 8220
8195 FIELD$(LEN(FIELD$)+N1)=CHR$(TEMP):GOTO 8190
8200 CLOSE #N2:IF PEEK(195)<>136 THEN 8500
8220 FILE$(LEN(FILE$)-N3,LEN(FILE$))=".DAT"
8230 TRAP 8600:OPEN #N2,N4,N0,FILE$
8239 REM * CALL M/C FOR QUICK LOAD
8240 POKE 866,7:X=USR(1536,ADR(DAT$),LE+N2)
```

```
8250 CLOSE #N2:IF PEEK(208)<>136 THEN 8500
8260 TEMP=X-N1:DAT$(TEMP)=DAT$(TEMP,TEMP)
8270 ? ")":POSITION N1,N10:? B$;R$:? "          FILE HAS BEEN LOADED          ":?
R$:REM * ALL IN INVERSE
8300 FOR DELAY=N1 TO N100:NEXT DELAY:F1=N1:F2=N1:FILE$=FILE$(N4,LEN(FILE$)-N4):G
OTO 9500
8500 ? ")":? :? " Disk data CORRUPTED, cannot load file :-(":? :? TEMP$:? :? "Ple
ase check disk":GOTO 8620
8600 CLOSE #N2:? ")       FILE NOT ON THIS DISK "
8610 ? :? "  Please put correct disk in drive #1"
8620 ? :? "       press RETURN when ready":GET #N1,KEY:GOTO 8090
8999 REM * EXIT FROM PROGRAM
9000 ? ")":? :? "To exit from this program will mean     that all data will be l
ost!!"
9010 ? B$:? :? :? "Do you still wish to EXIT from program":? :? " enter <Y or N>
"
9020 GET #N1,KEY
9030 IF KEY=N78 THEN GOTO MENU
9040 IF KEY<>N89 THEN 9020
9050 ? ")":? :? "              PROGRAM  ENDED"
9060 POKE 752,N0:END
9498 REM * SET UP ARRAYS etc AFTER CREATE OR LOAD
9499 REM * CALLED ONLY AFTER A CREATE OR LOAD
9500 ? ") PLEASE WAIT..":TEMP=VAL(FIELD$(N2,N3)):TEMP1=N5:TEMP2=N5:PLEN=N0
9520 RDAT(N16)=N0:RDAT(N17)=N0:FDAT(N16)=N0:FDAT(N17)=N0
9530 FOR T=N1 TO TEMP
9540 TEMP2=TEMP2+N1:IF FIELD$(TEMP2,TEMP2)<>"*" THEN 9540
9550 FDAT(T)=TEMP2-TEMP1:RDAT(T)=VAL(FIELD$(TEMP2+N1,TEMP2+N3))
9560 FDAT(N17)=FDAT(N17)+FDAT(T):RDAT(N17)=RDAT(N17)+RDAT(T)
9570 TEMP1=TEMP2+N5:TEMP2=TEMP1-N1:NEXT T
9580 FDAT(N16)=TEMP:RDAT(N16)=TEMP:RLEN=RDAT(N17):FLEN=FDAT(N17)
9590 FOR T=N1 TO TEMP:IF FDAT(T)<RDAT(T) THEN PLEN=PLEN+RDAT(T):GOTO 9610
9600 PLEN=PLEN+FDAT(T)
9610 NEXT T:PLEN=PLEN+RDAT(N16):POKE 243,128:POKE 244,N5:GOTO MENU
9799 REM * GET DISK DIRECTORY
9800 ? ")":? :? :? "       Place disk into drive #1,              press <RETURN>
when ready.":GET #N1,KEY
9810 OPEN #N2,N6,N0,"D:*.*":TRAP 9840
9820 ? ")  DISK DIRECTORY":?
9830 INPUT #N2,TEMP$:? TEMP$:GOTO 9830
9840 CLOSE #N2:? :? :? " Press any key to return to main menu"j:GET #N1,KEY:GOTO
 MENU
9999 REM * MAIN MENU
10000 POKE 82,N1:GRAPHICS N0:SETCOLOR N2,N100,N6:POKE 752,N1:POKE N16,64:POKE 53
774,64:SETCOLOR N1,202,N15
10010 ? R$:? "          M A I N  M E N U          ":? R$:REM * ALL IN INVERSE
10040 IF F1=N1 THEN ? :? "        file in use :- "jFILE$
10050 ? :? "        <C> CREATE a new database"
10060 ? :? "        <A> ADD records"
10070 ? "        <F> FIND/PRINT/MODIFY records"
10080 ? "        <S> SORT records"
10090 ? :? "        <P> PUT records onto disk"
10100 ? "        <G> GET records from disk"
10110 ? :? "        <D> DISK DIRECTORY"
10120 ? :? "        <T> SPLIT file in two"
10130 ? :? "        <E> EXIT from program"
10140 ? :? R$:? "       PLEASE ENTER YOUR CHOICE"
10150 GET #N1,KEY
10160 IF KEY=65 THEN 1000
10170 IF KEY=67 THEN 6000
10180 IF KEY=68 THEN 9800
10190 IF KEY=69 THEN 9000
10200 IF KEY=70 THEN 2000
10210 IF KEY=71 THEN 8000
10220 IF KEY=80 THEN 7000
10230 IF KEY=83 THEN 5000
10240 IF KEY=84 THEN 5500
10250 GOTO 10000
14999 REM * SET UP VARIABLES, ARRAYS, etc
15000 N0=0:N1=1:N2=N1+N1:N3=N2+N1:N4=N3+N1:N5=N4+N1:N6=N5+N1:N8=N5+N3:N9=N8+N1:N
10=N9+N1:N12=N10+N2
15010 N15=N12+N3:N16=N15+N1:N18=N16+N2:N20=N10+N10:N30=N20+N10:N38=N30+N8:N35=N3
0+N5:N764=764:N17=N16+N1
15020 N40=N30+N10:N80=N40+N40:N200=N10*N20:N83=N80+N3:N70=N80-N10:N82=N80+N2:N10
0=N10*N10:N255=255:N155=155
15030 N39=N38+N1:N89=N80+N9:N500=N5*N100:N150=N15*N10:N132=132:N22=N20+N2:N21=N2
0+N1:N78=N70+N8
15040 MENU=10000:SCLEAR=N200:KEYINPUT=N10:OPEN #N1,N4,N0,"K:":POKE 82,N1
15060 DIM FDAT(N17),RDAT(N17),TEMP$(N255),FIELD$(380),FILE$(N15),DASH$(N255),SPA
CE$(N255)
15070 DIM B$(N1),R$(N38),E$(N1)
15080 DASH$="-":DASH$(N255)="-":DASH$(N2)=DASH$:SPACE$=" ":SPACE$(N255)=" ":SPAC
E$(N2)=SPACE$
15090 B$=CHR$(253):FOR T=N1 TO N38:R$(T,T)=CHR$(N18):NEXT T:E$=CHR$(27)
15100 LE=FRE(X)-N100:DIM DAT$(LE)
15110 IF PEEK(1538)<>N4 THEN ? B$:? :? ") You will have to 'RUN D1:DBASEDAT.BAS'
 file first":POKE 752,N1:END
15120 GOTO MENU
16000 REM * HERE IS A LIST OF VARIBLES USED :-
16010 REM * FDAT(N) - width of each field heading name
16020 REM * RDAT(N) - width of each record field
16030 REM * DAT$    - file data
16040 REM * FIELD$  - field names and record widths
16050 REM * FILE$   - DOS file name
16060 REM * TEMP$   - temperary string storage area
16070 REM * DASH$   - 255 dashes
16080 REM * SPACE$  - 255 spaces
16090 REM * B$      - bell
16100 REM * R$      - 38 control R
16110 REM * T,T1,T2 - loop variables
16120 REM * TEMP-TEMP4 - temperary variables
16130 REM * N0-N764 - as number, but saves 6 bytes
16140 REM * when used instead of the actual number
16150 REM * POKE 243,128:POKE 244,5 - clears the bug
16160 REM * which occurs when using GET and VAL
16170 REM * X1,X2,Y1,Z - used for keyboard input routine
16180 REM * START,RSTART - used for pointers in DAT$
16190 REM * MAXLEN  - maximum # characters in input routine
16200 REM * PLEN,RLEN,FLEN - printer,record,field lengths
16210 REM * PRTCOL  - printer column width
16220 REM * PRT     - set to 1 when printer selected
16230 REM * F1      - set to 1 if FIELD$ contains data
16240 REM * F2      - set to 1 if DAT$ contains data
```

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PROGRAM FILE

QL Microdrive Filing

by Alan Prior

This program provides the ease of use of a disk filing system for the QL microdrives. It allows you to back up a whole cartridge, copy individual files, list directories onscreen or printer, delete individual files, format cartridges and give help information.

All operations are menu-driven, and messages are given continually to explain what is going on.

```
100 REMark *MICRODRIVE UTILITY - V 1.0*
110 REMark *Copyright - Alan Prior - 1985*
120 REMark
130 DIM d$(100,41)
140 screen
150 header
160 menu
170 STOP
180 REMark
190 DEFine PROCedure screen
200   MODE 4
210   OPEN  #5,con_512x256a0x0
220   PAPER #5,7
230   CLS   #5
240   CLOSE #5
250   OPEN #1,con_448x204a32x39
260   OPEN #2,con_220x21a250x18
270   OPEN #3,con_448x23a32x16
280   OPEN #4,con_448x12a32x243_128
290   OPEN #5,con_75x21a180x18
300   PAPER #1,7
310   PAPER #2,0
320   PAPER #3,0
330   PAPER #4,0
340   PAPER #5,0
350   INK #1,0
360   INK #2,7
370   INK #3,4
380   INK #4,4
390   INK #5,2
400   BORDER #1,1,2
410   BORDER #3,1,2
420   BORDER #4,1,2
430   MODE 4
440   CLS #1
450   CLS #3
460   CLS #4
470 END DEFine screen
480 REMark
490 DEFine PROCedure tv
500   shut
510   WINDOW #0,448,40,32,216
520   OPEN   #1,con_448x200a32x16_128
530   OPEN   #2,con_448x200a32x16_128
540   PAPER #0,0
550   PAPER #1,2
560   PAPER #2,1
570   INK #0,7
580   INK #1,7
590   INK #2,7
600   BORDER #0
610   BORDER #1
620   BORDER #2
630   MODE 8
640   CLS
650 END DEFine tv
660 REMark
670 DEFine PROCedure mon
680   shut
690   WINDOW #0,512,50,0,206
700   OPEN   #1,con_256x202a256x0_128
710   OPEN   #2,con_256x202a0x0_128
720   PAPER #0,0
730   PAPER #1,2
740   PAPER #2,7
750   INK #0,4
760   INK #1,7
770   INK #2,2
780   BORDER #0
790   BORDER #1,1,255
800   BORDER #2,1,255
810   MODE 4
820 END DEFine mon
830 REMark
840 DEFine PROCedure shut
850   OPEN  #5,con_512x256a0x0
860   PAPER #5,0
870   CLS   #5
880   CLOSE #1
890   CLOSE #2
900   CLOSE #3
910   CLOSE #4
920   CLOSE #5
930 END DEFine shut
940 REMark
950 DEFine PROCedure header
960   CSIZE #3,1,1
970   PRINT #3,'MICRODRIVE UTILITY'
980   PRINT #5,' A.Prior)'
990   PRINT #5,'(V1 - 1985)'
1000   BORDER #3,1,2
1010 END DEFine header
1020 REMark
1030 DEFine PROCedure menu
1040   REPeat loop
1050     PRINT #4,' LOAD TAPE(S) - SELECT OPTION (Press a key 1-8) .....'
1060     AT #2,0,0
1070     PRINT #2,'1.BACKUP 2.COPY 3.DELETE 4.DIRECTORY'
1080     PRINT #2,'5.FORMAT 6.HELP 7.LIST   8.EXIT'
1090     a$=INKEY$(-1)
1100     IF (a$<'1') OR (a$>'8'):GO TO 1090
1110     PAPER #2,2
1120       IF a$='1':AT #2,0,0:PRINT #2,'1.BACKUP':abackup
```

PROGRAM FILE

```
1130        IF a$='2':AT #2,0,9:PRINT #2,'2.COPY':acopy
1140        IF a$='3':AT #2,0,16:PRINT #2,'3.DELETE':adelete
1150        IF a$='4':AT #2,0,25:PRINT #2,'4.DIRECTORY':adirectory
1160        IF a$='5':AT #2,1,0:PRINT #2,'5.FORMAT':aformat
1170        IF a$='6':AT #2,1,9:PRINT #2,'6.HELP':ahelp
1180        IF a$='7':AT #2,1,16:PRINT #2,'7.LIST':alist
1190        IF a$='8':AT #2,1,25:PRINT #2,'8.EXIT':aexit
1200        PAPER #2,0
1210      END SELect
1220    END REPeat loop
1230 END DEFine menu
1240 REMark
1250 DEFine PROCedure aexit
1260    PRINT #4,'TV or MONITOR mode? (T/M)'
1270    a$=INKEY$(-1)
1280    IF CODE(a$)=27:GO TO 1350
1290    IF a$='m' THEN
1300      mon
1310    ELSE
1320      tv
1330    END IF
1340    STOP
1350 END DEFine aexit
1360 REMark
1370 DEFine PROCedure adirectory
1380    PRINT #4,'From which device? - (1/2)'
1390    a$=INKEY$(-1)
1400    IF CODE(a$)=27:GO TO 1830
1410    bdirectory
1420 END DEFine adirectory
1430 REMark
1440 DEFine PROCedure bdirectory
1450    IF (a$<'1') OR (a$>'2'):GO TO 1390
1460    u$='mdv'&a$&'_direct'
1470    PRINT #4,'Writing directory for - ';u$
1480    OPEN_NEW #6,u$
1490    DIR #6,'mdv'&a$&'_'
1500    CLOSE #6
1510    PRINT #4,'Reading directory for - ';u$
1520    OPEN_IN #6,u$
1530    INPUT #6,b$,c$
1540    CLS
1550    UNDER 1
1560    AT 0,1:PRINT 'DEVICE: mdv';a$;'_ NAME: ';b$;' SECTORS: ';c$
1570    UNDER 0
1580    d=-1
1590    l=0
1600    REPeat rdir
1610      IF EOF(#6):EXIT rdir
1620      d=d+1
1630      INPUT #6,d$(d)
1640       IF d$(d)='direct':d=d-1:GO TO 1660
1650      IF LEN(d$(d))>l:l=LEN(d$(d))
1660    END REPeat rdir
1670    CLOSE #6
1680    PRINT #4,'Sorting directory ...'
1690    IF d>0:shell
1700    PRINT #4,' '
1710    DELETE u$
1720    q=1
1730    l=INT(72/(l+4))
1740    l=INT(72/l)
1750    m=1
1760    p=1
1770    FOR n=0 TO d
1780      IF m+1>=73:p=p+1:m=1
1790      AT p,m:PRINT n+1;'.';d$(n)
1800      m=m+1
1810    END FOR n
1820    u$=a$
1830 END DEFine adirectory
1840 REMark
1850 DEFine PROCedure shell
1860    i=d
1870    i=i DIV 2
1880    FOR j=1 TO d-i
1890      FOR h=j TO 0 STEP -i
1900        n=h+i
1910        k=0
1920        e$=d$(h)
1930        f$=d$(n)
1940        IF LEN(e$)>LEN(f$) THEN
1950          a=LEN(e$)
1960        ELSE
1970          a=LEN(f$)
1980        END IF
1990        IF e$(1 TO a)>f$(1 TO a):temp$=d$(h):d$(h)=d$(n):d$(n)=temp$:k=h
2000        h=k
2010      END FOR h
2020    END FOR j
2030    i=i DIV 2
2040    IF i>0:GO TO 1880
2050 END DEFine shell
2060 REMark
2070 DEFine PROCedure acopy
2080    adirectory
2090   IF CODE(a$)=27:GO TO 2270
2100   PRINT 'Copying ...':PRINT ' ';
2110    REPeat bcopy
2120      INPUT #4,'File number?'!a$
2130      a=a$
2140      PRINT !a$;
2150      PRINT #4,'Copy to drive number? (1/2)'
2160      a$=INKEY$(-1)
2170      IF (a$<'1') OR (a$>'2'):GO TO 2160
2180      b$=d$(a-1)
2190      IF a$=u$:INPUT #4,'New file name?'!b$
2200      PRINT #4,'Copying mdv';u$;'_';b$;' to mdv';a$;'_';b$
2210      DELETE 'mdv'&a$&'_'&b$
2220      COPY 'mdv'&u$&'_'&d$(a-1) TO 'mdv'&a$&'_'&b$
2230      PRINT #4,'Copy OK - ANYMORE? (y/n)'
2240      a$=INKEY$(-1)
2250      IF a$='n':EXIT bcopy
2260    END REPeat bcopy
2270 END DEFine acopy
2280 REMark
2290 DEFine PROCedure adelete
2300    adirectory
2310    IF CODE(a$)=27:GO TO 2470
2320    PRINT 'Deleting ...':PRINT ' ';
2330    REPeat bdel
2340      INPUT #4,'Delete file number?'!a$
2350      a=a$
```


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PROGRAM FILE

```
2360      PRINT !a$;
2370      PRINT #4,'Confirm delete for mdv';u$;'_';d$(a-1);' (y/n)'
2380      a$=INKEY$(-1)
2390      IF a$='n':PRINT #4,' - NOT DELETED - ANYMORE? (y/n)':GO TO 2400
2400      PRINT #4
2410      PRINT #4,'Deleting  mdv';u$;'_';d$(a-1);
2420      DELETE 'mdv'&u$&'_'&d$(a-1)
2430      PRINT #4,' - DELETED - ANYMORE? (y/n)'
2440      a$=INKEY$(-1)
2450      IF a$='n':EXIT bdel
2460    END REPeat bdel
2470  END DEFine adelete
2480  REMark
2490  DEFine PROCedure aformat
2500    CLS
2510    REPeat bfor
2520      PRINT #4,'Format which drive? (1/2)'
2530      a$=INKEY$(-1)
2540      IF CODE(a$)=27:GO TO 2730
2550      IF (a$<'1') OR (a$>'2'):GO TO 2550
2560      PRINT 'Format mdv';a$;'_';
2570      INPUT #4,'Tape name?'!b$
2580      PRINT b$;
2590      PRINT #4,'How many times? (1-9)'
2600      c$=INKEY$(-1)
2610      IF (c$<'1') OR (c$>'9'):GO TO 2590
2620      PRINT !c$!'times ....'
2630      a=c$
2640      PRINT #4,'Formatting .......'
2650      FOR n=1 TO a
2660        PRINT ' FORMAT'!n!' - ';
2670        FORMAT 'mdv'&a$&'_'&b$
2680      END FOR n
2690      PRINT #4,'Formatting ended - ANYMORE? (y/n)'
2700      a$=INKEY$(-1)
2710      IF a$='n':EXIT bfor
2720    END REPeat bfor
2730  END DEFine aformat
2740  REMark
2750  DEFine PROCedure abackup
2760    adirectory
2770   IF CODE(a$)=27:GO TO 2990
2780    REPeat bback
2790      b$='1'
2800      IF u$='1':b$='2'
2810      PRINT #4,'Load BACKUP tape to mdv';b$;'_ then press a key ...'
2820      a$=INKEY$(-1)
2830      INPUT #4,'Backup tape name?'!c$
2840      PRINT 'Backup tape is mdv';b$;'_';c$
2850      PRINT #4,'Formatting .....'
2860      FORMAT 'mdv'&b$&'_'&c$
2870      PRINT #4,'Copying .....'
2880      PRINT 'Copying ... '
2890      FOR n=0 TO d
2900        PRINT !n+1;
2910        PRINT #4,'Copying mdv';u$;'_';d$(n);' to mdv ';b$;'_';d$(n)
2920        COPY 'mdv'&u$&'_'&d$(n) TO 'mdv'&b$&'_'&d$(n)
2930      END FOR n
2940      PRINT
2950      PRINT #4,'Backup complete - ANYMORE? (y/n)'
2960      a$=INKEY$(-1)
2970      IF a$='n':EXIT bback
2980    END REPeat bback
2990  END DEFine abackup
3000  REMark
3010  DEFine PROCedure alist
3020    PRINT #4,'Switch on printer - then press a key ...'
3030    a$=INKEY$(-1)
3040    IF CODE(a$)=27:GO TO 3270
3050    OPEN #7,ser1c
3060    REPeat blist
3070      adirectory
3080      INPUT #4,'Enter heading line:'!e$
3090      PRINT #4,'Printing ......'
3100      PRINT #7
3110      PRINT #7;CHR$(27);CHR$(45);CHR$(49);CHR$(27);CHR$(62);e$!'  TAPE N
AME:'!b$!'  SECTORS:'!c$
3120      PRINT #7;CHR$(27);CHR$(45);CHR$(48);CHR$(27);CHR$(70)
3130        q=q+4
3140      m=1
3150      FOR n=0 TO d
3160        IF m+q>80:PRINT #7:m=1
3170        PRINT #7,TO m;n+1;'.';d$(n);
3180        m=m+q
3190      END FOR n
3200      PRINT #7
3210      PRINT #4,'Printing finished - ANYMORE? (y/n)'
3220      a$=INKEY$(-1)
3230      IF a$='n':EXIT blist
3240    END REPeat blist
3250    PRINT #7
3260    CLOSE #7
3270  END DEFine alist
3280  REMark
3290  DEFine PROCedure ahelp
3300   REPeat bhelp
3310    CLS
3320    PRINT
3330    PRINT ,,'HELP MENU'
3340    PRINT:PRINT ,,'1.BACKUP'
3350    PRINT ,,'2.COPY'
3360    PRINT ,,'3.DELETE'
3370    PRINT ,,'4.DIRECTORY'
3380    PRINT ,,'5.FORMAT'
3390    PRINT ,,'6.(GENERAL)'
3400    PRINT ,,'7.LIST'
3410    PRINT ,,'8.EXIT'
3420    PRINT ,,'9.EXIT HELP'
3430    PRINT
3440    PRINT ,,'(Press a key 1-9)'
3450    a$=INKEY$(-1)
3460    IF (a$<'1') OR (a$>'9'):GO TO 3450
3470    IF a$='9':CLS:EXIT bhelp
3480    IF a$='1':help1
3490    IF a$='2':help2
3500    IF a$='3':help3
3510    IF a$='4':help4
3520    IF a$='5':help5
3530    IF a$='6':help6
3540    IF a$='7':help7
3550    IF a$='8':help8
3560    PRINT
3570    PRINT ,,'(Press a key for help menu)'
```


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PROGRAM FILE

```
3580   a$=INKEY$(-1)
3590  END REPeat bhelp
3600 END DEFine help
3610 REMark
3620 DEFine PROCedure help1
3630   CLS
3640   PRINT
3650   PRINT ' BACKUP'
3660   PRINT
3670   PRINT ' First lists the directory for the cartridge to be backed up.'
3680   PRINT
3690   PRINT ' Then formats the backup cartridge as many times as specified.'
3700   PRINT
3710   PRINT ' After this all files are copied to the back up cartridge.'
3720 END DEFine help1
3730 REMark
3740 REMark
3750 DEFine PROCedure help2
3760   CLS
3770   PRINT
3780   PRINT ' COPY'
3790   PRINT
3800   PRINT ' First, the directory for the cartridge to be copied from is liste
d.'
3810   PRINT
3820   PRINT ' Then the number of the file to be copied is requested.'
3830   PRINT
3840   PRINT ' The file is copied, then the next file number is requested and so
 on.'
3850   PRINT
3860   PRINT ' If the file is to be copied to the same cartridge, a new file nam
e'
3870   PRINT
3880   PRINT ' must be given.'
3890   PRINT
3900   PRINT 'NOTE: You do not need to DELETE before a COPY'
3910 END DEFine help2
3920 REMark
3930 DEFine PROCedure help3
3940   CLS
3950   PRINT
3960   PRINT ' DELETE'
3970   PRINT
3980   PRINT ' First lists the directory of the cartridge files are to be delete
d'
3990   PRINT
4000   PRINT ' from.'
4010   PRINT
4020   PRINT ' Then the program repeatedly requests the number of the next'
4030   PRINT
4040   PRINT ' file to be deleted, and deletes it.'
4050   PRINT
4060   PRINT ' Before each deletion you are asked to confirm the delete for'
4070   PRINT
4080   PRINT ' for that particular file.'
4090 END DEFine help3
4100 REMark
4110 DEFine PROCedure help4
4120   CLS
4130   PRINT
4140   PRINT ' DIRECTORY'
4150   PRINT
4160   PRINT ' The program requests the number of the drive whose directory is'
4170   PRINT
4180   PRINT ' to be listed.'
4190   PRINT
4200   PRINT ' The directory is then listed in alphabetical order.'
4210   PRINT
4220   PRINT ' Names are spaced across the screen according to the length of the
4230   PRINT
4240   PRINT ' longest file name on the cartridge.'
4250 END DEFine help4
4260 REMark
4270 DEFine PROCedure help5
4280   CLS
4290   PRINT
4300   PRINT ' FORMAT'
4310   PRINT
4320   PRINT ' The program requests the microdrive number, the cartridge name'
4330   PRINT
4340   PRINT ' and the number of times to format the cartridge.'
4350   PRINT
4360   PRINT ' The cartridge is then formatted according to the specifications.'
4370 END DEFine help5
4380 REMark
4390 DEFine PROCedure help6
4400   CLS
4410  PRINT
4420   PRINT ' GENERAL'
4430   PRINT
4440   PRINT ' Major options are selected from the menu at the top right.'
4450   PRINT
4460   PRINT ' Other options are requested from the lower part of the screen'
4470   PRINT
4480   PRINT ' when required.'
4490   PRINT
4500   PRINT ' Also messages are printed on the lower part of the screen to tell
'
4510   PRINT
4520   PRINT ' you what is happening.'
4530   PRINT
4540   PRINT ' If a major option is requested by accident, press ESC to return'
4550   PRINT
4560   PRINT ' to the main menu.'
4570 END DEFine help6
4580 REMark
4590 DEFine PROCedure help7
4600   CLS
4610  PRINT
4620   PRINT ' LIST'
4630   PRINT
4640   PRINT ' Works as DIRECTORY but dumps the directory to an EPSON compatible
4650   PRINT
4660   PRINT ' printer.'
4670   PRINT
4680   PRINT ' Before dumping there is an option to enter a comment which is'
4690   PRINT
4700   PRINT ' then printed as the first part of the header.'
4710 END DEFine help7
4720 REMark
4730 DEFine PROCedure help8
4740   CLS
```


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```
4750   PRINT
4760   PRINT ' EXIT'
4770   PRINT
4780   PRINT ' Before leaving the program you are given the option to re-configu
re'
4790   PRINT
4800   PRINT ' the screen windows for TV or Monitor mode.'
4810 END DEFine help8
```

Memotech MTX Database

by Dave England

The program is a menu-driven database for the Memotech MTX-512 which can handle up to 170 records. For machines with less memory, some juggling with the maximum file dimensions should enable the program to run. Owners of the RS-128 or disk drives should find no problem in extending the program to run with more records and use disk storage. After the Basic listing is Noddy code, which has to be typed in to give the necessary instructions and menus contained within the program.

```
0 REM ******* MTX DATABASE BY DAVE ENGLAND *******
5 REM *******              MAY 1985              ********
10 VS 7: PAPER 12: INK 15: VS 0: PAPER 12: INK 15: VS 1: INK 15: PAPER 12: VS 5:
 PAPER 12: INK 15
20 GOSUB 500
30 GOSUB 200
40 PLOD "INT": GOSUB 400
50 PLOD "PR1": GOSUB 100
60 LET A=(ABS(A-128))
70 ON A GOTO 1000,2000,3000,4000,5000,6000,7000,8000,9010
80 GOTO 50
100 LET A$=INKEY$: IF A$<>"" THEN  GOTO 100
110 LET A$=INKEY$: IF A$="" THEN  GOTO 110
120 LET A=ASC(A$): IF A>90 AND A<127 THEN  LET A=A+32: LET A$=CHR$(A)
130 RETURN
200 REM SET UP PASSWORD
210 VS 5: CLS : PRINT "ENTRY CODE :";: LET B$="": FOR I=1 TO 6: GOSUB 100: LET B
$=B$+A$: PRINT A$;: NEXT I: IF B$<>ENTRY$ THEN  GOTO 210
220 REM change screen colours
230 CLS : PRINT : PRINT "Would you like different screen colours (Y or N)": GOSU
B 100
240 IF A$="N" THEN  RETURN
250 IF A$<>"Y" THEN  GOTO 230 ELSE  PRINT : PRINT : INPUT "New paper colour (1 T
O 15) ";P: IF P>15 THEN  GOTO 250
260 PRINT : PRINT : INPUT "New ink colour (1 TO 15) ";I: IF I>15 THEN  GOTO 260
270 VS 0: PAPER P: INK I: VS 1: PAPER P: INK I: VS 7: PAPER P: INK I: VS 5: PAPE
R P: INK I
280 PRINT : PRINT "Are these colours OK ? (Y or N)": GOSUB 100
290 IF A$="Y" THEN  RETURN  ELSE  IF A$<>"N" THEN  GOTO 280
300 GOTO 230
400 VS 7: CLS : PRINT "Press any key to continue......";: VS 5: GOSUB 100: RETUR
N
500 LET E=20: LET NR=0: LET NNR=0: LET FILE$="": LET B$="": DIM A$(1),P(15),I(15
),PASS$(6),ENTRY$(6): LET ENTRY$="LOGON1"
510 RETURN
600 CLS : PRINT "Record does not exist in memory": GOSUB 400: RETURN
1000 REM new file routine
1010 PLOD "PR7": GOSUB 100
1020 LET A=ABS(A-128): ON A GOTO 1030,50: GOTO 1000
1030 CLEAR : GOSUB 500: CLS
1040 INPUT "New file name (Maximum 12 letters )     ";B$: IF LEN (B$)>12 THEN  GO
TO 1040 ELSE  LET FILE$=B$
1050 PRINT : PRINT "Number of records to store ": PRINT "Maximum 150 ";: INPUT N
R: IF (NR+E)>170 OR NR<1 THEN  GOTO 1050
1060 PRINT : PRINT "Number of headings per record": PRINT "(Maximum 8) ";: INPUT
 NH: IF NH>8 OR NH<1 THEN  GOTO 1060
1070 DIM HEAD$(NH,20),RECORD$(NR+E,NH,40)
1080 CLS : FOR I=1 TO NH
1090 LET B$="": PRINT : PRINT "Enter heading";I: INPUT B$: IF LEN (B$)>20 THEN
PRINT "Too long": GOSUB 400: GOTO 1090
1100 LET HEAD$(I)=B$: NEXT I
1110 CLS : FOR I=1 TO NR: CSR 11,0: PRINT FILE$;" Page";I: FOR J=1 TO NH
1120 LET B$="": PRINT HEAD$(J): PRINT : INPUT B$
1130 IF LEN (B$)>40 THEN  PRINT "Too long - try again": GOSUB 400: GOTO 1120 ELS
E  LET RECORD$(I,J)=B$
1140 NEXT J: CLS : NEXT I
1150 CLS : PRINT "File now complete as defined": GOSUB 400: GOTO 50
2000 REM save file routine
2010 IF NR=0 THEN  GOSUB 600: GOTO 50 ELSE  PLOD "PR2"
2020 GOSUB 100: LET A=ABS(A-128): ON A GOTO 2030,50: GOTO 2000
2030 VS 7: CLS : PRINT "Start tape then press any key...";: GOSUB 100
2040 VS 7: CLS : PRINT "Saving......";
2050 SAVE FILE$: GOTO 30
3000 REM examine file routine
3010 IF NR=0 THEN  GOSUB 600: GOTO 50
3020 PLOD "PR3": GOSUB 100
3030 LET A=ABS(A-128): ON A GOTO 3040,3100,50: GOTO 3020
3040 REM examine individual record
3050 CLS : INPUT "Enter the number of the record you wish to see ";R: IF R>NR TH
EN  GOSUB 600: GOTO 3000
3060 CLS : FOR I=1 TO NH: PRINT RECORD$(R,I): PRINT : NEXT
3070 PRINT : PRINT "Is this the correct entry (Y or N) ": GOSUB 100
3080 IF A$="N" THEN  GOTO 3100 ELSE  IF A$<>"Y" THEN  GOTO 3070
3090 GOSUB 400: GOTO 3000
3100 CLS : PRINT "List of records in file (By first      record)"
3110 PRINT : FOR I=1 TO NR: PRINT I;" ";RECORD$(I,1): IF I/10=INT(I/10) THEN  GO
SUB 400
3120 PRINT : NEXT I
3130 GOSUB 400: GOTO 3000
4000 REM load file routine
4010 PLOD "PR4": GOSUB 100: LET A=ABS(A-128): ON A GOTO 4020,50: GOTO 4010
4020 CLS : INPUT "Load which file ? ";FILE$: IF FILE$="" THEN  GOTO 4020
4030 CLS : PRINT "Searching for ";FILE$
4040 LOAD FILE$
5000 REM edit file routine
5010 IF NR=0 THEN  GOSUB 600: GOTO 50
5020 PLOD "PR5": GOSUB 100
5030 LET A=ABS(A-128): ON A GOTO 5040,5110,5140,5190,50: GOTO 5000
5040 REM change record
```


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PROGRAM FILE

```
5050 INPUT "What is the number of the file to      alter ? ";F: IF F>NR THEN  GO
SUB 600: GOTO 5000
5060 FOR I=1 TO NH: PRINT RECORD$(F,I): PRINT : NEXT I
5070 PRINT : PRINT "Is this the correct record (Y or N)": GOSUB 100: IF A$="N" T
HEN  GOTO 5110
5080 IF A$<>"Y" THEN  GOTO 5070 ELSE  PRINT "Enter the line number  you wish to
     alter or 0 to alter all records ";: INPUT L: IF L=0 THEN  GOTO 5100
5090 PRINT HEAD$(L): PRINT RECORD$(F,L): INPUT "New record:";RECORD$(F,L): GOTO
5000
5100 FOR I=1 TO NH: PRINT HEAD$(I): PRINT RECORD$(F,I): INPUT "New record :";REC
ORD$(F,I): NEXT : GOTO 5000
5110 CLS : PRINT FILE$: PRINT : FOR I=1 TO NR+NNR: PRINT I;" ";RECORD$(I,1): PRI
NT : IF I/10=INT(I/10) THEN  GOSUB 400
5120 NEXT I: GOSUB 400: GOTO 5000
5130 REM change file name
5140 CLS : PRINT "Current file name is ";FILE$
5150 PRINT : PRINT "Do you wish to change this ?(Y or N)"
5160 GOSUB 100: IF A$="Y" THEN  GOTO 5180 ELSE  IF A$<>"N" THEN  GOTO 5160
5170 GOTO 5000
5180 INPUT "New file name (Maximum 12 letters)      ";B$: IF LEN (B$)>12 THEN  GO
TO 5180 ELSE  LET FILE$=B$: GOTO 5000
5190 CLS : FOR I=1 TO NH: PRINT I;" ";HEAD$(I): PRINT : NEXT I
5200 INPUT "Please enter the line number you wish to change ";B$: LET B=VAL(B$):
 IF B>NH OR B<1 THEN  GOTO 5200
5210 PRINT "Please enter new heading": INPUT B$: IF LEN (B$)>20 THEN  PRINT "Too
 long - maximum 20 characters": GOTO 5210
5220 LET HEAD$(B)=B$: GOTO 5000
6000 REM printer routines
6010 IF NR=0 THEN  GOSUB 600: GOTO 50
6020 PLOD "PR6": GOSUB 100
6030 LET A=ABS(A-128): ON A GOTO 6040,6060,6070,6110,6130,50: GOTO 6030
6040 LPRINT CHR$(27);"Q";CHR$(39);
6050 GOTO 6000
6060 LPRINT CHR$(27);"E";: GOTO 6000
6070 FOR I=1 TO NR+NNR: LPRINT FILE$;" Page";I: FOR J=1 TO NH
6080 LPRINT RECORD$(I,J): NEXT J
6090 FOR K=1 TO 5: LPRINT : NEXT K: NEXT I
6100 GOTO 6000
6110 LPRINT "Format of each record": LPRINT : FOR I=1 TO NH: LPRINT HEAD$(I): NE
XT
6120 GOTO 6000
6130 CLS : INPUT "Print which record number ";RN: IF RN>NR THEN  GOSUB 600: GOTO
 6000
6140 CLS : FOR I=1 TO NH: PRINT RECORD$(RN,I): PRINT : NEXT : PRINT "Is this the
 correct record (Y or N)": GOSUB 100
6150 IF A$="Y" THEN  GOTO 6170 ELSE  IF A$<>"N" THEN  GOTO 6140
6160 GOTO 6000
6170 FOR I=1 TO NH: LPRINT RECORD$(RN,I): NEXT
6180 GOTO 6000
7000 REM expand file routine
7010 IF NR=0 THEN  GOSUB 600: GOTO 50
7020 CLS : INPUT "Number of records to add";NNR: IF NNR>E OR NNR<1 THEN  PRINT "
Out of range - try again": GOSUB 400: CLS : GOTO 7000
7030 LET E=E-NNR
7040 CLS : FOR I=NR+1 TO NNR+NR: CSR 11,0: PRINT FILE$;" Page ";I: FOR J=1 TO NH
7050 PRINT HEAD$(J): INPUT B$: IF LEN (B$)<40 THEN  LET RECORD$(I,J)=B$ ELSE  GO
TO 7050
7060 NEXT J: CLS : NEXT I: LET NR=NR+NNR
7070 CLS : PRINT "File enlarged as defined ": GOSUB 400: GOTO 40
8000 REM change password
8010 CLS : PRINT "Current password is :";ENTRY$
8020 PRINT : INPUT "New password (Maximum 6 letters) :";B$: IF LEN (B$)>6 THEN
PRINT "Too long - try again": GOSUB 400: GOTO 8020
8030 LET ENTRY$=B$: GOTO 50
9000 REM quit program
9010 CLS : PRINT "Are you certain you wish to exit ?      (Y or N)": GOSUB 100
9020 IF A$="Y" THEN  NEW  ELSE  IF A$="N" THEN  GOTO 50
9030 GOTO 50


WHEN ABOVE PROGRAM IS ENTERED TYPE IN '
NODDY' PAGES AS SET OUT BELOW.
TO ERASE THE PAGE TITLE FROM THE PAGE T
YPE <HOME> FOLLLOWED BY <EOL> WHEN YOU
FIRST SET UP THE PAGE. THIS  WILL ERASE
 THE WORD FROM  THE PAGE BUT WILL STILL
 KEEP THE PAGE TITLE IN MEMORY
PR1 TO PR7 AND INT ARE ALL ON DIFFERENT
 NODDY PAGES, BUT FORMATTING THEM TO TH
E PRINTER WOULD LEAVE LARGE AREAS OF BL
ANK PAPER.



 PR1

    *D MENU1.*R
 PR7



    *D MENU7.*R
 PR2



    *D MENU2.*R
 PR3

    *D MENU3.*R
 PR4



    *D MENU4.*R
 PR5



    *D MENU5.*R
 PR6
```


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```
   #D MENU6.#R
INT



   #D INTRO.#R


INTRO       INTRODUCTION
            ~~~~~~~~~~~~
This program has been designed for ease
of use, speed and simplicity.
All options are menu-driven, and most
only require a single key response.
If the cursor (flashing white square)
is on the screen, you will need to
press RETurn at the end of your entry,
such as when entering data.
For reasons of memory, the limit of the
record under each heading is 40
characters, so each page can be up to
320 characters (8 lines of 40). To
accomodate this the headings can be
empty strings.(No heading actually
defined-simply press RETurn when the
prompt appears.)
The limit of 150 records is set in
order to allow expansion up to 170
records.(MTX512).
This will allow up to 54,400 letters
or numbers to be stored.
MENU1       OPENING MENU
            ~~~~~~~~~~~~

Start new file.............Press F1

Save current file..........Press F2

Examine file in memory.....Press F3

Load a new file from tape....Press F4

Edit file in memory.......Press F5

Send records to printer......Press F6

Expand current file.......Press F7

Change entry code..........Press F8

Quit program completely.....Press S/F1
                          (S=Shift Key)
MENU7       NEW FILE MENU
            ~~~~~~~~~~~~~

Open new file..............Press F1

Return to opening menu.....Press F2

               WARNING
               ~~~~~~~

When a new file is started, previous

file is lost, so if not already saved,


please do so now
MENU2       SAVE MENU
            ~~~~~~~~~

Save current file to tape.....F1

Return to opening menu.........F2
MENU3     FILE VIEWING MENU
          ~~~~~~~~~~~~~~~~~~

Examine a particular file.....F1

List all current records.....F2

Return to opening menu.........F3
MENU4       LOAD MENU
            ~~~~~~~~~

Load file from tape..........Press F1

Return to opening menu.....Press F2
MENU5       EDITING MENU
            ~~~~~~~~~~~~

Edit a record..............Press F1

List all records...........Press F2

Change file name (same file)...Press F3

Redefine a heading.........Press F4

Return to opening menu.....Press F5
MENU6     PRINTER OPTIONS
          ~~~~~~~~~~~~~~~

Set printer to same as screen..Press F1

Set Emphasised mode..........Press F2

   Both above are for Epson-type

               printers

Print out all records.....Press F3

Send headings to printer.....Press F4

Print a particular record.....Press F5

Return to opening menu.....Press F6
```

PROGRAM FILE



Spectrum NAK

by Mark Summers

Yes, you guessed it, Not Another Kong! This is a fast-moving and difficult version, with people and gorillas running up and down ladders, eating bananas and generally acting the monkey. The program includes full instructions and a high-score table. The gorilla is very quick, so don't wait around.

When typing in the program, use the appropriate letter for the graphics characters given in the table at the end. The symbol that sometimes appears after the PRINT statement (looks like a verical line with a hook at the beginning) should be typed in as a # symbol. Some of the lines between 1200 and 1225 are very long and contain breaks; these should be typed in as if they were continuous.

```
   O>REM                                  >>>>   MA
RK SUMMERS 1985                             <<<<
   O>REM   COMPLETED ON                        17th APRIL
   1 PRINT AT 18,6; BRIGHT 1; INK 2; PAPER 6; FLASH 1;"PRESS ANY KEY TO PLAY"
   2 PAUSE 1: IF INKEY$="" THEN  BORDER 1: BORDER 2: BORDER 3: BORDER 4: BORDER
5: BORDER 6: BORDER 7: BORDER 0: GO TO 2
   3 PRINT AT 18,6;"                    ": POKE 23658,0: GO SUB 80
   4 GO SUB 1000
   6 DIM b$(10,10): DIM q(10): GO SUB 610
   9 RESTORE
  10 FOR f=USR "a" TO USR "h"+7: READ a: POKE f,a: NEXT f
  20 DATA 2,2,2,255,32,32,32,255
  21 DATA 66,66,126,66,66,66,126,66
  22 DATA 28,28,8,126,8,8,20,34
  23 DATA 255,24,126,255,153,255,66,60,24,24,126,255,153,255,66,60,60,126,219,25
5,195,195,126,60,60,126,219,255,255,126,60,0
  24 DATA 128,192,118,57,20,42,69,67
  30 BORDER 0: PAPER 0: INK 7: BRIGHT 0: INVERSE 0: OVER 0: GO SUB 40: GO TO 100
  40 CLS : INK 5: INVERSE 1: PRINT "                                        NOT
ANOTHER KONG!                          ": PRINT AT 1,4; OVER 1;"▬
▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬"
  45 PRINT '''" The object of the game is to    reach the top of the building
 with-out being captured by the  monster more than three times.  A bonus of "; I
NVERSE 0;"40"; INVERSE 1;" is received for   every banana colected.",: PRINT '''
 On succesful completion of      each screen you will receive a  bonus of "; INV
ERSE 0;"500"; INVERSE 1;" points.                "
  50 PRINT '" On completion of the four       screens you will be put back    on
 sheet one.                    "
  55 INVERSE 0: INK 7: PRINT ⌐0;AT 0,3;"PRESS KEY ~M~ TO CONTINUE."
  60 LET f=1: LET c=0
  65 PRINT AT 5,c;" ";AT 12,31-c;" ": LET c=c+f: BEEP .002,c+5: BEEP .002,c: PRI
NT AT 5,c;"☻";AT 12,31-c;"☻": IF c=31 OR c=0 THEN  LET f=-f
  70 IF INKEY$="m" THEN  RETURN
  75 PAUSE 10: PRINT AT 5,c;"☻";AT 12,31-c;"☻": PAUSE 10: GO TO 65
  80 RESTORE 80: FOR f=64100 TO 64125: READ a: POKE f,a: NEXT f: DATA 33,0,88,1,
3,0,126,198,1,230,7,95,126,198,8,230,56,131,119,35,16,240,13,32,237,201
  81 FOR f=64050 TO 64075: READ a: POKE f,a: NEXT f: DATA 33,128,88,1,2,32,126,1
98,1,230,7,95,126,198,8,230,56,131,119,35,16,240,13,32,237,201
  83 FOR f=60000 TO 60024: READ a: POKE f,a: NEXT f: DATA 33,200,21,6,40,0,17,0,
0,197,229,205,181,3,225,193,43,43,43,43,43,43,16,238,201
  85 FOR f=64000 TO 64016: READ a: POKE f,a: NEXT f: RETURN : DATA 33,0,64,1,0,2
4,203,6,203,134,35,11,120,177,32,246,201
  90 INVERSE 1: INK 6: PRINT AT 0,0;"                                "
 K E Y S
  91 PRINT AT 1,4; OVER 1;"▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬"
  92 PRINT AT 7,0;"            UP    2                              LEFT  9
                RIGHT 0          ",,,
  94 INVERSE 0: INK 7: PRINT ⌐0;AT 0,4;"PRESS KEY ~M~ TO CONTINUE."
  95 LET f=10
  96 PRINT AT 6,0;"☻";AT 6,31;"☻";AT 11,0;"☻";AT 11,31;"☻";⌐0;AT 0,0;"☻";⌐0;AT
 0
,31;"☻": BEEP .003,f: LET f=10
  97 IF INKEY$="m" THEN  RETURN
  98 PAUSE 15: PRINT AT 6,0;"☻";AT 6,31;"☻";AT 11,0;"☻";AT 11,31;"☻";⌐0;AT 0,0
;"
☻";⌐0;AT 0,31;"☻": BEEP .003,f: LET f=20: PAUSE 15: GO TO 96
  99 FOR f=1 TO 8: POKE 60002,10-f: LET dummy=USR 60000:: LET dummy=USR 64000: B
EEP .002,f*5: NEXT f: RETURN
 100 IF INKEY$<>"" THEN  BEEP .002,42: GO TO 100
 105 GO SUB 99: GO SUB 90
 110 IF INKEY$<>"" THEN  BEEP .002,42: GO TO 110
 115 GO SUB 99
 123 REM **********************
 125 LET p=1: LET l=3: LET s=0: LET h=q(1)
 130 CLS : PRINT ⌐0;AT 0,0; INK 5; PAPER 1;"   ~SCORE~    ~HIGH~   ~LIVES~

00000      0000      ☨ ☨ ☨   "
 131 PRINT AT 0,0; BRIGHT 1; INK 2; PAPER 6;" SHEET NUMBER : ";p;
 132 PRINT ⌐0;AT 1,24; INK 8; PAPER 8;"       ";AT 1,24;"☨ ☨ ☨"( TO l*2);"  ";A
T
 1,9-LEN STR$ s; INK 8; PAPER 8;s;AT 1,19-LEN STR$ h; INK 8; PAPER 8;h
 135 PRINT AT 21,0; INK 6; PAPER 2; BRIGHT 1;"▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭
▭▭▭▭▭▭"
 140 LET a=20: LET b=1: LET a$="▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭"
 145 LET c=8: LET d=31: LET a=20: LET b=1
 150 IF p>=5 THEN  STOP
 155 RESTORE 500+(p-1)*20
 160 READ w: FOR f=1 TO w: INVERSE 0: READ x,y,z: PRINT AT x,y; INK 6; PAPER 2;
BRIGHT 1;a$( TO z): NEXT f
 165 READ w: FOR f=1 TO w: READ x,y: PRINT AT x,y; INK 5;"⊟";AT x+1,y;"⊟";AT x+
2
,y;"⊟": NEXT f
 170 READ w: FOR f=1 TO w: READ x,y: PRINT AT x,y; INK 6;"⊠": NEXT f
 175 GO TO 200
 180 PRINT AT a,b; INK 8; PAPER 8; FLASH 8;"☨";AT c,d;"☻": RESTORE 180
 181 DATA 12,12,15,16,19,19,21,19,12,24,22,21,19,17,16,14,12,12,15,16,19,19,21,1
9,12,24,22,21,19,17,16,14,17,17,20,21,24,24,26,24,17,24,22,21,19,17,16,14,12,12,
15,16,19,19,21,19
 182 DATA 12,24,22,21,19,17,16,14,19,19,23,24,26,26,24,23,17,17,20,21,24,24,20,2
1,12,12,15,16,19,19,21,19,12,24,22,21,19,17,16,14,255
 184 LET z=4
 185 PRINT  BRIGHT 1;AT 1,5; INK z;"PRESS ANY KEY TO START": LET z=z+1: IF z=8 T
HEN  LET z=4
 190 READ x: IF x=255 THEN  RESTORE 180: GO TO 185
 195 BEEP .1,x: IF INKEY$<>"" THEN  RETURN
 197 GO TO 190
 200 GO SUB 180
 210 PRINT AT 1,5;"                    "
 215 PRINT AT 1,30; FLASH 1; INK 2; PAPER 6;"\/";AT 2,30;"/\"
```


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PROGRAM FILE

```
 219 LET d$="☻☻☻☻": LET c1=c: LET d1=d: LET a1=a: LET b1=b
 220 FOR g=1 TO 2: LET a=a1: LET b=b1: LET c=c1: LET d=d1
 222 IF a<=2 THEN  IF b>=30 THEN  GO TO 900
 225 GO SUB 400
 230 LET d1=d+(b>d)-(b<d)
 235 LET c1=c+3*(((a+1)>c AND ATTR (c+1,d)=5)-((a+1)<c AND ATTR (c-2,d)=5))
 240 IF ATTR (c1+1,d)=7 THEN  LET c1=c1+3
 250 IF a=c1 THEN  IF b=d1 THEN  GO TO 850
 255 PRINT AT c,d; OVER 1; INK 8; PAPER 8; BRIGHT 8; FLASH 8;d$(g);AT c1,d1;d$(g
+1)
 260 NEXT g: GO TO 220
 400 IF INKEY$="2" AND ATTR (a-1,b)=5 THEN  LET a1=a-3: FOR f=40 TO 60 STEP 4: B
EEP .05,f: NEXT f
 405 LET b1=b+(INKEY$="0" AND b<31)-(INKEY$="9" AND b>0)
 410 IF ATTR (a,b)=6 THEN  GO SUB 600
 415 IF ATTR (a+1,b)=7 OR ATTR (a1+1,b1)=7 THEN  LET a1=a+3: FOR f=60 TO 40 STEP
 -4: BEEP .002,f: NEXT f
 420 PRINT AT a,b; INK 8; PAPER 8; OVER 1; FLASH 8;"*";AT a1,b1;"*": RETURN
 500 DATA 15,18,7,12,15,1,9,15,17,15,12,6,12,12,20,7,12,30,2,9,29,3,9,23,4,9,11,
10,9,0,7,6,4,5,3,12,20,6,9,11,3,0,9,3,28,4
 505 DATA 15,3,13,3,18,9,13,6,4,3,6,9,6,9,23,12,9,6,15,12,26,12,30,15,7,15,18,18
,9,18,16
 510 DATA 14,8,19,8,26,2,1,20,28,17,10,17,14,14,2,11,9,11,16,11,21,11,31,8,1,2,1
5,14,31
 520 DATA 18,3,0,10,6,0,4,18,0,5,15,2,11,12,5,2,9,2,4,9,7,12,6,7,7,3,13,7,6,17,8
,12,15,17,15,15,7,18,7,13,18,24,5,15,25,7,9,24,7,6,27,5,3,28,4
 525 DATA 18,18,8,18,26,15,3,15,10,15,18,15,28,12,21,12,26,9,5,9,17,6,3,6,8,6,24
,6,30,3,1,3,13,3,18,3,28
 530 DATA 15,17,1,17,15,17,24,20,30,14,7,14,30,11,6,11,15,11,30,5,11,5,22,5,31,2
,4,2,8,2,29
 540 DATA 16,3,1,14,3,17,15,6,8,12,6,25,5,9,0,16,9,18,8,9,28,4,12,4,6,12,17,4,12
,26,6,15,1,2,15,8,8,15,24,7,18,0,10,18,12,12,18,26,4
 545 DATA 15,3,9,3,27,6,11,6,18,6,29,9,5,9,28,12,9,12,27,15,2,15,8,15,15,15,26,1
8,13,18,29
 550 DATA 15,2,1,2,17,5,16,5,25,8,1,8,30,11,19,11,26,11,30,14,1,14,30,17,9,17,18
,17,27,20,18
 560 DATA 26,18,1,7,18,9,2,18,12,8,18,24,5,18,30,2,15,0,2,15,4,6,15,12,8,15,24,7
,12,0,5,12,9,4,12,15,12,12,28,2,9,0,5,9,7,3,9,13,10,9,25,2,9,29,3,6,3,4,6,8,6,6,
15,3,6,20,6,6,27,4,3,3,13,3,17,10,3,29,3
 565 DATA 20,18,10,18,14,18,31,15,1,15,13,15,27,15,30,12,0,12,9,12,18,12,29,9,4,
9,26,6,3,6,13,6,25,3,6,3,15,3,17,3,30
 570 DATA 20,20,4,20,21,17,7,17,9,17,25,17,31,14,6,14,12,14,26,11,15,11,28,8,0,8
,8,8,19,8,26,8,30,5,10,5,27,2,3,2,23
 600 BEEP .02,10: BEEP .03,15: PRINT AT a,b; OVER 1;"%"
 605 LET s=s+40: PRINT ~0;AT 1,9-LEN STR$ s; INK 5; PAPER 1;s: RETURN
 610 RESTORE 610: FOR f=1 TO 10: READ b$(f): LET q(f)=12000-(1000*f+10*INT (RND*
100)): NEXT f
 615 DATA "MARK","MARTIN","MICROMAD","SID","GERTIE","PAC-MAN","SPUD","RICK","BLO
B","MIKE"
 620 RETURN
 700 PRINT AT a1,b1; INK 8; PAPER 8; FLASH 8;;"*";AT a1,b1;"☻";AT c,d;" ";AT c1
,
d1;" ": BEEP 1,10: BEEP 1,20
 705 GO SUB 99
 710 CLS : PRINT  PAPER 3;AT 7,5;"                              ";AT 8,5;"       GAME  O
VER       ";AT 9,5;"                "
 715 PRINT ~0;AT 1,4;"PRESS ANY KEY TO CONTINUE"
 720 IF INKEY$="" THEN  BEEP .002,42: GO TO 720
 725 GO SUB 99: CLS
 730 FOR f=1 TO 10: IF s>q(f) THEN  GO TO 802
 735 NEXT f
 750 PRINT AT 1,9; PAPER 3; INVERSE 1;" HALL OF FAME "
 800 GO TO 805
 802 FOR g=10 TO f+1 STEP -1: LET q(g)=q(g-1): LET b$(g)=b$(g-1): NEXT g: LET q(
f)=s: POKE 23658,8: INPUT "CONGRATULATIONS! A HIGH SCORE!  ENTER YOUR NAME(< 10
CHARACTERS)"; LINE b$(f)
 810 POKE 23658,0: PRINT AT 1,9; INVERSE 1;" HALL OF FAME "''': FOR f=1 TO 10: P
RINT TAB 8; BRIGHT 1; INK f/2+2;b$(f);" ";"00000";AT f+3,25-LEN STR$ q(f); BRIGH
T 1; INK f/2+2;,q(f): NEXT f
 814 PRINT AT 16,0; INVERSE 1; INK 6; PAPER 2,," YOUR SCORE :",s,,,
 815 FOR f=1 TO 7: BEEP .001,f*4: PRINT ~0;AT 1,4; INK f;"PRESS KEY ~M~ TO CONTI
NUE"
 820 IF INKEY$="m" THEN  GO TO 830
 825 NEXT f: GO TO 815
 830 GO SUB 99: CLS : INK 3: INVERSE 1: PRINT ,,"    DO YOU WANT ANOTHER GO ?
",,,
 835 PRINT ''',,"           YES OR NO            ",,: INVERSE 0: RESTORE 180
 837 GO SUB 930
 840 READ x: IF x=255 THEN  RESTORE 180: GO TO 840
 842 IF INKEY$="n" THEN  GO TO 1350
 845 BEEP .07,x-30: PRINT AT 13,x; INK 2; PAPER 6; FLASH 1; OVER 1;" ": LET g=x:
 READ x: BEEP .07,x-30: PRINT AT 13,g; INK 0; PAPER 7; OVER 1;" ": IF INKEY$<>"y
" THEN  GO TO 840
 847 INK 7: BRIGHT 0: PAPER 0: BORDER 0: GO SUB 99: CLS : GO TO 120
 849 STOP
 850 PRINT AT a,b;" ";AT c,d;" ": PRINT AT a1,b1;"*";AT a1,b1; OVER 1;"☻"
 855 LET l=l-1
 860 IF INKEY$<>"" THEN  GO TO 860
 865 IF l<=0 THEN  GO TO 700
 870 PRINT AT a,b; INK 8; PAPER 8; OVER 1;" ";AT c,d;" "
 875 LET a=20: LET b=1: LET c=9: LET d=31: GO SUB 99: GO TO 130
 900 FOR f=1 TO 3: FOR g=0 TO 20 STEP f: RANDOMIZE USR 64100: BEEP .02,f*g: BORD
ER g/7: NEXT g: NEXT f: BORDER 0
 905 PRINT ~0;AT 0,0; INK 2; INVERSE 1,,"   STAGE NUMBER ";p;" COMPLETED",,,
 907 IF p=4 THEN  GO SUB 1300: LET s=s+1000
 910 PRINT AT 7,0; INK 6; INVERSE 1,,"   PRESS KEY ~M~ TO CONTINUE     ",,'' INK
4,,("     500  POINTS BONUS ! ! !     " AND p<4),,
 915 IF INKEY$<>"m" THEN  BEEP .001,42: GO TO 915
 920 LET s=s+500*(p<4): LET p=p+1: IF p>4 THEN  LET p=1
 925 GO TO 130
 930 PRINT AT 10,2; INK 0; PAPER 7;"▀▀ ▀▀  ▀▀ ▀▀ ▀▀ ▀▀  ▀▀ ▀▀ ▀▀  ▀▀ ▀▀ "
 935 PRINT AT 11,2; INK 0; PAPER 7;"▀▀ ▀▀  ▀▀ ▀▀ ▀▀ ▀▀  ▀▀ ▀▀ ▀▀  ▀▀ ▀▀ "
 940 PRINT AT 12,2; PAPER 7; INK 0;"                                "
 945 PRINT AT 13,2; PAPER 7; INK 0;"
 950 FOR f=23 TO 239 STEP 8: PLOT f,64: DRAW  INK 0; PAPER 7;0,31: NEXT f
 955 PLOT 15,64: DRAW 0,32: DRAW 225,0: DRAW 0,-33: DRAW -225,0: RETURN
1000 RESTORE 1000: FOR f=USR "a" TO USR "c"+7: READ a: POKE f,a: NEXT f: RESTORE

1020 DATA 1,7,7,15,13,15,15,15,128,224,224,240,176,240,240,240,0,1,7,15,31,63,12
7,63,255,255,255,255,255,255,255,255,252,255,255,255,255,255,255,255,0,128,224,2
40,248,248,252,254
1030 DATA 127,251,243,241,241,121,120,124,223,255,255,255,255,255,255,127,251,25
5,255,255,255,255,255,254,254,223,207,143,143,158,30,62,56,1,7,15,15,31,31,31,12
7,255,255,255,255,255,252,224,254,255,255,255,255,255,63,7,28,128,224,240,240,24
8,248,248,31,31,15,15,15,15
1040 DATA 31,63,192,128,0,0,0,0,0,0,1,1,0,0,0,0,0,0,248,240,240,240,240,248,252,
255
1150 BORDER 7: PAPER 7: INK 2: CLS
1200  FOR f=15 TO 0 STEP -1: BEEP .03,-35: PRINT AT f,1;"  ⊥⊟ ";AT f+1,1;" ☻☻☻
";AT f+2,1;" ☻▚▟▙ NOT";AT f+3,1;" ▟▀▙▖      ";AT f+4,1;" ▐▌  ▐▙";AT f+5,1;"
": B
EEP .03,-30: NEXT f
1205  FOR f=1 TO 16: BEEP .03,-35: PRINT AT f-1,1;"       ";AT f,1;"  ⊥⊟ ";AT f+
1
,1;" ☻☻☻";AT f+2,1;" ☻▚▟▙";AT f+3,1;" ▟▀▙▖      ";AT f+4,1;" ▐▌  ▐▙": BEEP .0
```

PROGRAM FILE

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3,-30:
 NEXT f
1210  FOR f=1 TO 11: BEEP .03,-35: PRINT AT 16,f;"  ⊾⊟ ";AT 17,f;"  ✱♣♣✪";AT 18
,f
;"  ✪✕▟▛";AT 19,f;"  ▟▛▟▛     ";AT 20,f;"  ▛  ▙";: BEEP .03,-30: NEXT f
1215  FOR f=15 TO 0 STEP -1: BEEP .03,-35: PRINT AT f,11;"  ⊾⊟ ";AT f+1,11;"  ✱♣
✪";AT f+2,11;"  ✪✕▟▛ ANOTHER";AT f+3,11;"  ▟▛▟▛          ";AT f+4,11;"  ▛  ▙";AT
 f+5,
11;"       ": BEEP .03,-30: NEXT f
1220  FOR f=1 TO 16: BEEP .03,-35: PRINT AT f-1,11;"       ";AT f,11;"  ⊾⊟ ";AT
f
+1,11;"  ✱♣♣✪";AT f+2,11;"  ✪✕▟▛";AT f+3,11;"  ▟▛▟▛      ";AT f+4,11;"  ▛  ▙": B
EEP .0
3,-30: NEXT f
1225 LET b$="  PRESS ANY KEY  ": LET a$="  ▛  ▗▘ ▗▀▀▖ ▙  ▛  ▗▀▀▖
  ▛  ▗▘  ▛
▛  ▛▖ ▛  ▛                 ▙▗  ▛  ▛ ▛ ▛ ▛  ▟▄▄                ▛▖
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          ▛▖ ▛  ▛ ▛  ▛▄▟  ▛                ▗  ▗  ▀▀▀  ▗  ▗  ▀▀▀▘"
1227 PRINT AT 6,5;a$
1230 FOR f=0 TO 6: BEEP .003,f*3: PRINT ⌐0; INK 8-f;AT 1,8;b$: LET b$=b$(2 TO )+
b$(1): LET dummy=USR 64050
1235 IF INKEY$="" THEN  BEEP .01,f*3: NEXT f: GO TO 1230
1240 FOR f=0 TO 7: LET dummy=USR 64000: NEXT f: RETURN
1300 RESTORE 1300: PRINT AT 7,0; INK 7; PAPER 3; BRIGHT 1;,"          CONGRATULATIO
NS!
1301 FOR f=1 TO 44: READ x,y: BEEP x/20,y: NEXT f
1302 DATA 2,7,2,9,2,11,6,12,8,7,2,12,2,11,2,12,6,14,8,9,2,9,2,11,2,12,2,16,2,14,
2,14,2,12,2,12,2,11,2,9,2,11,8,7,2,7,2,9,2,11,6,12,8,7,2,12,2,11,2,12,6,14,8,9,2
,9,2,11,2,12,3,16,1,14,2,14,2,12,2,12,2,11,2,9,2,11,8,12
1305 PRINT '': PRINT  BRIGHT 1; INK 0; PAPER 4;,"          PRESS ANY KEY
1310 IF INKEY$="" THEN  LET dummy=USR 64100: POKE 60002,2+INT (RND*5): LET dummy
=USR 60000: GO TO 1310
1315 FOR f=0 TO 7: POKE 60002,f+3: LET dummy=USR 60000: LET dummy=USR 64000: NEX
T f: PAUSE 50: CLS
1320 PRINT AT 5,0; INK 1; PAPER 6; BRIGHT 1;,"          SUPER BONUS          ",
,,"                1000          ",,"          POINTS          ",,
1325 FOR f=0 TO 14: LET dummy=USR 64100: BEEP .05,f: BEEP .05,-f: NEXT f: CLS :
RETURN
1350 RESTORE 1350: FOR f=USR "u" TO USR "u"+7: READ a: POKE f,a: NEXT f: DATA 80
,112,80,94,8,14,2,14
1355 GO SUB 99: CLS
1360 GO SUB 1500
1370 FOR f=9 TO 20 STEP 2: FOR g=0 TO 31 STEP 2: PRINT AT f+1,g;"u";AT f,g+1;"u
": NEXT g: NEXT f
1375 PRINT AT 21,0;" u u u u u u u u u u u u u u u u u u u u"
1380 PRINT ⌐0;AT 1,0;"  MARK SUMMERS  APRIL 1985  "
1400 LET as=1: LET bs=1: LET a=9: LET b=0
1401 FOR f=1 TO 373: PRINT  BRIGHT 1; INK 6; PAPER 2; OVER 1;AT a,b;"u"
1403 BEEP .003,a+b-(b-a)
1405 IF a<10 THEN  LET as=1
1407 IF b<1 THEN  LET bs=1
1410 IF a>20 THEN  LET as=-1
1412 IF b>30 THEN  LET bs=-1
1415 LET a=a+as: LET b=b+bs: NEXT f
1420 LET a$=" ▗▄▄▖ ▗▄▄▖ ▗▄▄▖ ▗▄▄▖  ▗▄▄▖ ▛  ▗▄▄▖ ▛  ▛  ▛▖  ▛  ▛
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 ▛▀▀▘ ▛▀▀▘ ▛▀▀▘ ▛▀▀▘
▛    ▛  ▛▀▀▘
"
1422 POKE 64051,0: POKE 64054,1: POKE 64055,224
1423 PRINT AT 1,0;a$
1425 RESTORE 180
1430 READ a: IF a=255 THEN  STOP
1431 BEEP .02,a: RANDOMIZE USR 64050: GO TO 1430
1500 INK 0: PAPER 0
1505 LET f=11: PRINT AT f,4;"▛       ▛   ▛ ▛ ▛ ▛   ▛    ▛";AT f+2,4;"▛ ▛
 ▛    ▛ ▛";AT f+4,4;"▛    ▛ ▛    ▛ ▛ ▛ ▛    ▛ ▛";AT f+6,4;"▛       ▛
▛    ▛
▛"
1510 INK 7: RETURN
9998 PAUSE 0: BORDER 7: PAPER 7: INK 0: CLS
9999 SAVE CHR$ 8+CHR$ 8+CHR$ 8+CHR$ 8+CHR$ 8+CHR$ 8+" NAK1" LINE 0

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by Eric Corbett

Although there are innumerable programs for renumbering other Basic programs, this one works well on all GOTOs, GOSUBs, and so on. It is also very short, and occupies a mere 505 bytes of otherwise unused RAM from 49152 to 49656. To use the program, type it in, save before running, and then run it. You can now type NEW, and type or load in any Basic program. When you want to renumber a program, type SYS 49160 and the current Basic program will be neatly renumbered in steps of 10.

Any references to undefined line numbers will be altered to refer to a point after the end of the program.

```
10 REM ------------------------------
20 REM  THIS IS A MACHINE CODE ROUTINE
30 REM   TO RENUMBER BASIC PROGRAMS.
40 REM
50 REM   ALL GOTOS, GOSUBS, ETC ARE
60 REM   ADJUSTED.
```


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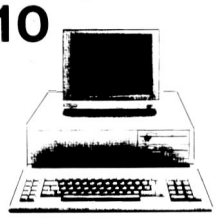

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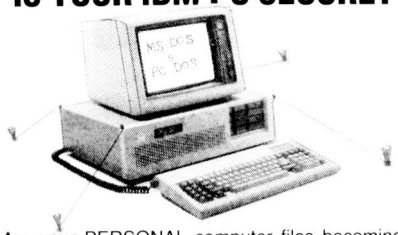

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PROGRAM FILE

```
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80 REM (C) ERIC CORBETT 1985
90 REM ================================
100 FOR I=49152 TO 49656
110 READ A
120 POKE I,A
130 NEXT
140 DATA 131,164,18,9,0,0,0,0,169,255
150 DATA 133,20,133,21,173,2,3,141,0
160 DATA 192,173,3,3,141,1,192,169,36
170 DATA 141,2,3,169,192,141,3,3,230
180 DATA 20,208,2,230,21,32,19,166,160
190 DATA 1,177,95,240,47,200,177,95,133
200 DATA 20,200,177,95,133,21,162,4,200
210 DATA 177,95,240,19,201,137,240,114
220 DATA 201,141,240,110,201,167,240
230 DATA 106,232,157,251,1,76,63,192
240 DATA 169,0,232,157,251,1,134,11,76
250 DATA 164,164,169,10,133,253,169
260 DATA 0,133,254,165,43,141,2,192
270 DATA 165,44,141,3,192,173,2,192
280 DATA 133,251,173,3,192,133,252
290 DATA 160,1,177,251,240,39,200
300 DATA 165,253,145,251,200,165,254
310 DATA 145,251,169,10,24,101,253
320 DATA 133,253,169,0,101,254,133
330 DATA 254,160,0,177,251,141,2,192
340 DATA 200,177,251,141,3,192,76
350 DATA 116,192,173,0,192,141,2,3
360 DATA 173,1,192,141,3,3,76,116
370 DATA 164,232,157,251,1,200,177
380 DATA 95,240,148,201,32,208,7,232
390 DATA 157,251,1,76,190,192,140
400 DATA 5,192,169,0,133,251,133,252
410 DATA 141,7,192,177,95,240,119,201
420 DATA 58,240,115,201,32,240,111,201
430 DATA 44,240,107,201
440 DATA 48,144,4,201,58,144,46,172,5
450 DATA 192,177,95,208,3,76,87,192
460 DATA 232,157,251,1,201,127,144,11
470 DATA 201,141,240,182,201,137,240
480 DATA 178,141,7,192,201,58,240,171
490 DATA 201,44,208,5,173,7,192,240
500 DATA 162,200,76,245,192,56,233
510 DATA 48,72,6,251,38,252,165,251,133
520 DATA 253,165,252,133,254,6,251,38
530 DATA 252,6,251,38,252,24,165,251
540 DATA 101,253,133,251,165,252,101
550 DATA 254,133,252,104,24,101,251
560 DATA 133,251,165,252,105,0,133
570 DATA 252,200,76,218,192,140,4,192
580 DATA 142,6,192,165,20,133
590 DATA 253,165,21,133,254,169,255,133
600 DATA 20,133,21,169,0,141,2,192,141
610 DATA 3,192,230
620 DATA 20,208,2,230,21,32,19,166,24
630 DATA 173,2,192,105,10,141,2,192,173
640 DATA 3,192,105,0,141,3,192,160,1
650 DATA 177,95,240,20,200,177,95,133
660 DATA 20,200,177,95,133,21,197,252
```

PROGRAM FILE

```
670 DATA 208,210,165,20,197,251,208,204
680 DATA 165,253,133,20,165,254,133,21
690 DATA 32,19,166,174,6,192,169,13,72
700 DATA 160,16,169,0,14,2,192,46,3,192
710 DATA 42,201,10,144,5,233,10,238,2
720 DATA 192,136,208,237,201,10,144,2
730 DATA 105,6,105,48,72,173,2,192,13
740 DATA 3,192,208,216,104,201,13,240
750 DATA 7,232,157,251,1,76,222,193,172
760 DATA 4,192,177,95,201,44,240,3,76
770 DATA 64,192,76,186,192
```

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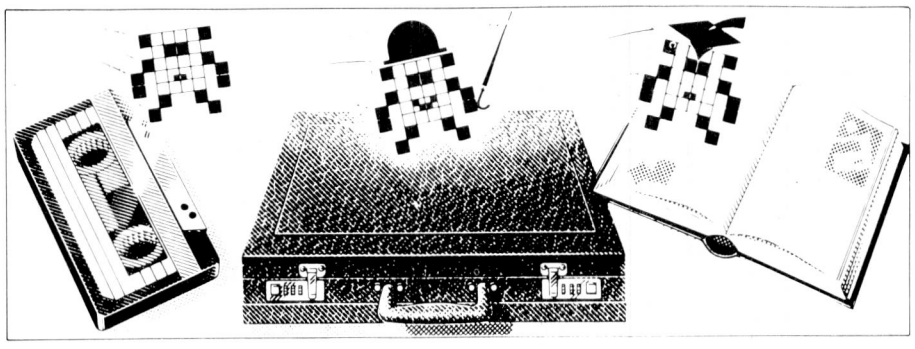

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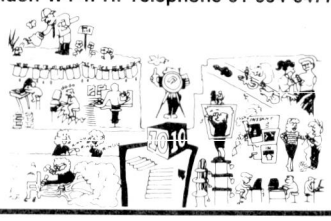

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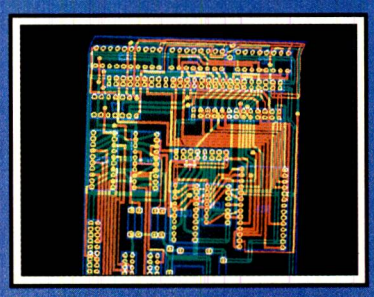

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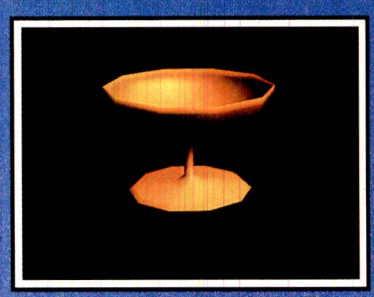

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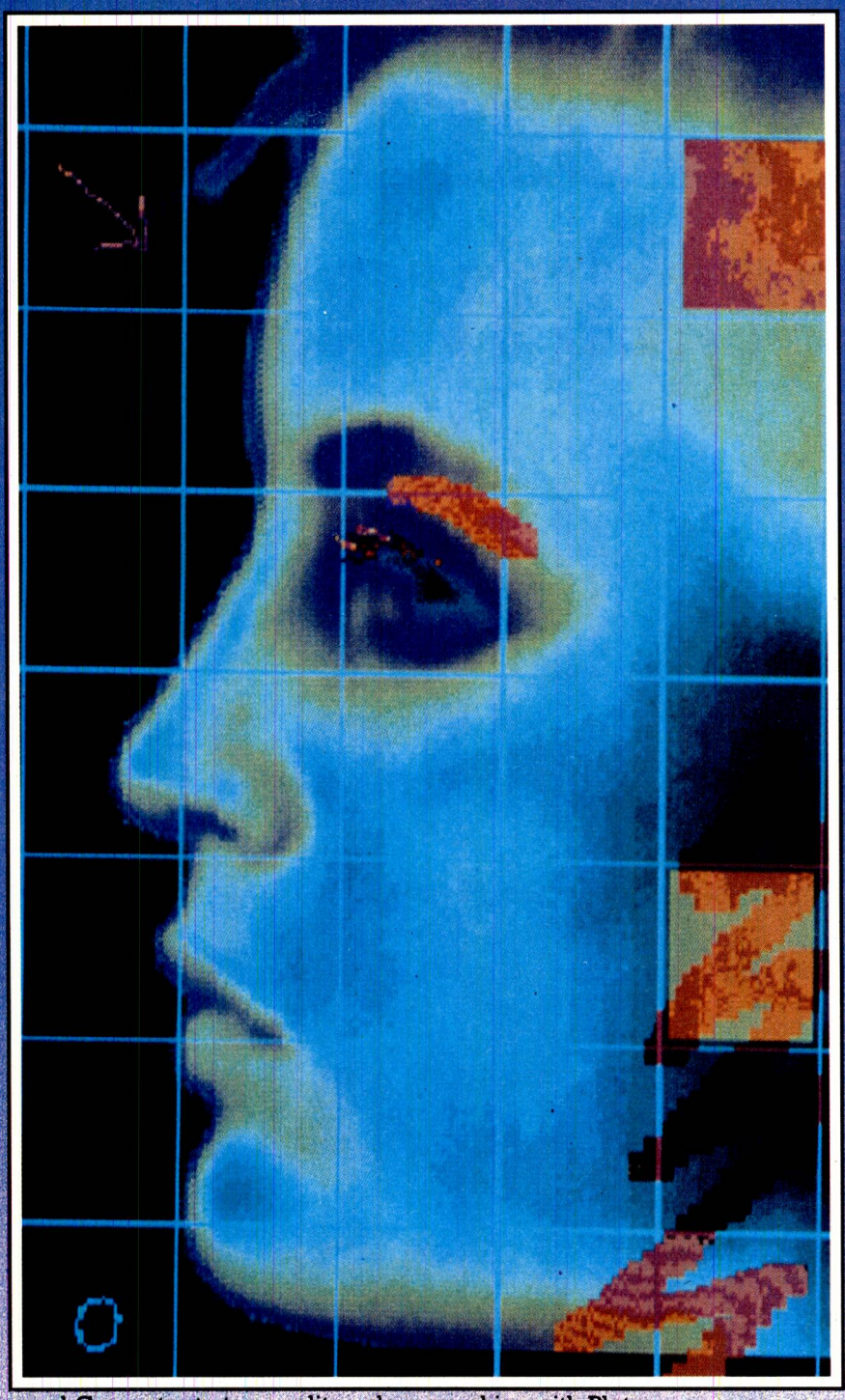

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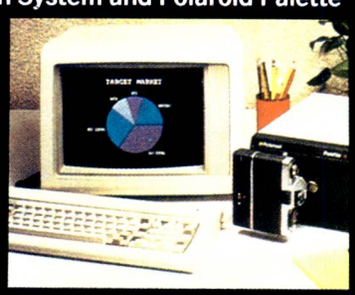

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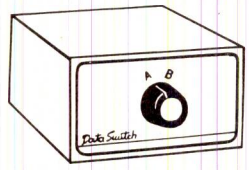

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Desk-top		
Acorn	ABC310	April85
ACT	Apricot	Oct83
ACT	Apricot F1	Oct84
Advance	86	July84
Apple	Apple III	May82
Apple	Lisa	July83
Apple	Macintosh	March84
Atari	530ST	June85
British Micro	Mimi 801	July82
C/WP	Cortex	Dec84
Canon	AS-100	Dec83
Canon	CH-1	Nov82
Casio	fx-9000p	Feb82
Casio	fx-900p	Feb83
Commodore	715	Jan84
Commodore	Amiga	Aug85
Commodore	PC10	May85
Compudata	Tulipsystem 1	Oct83
Corvus	Concept	March83
Digital Equipment	Rainbow 100	Nov82
Epson	QH-16	July85
Epson	QH-10	July83
Ferranti	Argus PPC	Nov83
Future	FH20	Oct83
Hewlett-Packard	HP-150	May84
Hewlett-Packard	HP86	Oct82
Hewlett-Packard	HP-125	March82
Hitachi	MB16001	June83
Hitachi	Peach	May82
IBM	9000 Instrumentation	March83
IBM	PC	Nov81
ICL	OPD	Dec84
LSI	M-Four	April83
MAD	MAD 1	Sept84
Monroe	OC8820	April82
NCR	Decision Mate U	Aug83
NEC	APC	Sept83
Olivetti	M20	Sept82
Olivetti	M24	Sept84
Research Machines	Nimbus	April85
Sage	Sage II	Feb83
Sanyo	550-2	Jan85
Sharp	MZ-5600	Nov84
Sharp	MZ-800	Feb85
SMT	Goupil-3	Dec83
Sony	SMC-70	Aug82
Sord	Exleigh Expert	Aug82
Texas Instruments	Professional	May83
Torch Computers	Torch	Jan83
Tycom	Microframe	Jan84
Victor	Sirius 1	Feb82
Herox	820	Jan82
Hand-held		
Canon	H-07	March84
Casio	602p	May82
Casio	Fx-820p	March85
Casio	PB-100	May83
Hewlett-Packard	15C & 16C	Sept82
Hewlett-Packard	HP-75C	Nov82
Microwriter	Microwriter	Sept82
Sharp	PC-1350	March85
Sharp	PC1251	Feb83
Sharp	PC1500	June82
Texas Instruments	TI-59	Jan83
Texax Instruments	TI-88	July82
Home		
Acorn	BBC Micro	Jan82
Acorn	Electron	Oct83
Amstrad	CPC-464	May84
Atari	400/800	Oct80
Camputers	Lynx	March83
Coleco	Adam	April82
Commodore	64	May83
Commodore	128	July85
Commodore	Plus/4	Oct84
Commodore	Vic20	Sept81
Dragon Data	Professional	Aug84
Dragon Data	Dragon 32	Aug82
Eaca International	Colour Genie	June83
Enterprise	Enterprise	Nov84
GCE	Vectrex System	Aug83
IBM	PC Junior	March84
Jupiter Cantab	Ace	Jan83
Mattel	Aquarius	Nov83
Memotech	Memotech RS 128	Oct84
Multitech	Micro-Professor II	Sept83
Oric Products	Atmos	May84
Oric Products	Oric I	April83
Sharp	MZ-700	Feb84
Sharp	MZ-80A	June82
Sinclair	QL	June84
Sinclair	ZX81	June81
Sinclair	ZH Spectrum	June82
Sony	HB-75	Sept84
Sord	M5	Aug83
Spectravideo	SV-318 & SV-328	March84
Tandy	MC10	Nov83
Tatung	Einstein	Aug84
Texas Instruments	TI99/4A	March82
Tradecom	Newbrain RD	July82
Lap-held		
Data General	Data General One	Dec84
Epson	PH-8	June84
Epson	HH-20	Dec82
Gavilan	Gavilan MC	Feb84
Grid	Compass	June84
Hewlett-Packard	HP-110	July84
NEC	PC-8201A	Dec83
Sharp	PC5000	May84
Talbot Computers	Dialtex-4	Feb85
Tandy	Model 100	Aug83
Texas Instruments	ProLite	May85
Luggable		
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Gulfstream	Hyperion	Oct83
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Jonos	Jonos	April84
Osborne	Encore	Aug84
Osborne	Executive	July83
Semi-Tech	Pied Piper	Sept83
Visuall	Commuter	May85
Wren Computer	Wren	April84
Multi-user		
Ashton Technology	Crystal	July84
Compaq	Deskpro 286	Aug85
Fortune	Fortune 32:16	Aug83
IBM	PC AT	Dec84
Kaypro	286i	Aug85
North Star Computers	Dimension	March85
TDI	Pinnacle	Jan85

SOFTWARE

PROGRAM	SUPPLIER	ISSUE
Accountancy		
Accountancy Round-up	Various	June83
Financial Director	Financial Director	June83
Home Accounts	Diamondsoft	Jan84
Microtax	Tax Planning	July83
Sage 400	Sage	Oct83
Communications		
Datatalk	Datasoft	Jan85
Perfect Link	Perfect Software	July84
Database		
1982 Database Round-up	Various	Dec82
1983 Database Round-up	Various	Dec83
1984 Database Round-up	Various	Jan84
Aquila	Kent Barlow Assocs	Sept82
Aspect	Microft Technology	Oct84
Beta	Ormskirk Computers	Aug83
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Busipost	Busipost	Feb83
Cardbox	Caxton Software	Aug82
Complete Manager	Pipeline software	March85
Condor Database	Condor Corp	Nov82
Dataflex	Equinox	Aug85
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Dbase II	Ashton Tate	May82
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DBMS 2	GW Computers	June82
Delta	Compsoft	Oct83
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Everyman	Vector International	Feb84
File (Macintosh)	Microsoft	July85
Files & Folders	ACT Pulsar	Dec84
Filevision	Telos Software	Dec84
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Friday!	Ashton Tate	July84
Information Management	BPI	April84
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Knowledgeman	Data Base Experts	Feb85
Omnis	Blyth Computers	July83
Optimum	Uveon	Nov83
Pearl	Pearl Software	Oct82
Perfect II	Thorn EMI	May85
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Expert system		
ES/P Advisor	Expert Systems	Sept 84
Expert Ease	Expert Software	June 84
Integrated system		
Appleworks	Apple	July 84
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Jane	Arktronics	July 84
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Smart	Innovative Software	Sept 84
Symphony	Lotus	Aug 84
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Language		
Basic (Macintosh)	Apple	Feb 85
Basic 2 (Macintosh)	Microsoft	May 85
BCPL (BBC)	Acornsoft	June 85
BCPL (QL)	Metacomco	June 85
C (Spectrum)	Hi Soft	Nov 84
Lisp (QL)	Metacomco	Feb 85
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Logo (BBC)	Open University	Feb 85
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Pascal (QL)	Computer One	Feb 85
Pascal, ISO (BBC)	Acornsoft	Feb 85
Pascal, ISO (QL)	Metacomco	July 85
Pascal, Turbo (PC)	Borland	April 85
Miscellaneous		
Brainstorm	Caxton Software	Feb 84
Codewriter	Codewriter	April 85
Entrepreneur	Tryptych	March 85
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TK! Solver	Software Arts	Feb 84
Operating environment		
Desq	Quarterdeck	Dec 83
GEM	Digital Research	Feb 85
Top View	IBM	Aug 85
Visi-On	Visicorp	Nov 83
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Operating system		
CP/M-86	Digital Research	Oct 82
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Spreadsheet		
1-2-3	Lotus	Nov 83
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1984 Spreadsheet Round-up	Various	Dec 84
Dynacalc	Dragon Data	June 84
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Utility		
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Samna +	Thorn EMI	July 85
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Miscellaneous		
Music 500	Acorn	May 85
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The Ferret	GCS	June 84
Printer/plotter		
Alphacom 81	Alphacom	Sept 84
EP44	Brother	April 84
Epson	FX-80	July 83
HR-5	Brother	Sept 84
Juki 6100	Micro Peripherals	Dec 84
MT160L	Mannesmann Tally	Aug 83
Penman	Penman	Feb 85
TC6000	Brother	April 85
ZX81 Printer	Sinclair	Jan 82
Speech		
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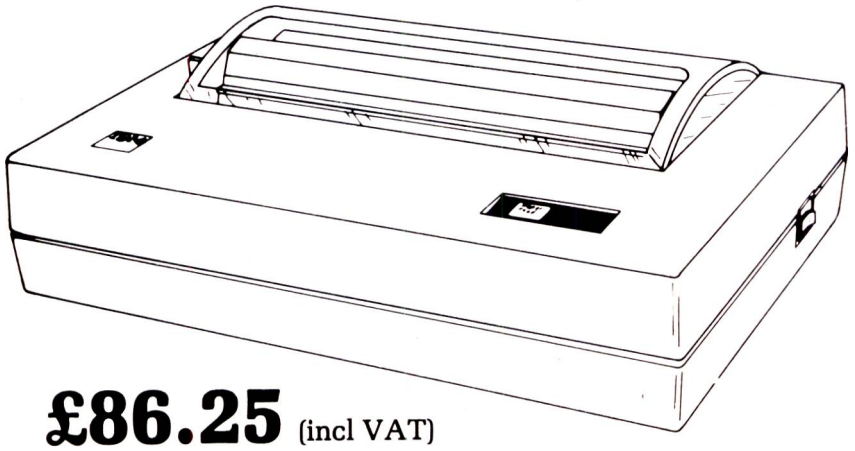

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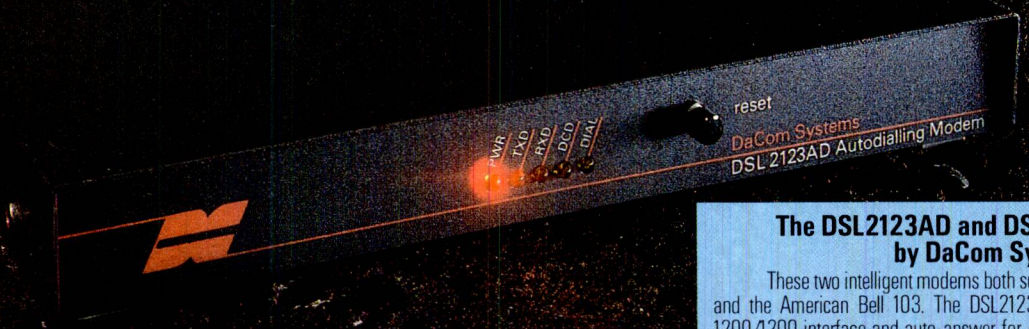

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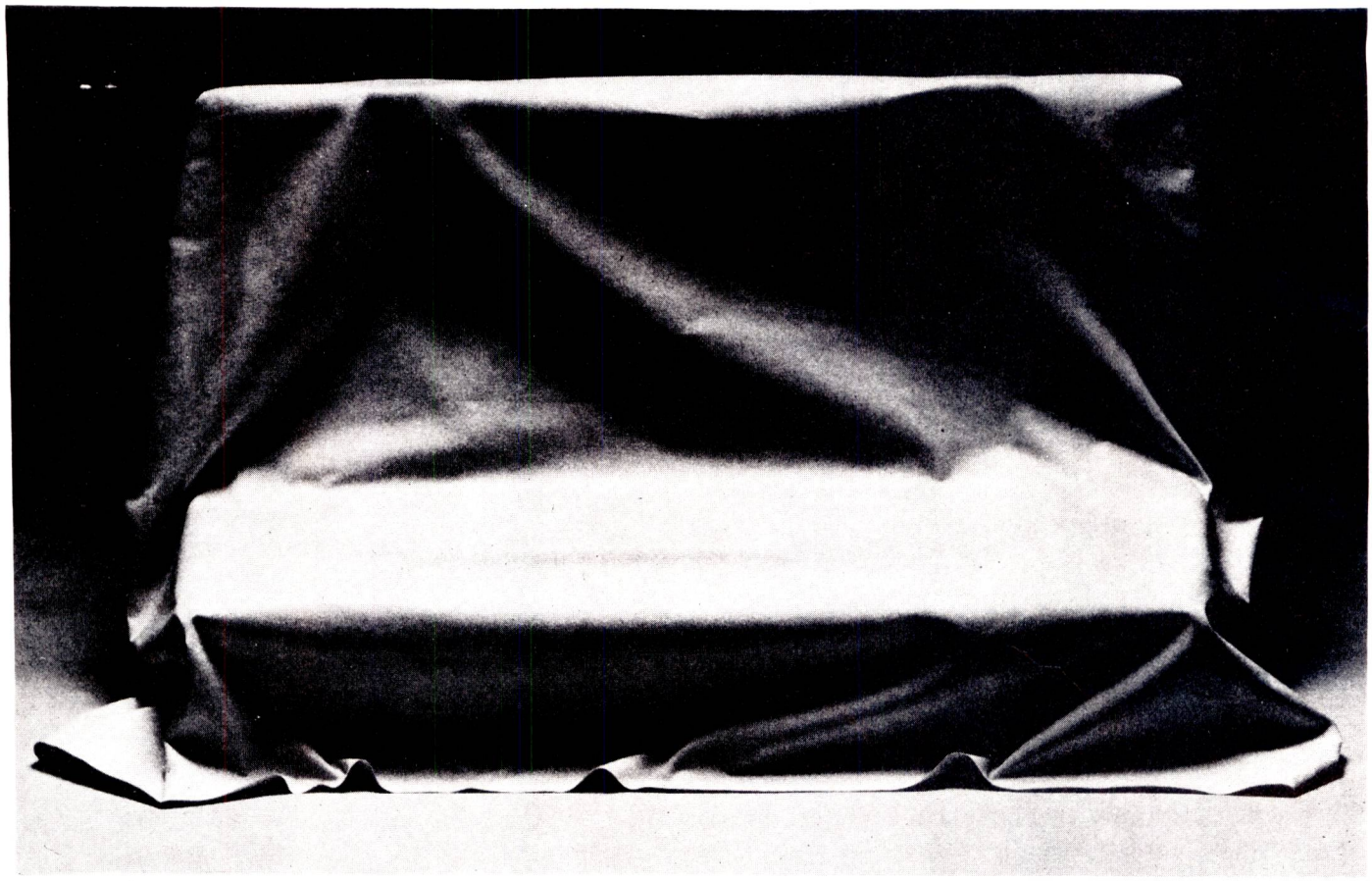

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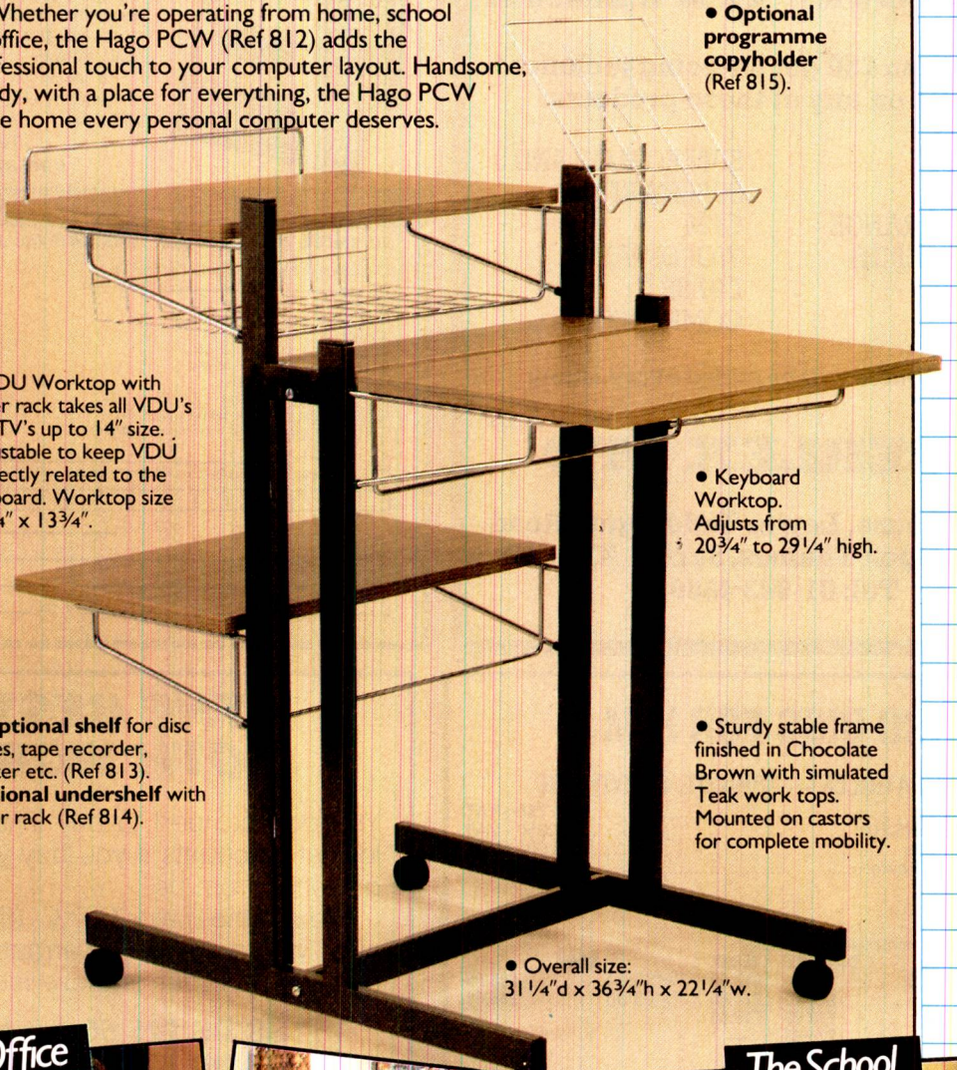

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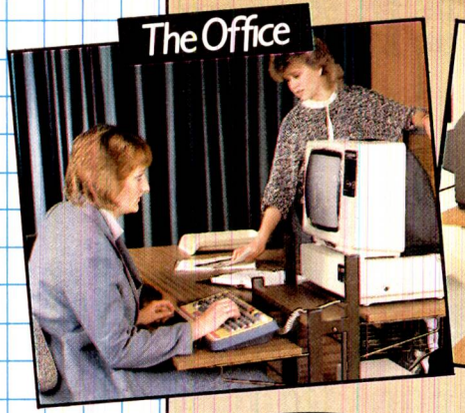



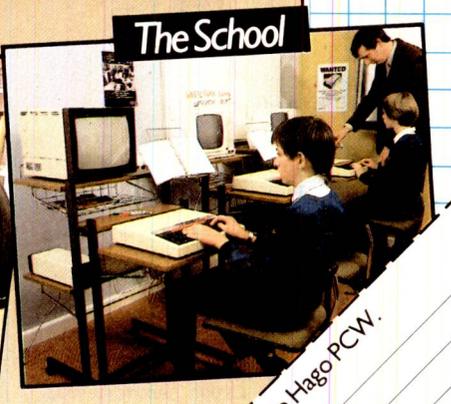

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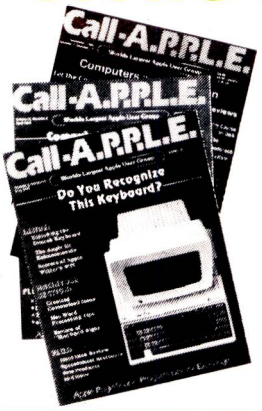

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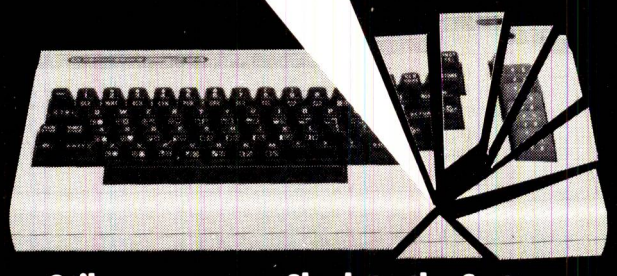

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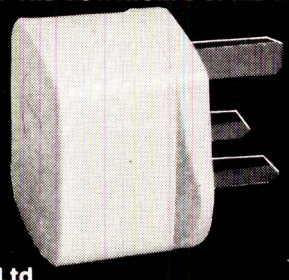

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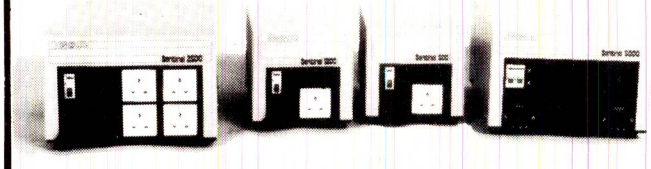

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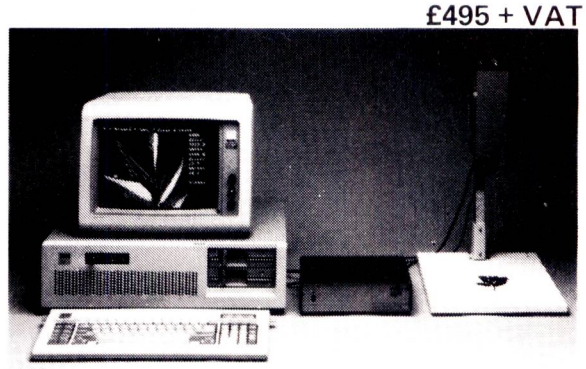

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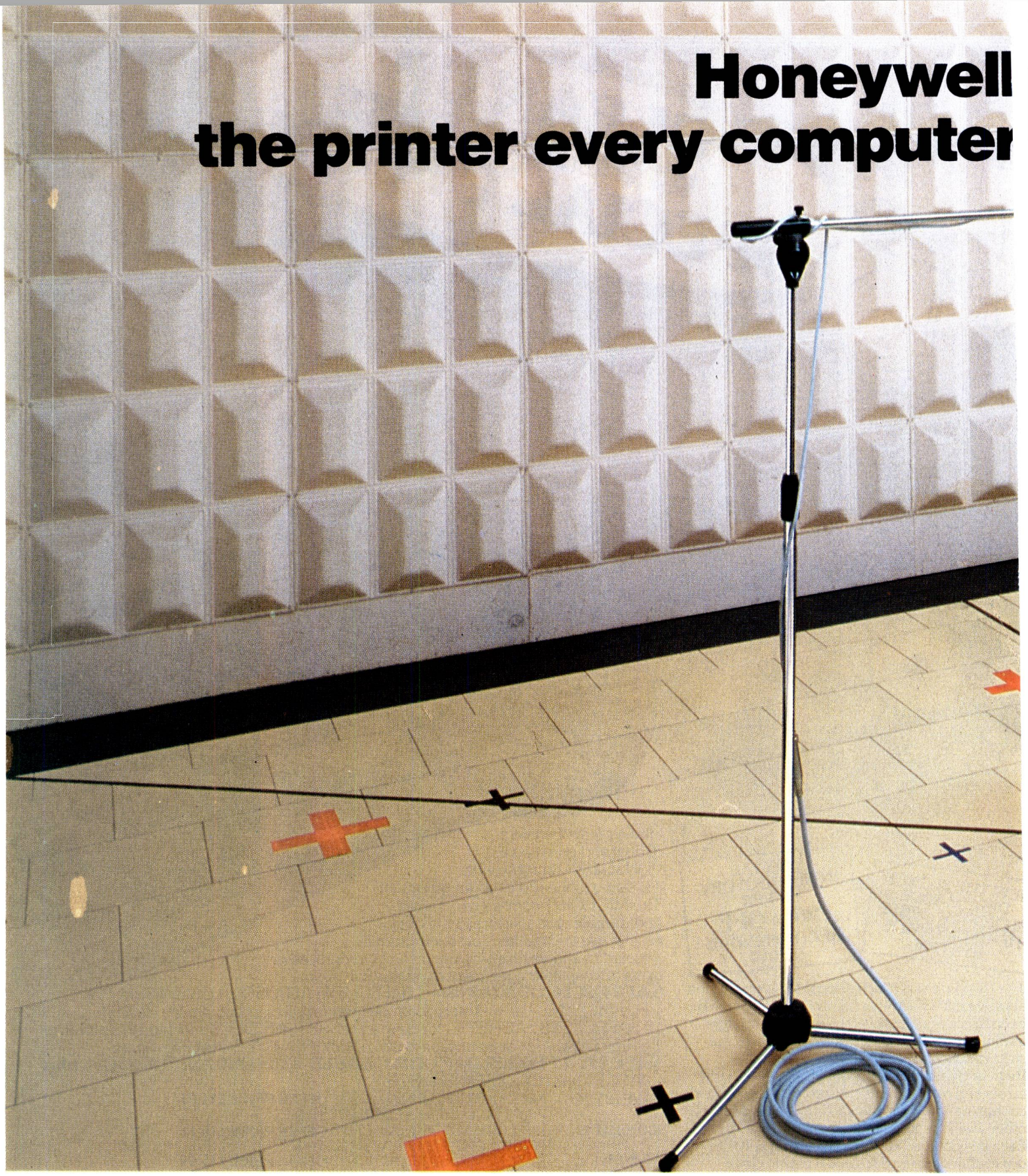

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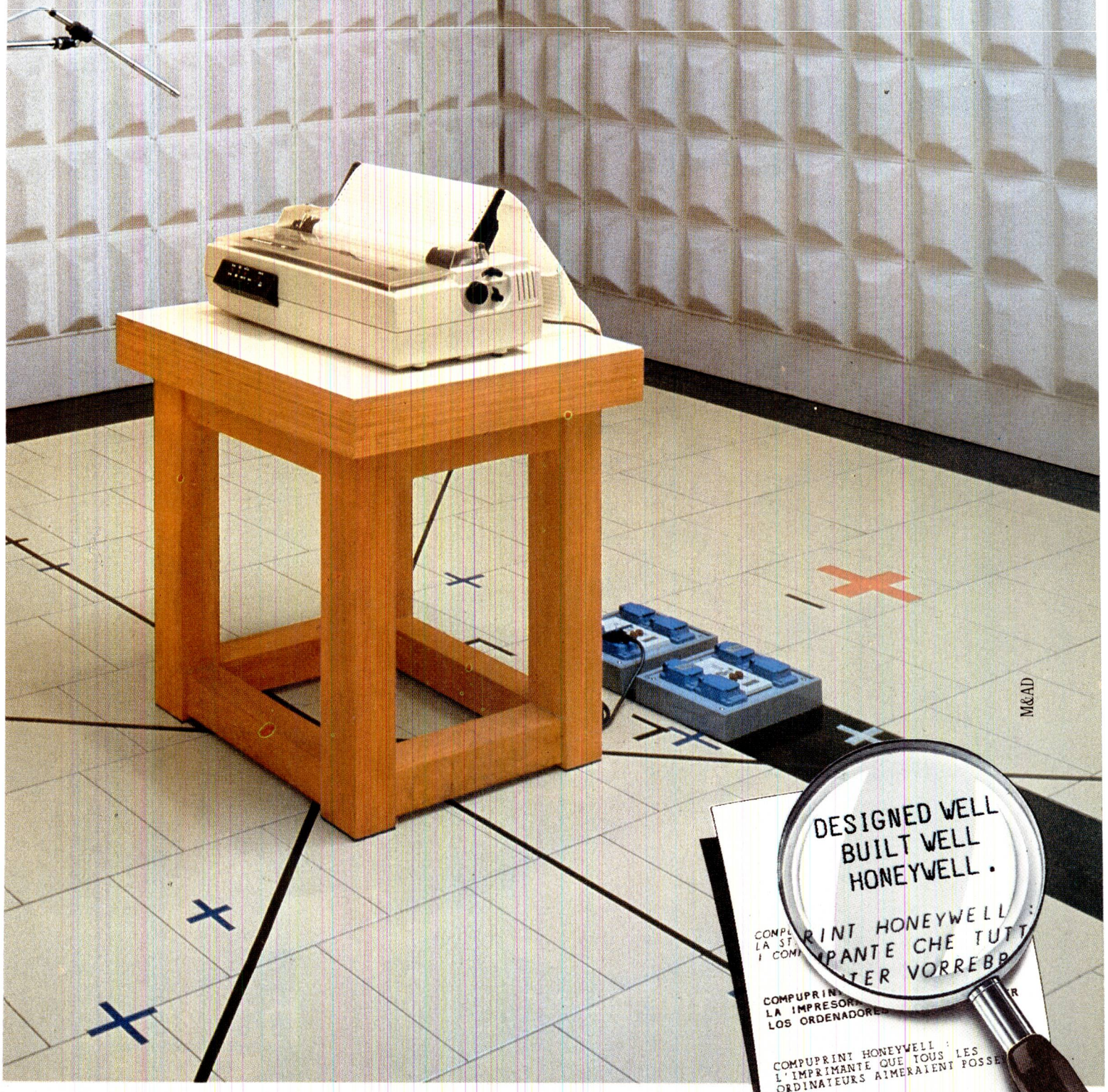

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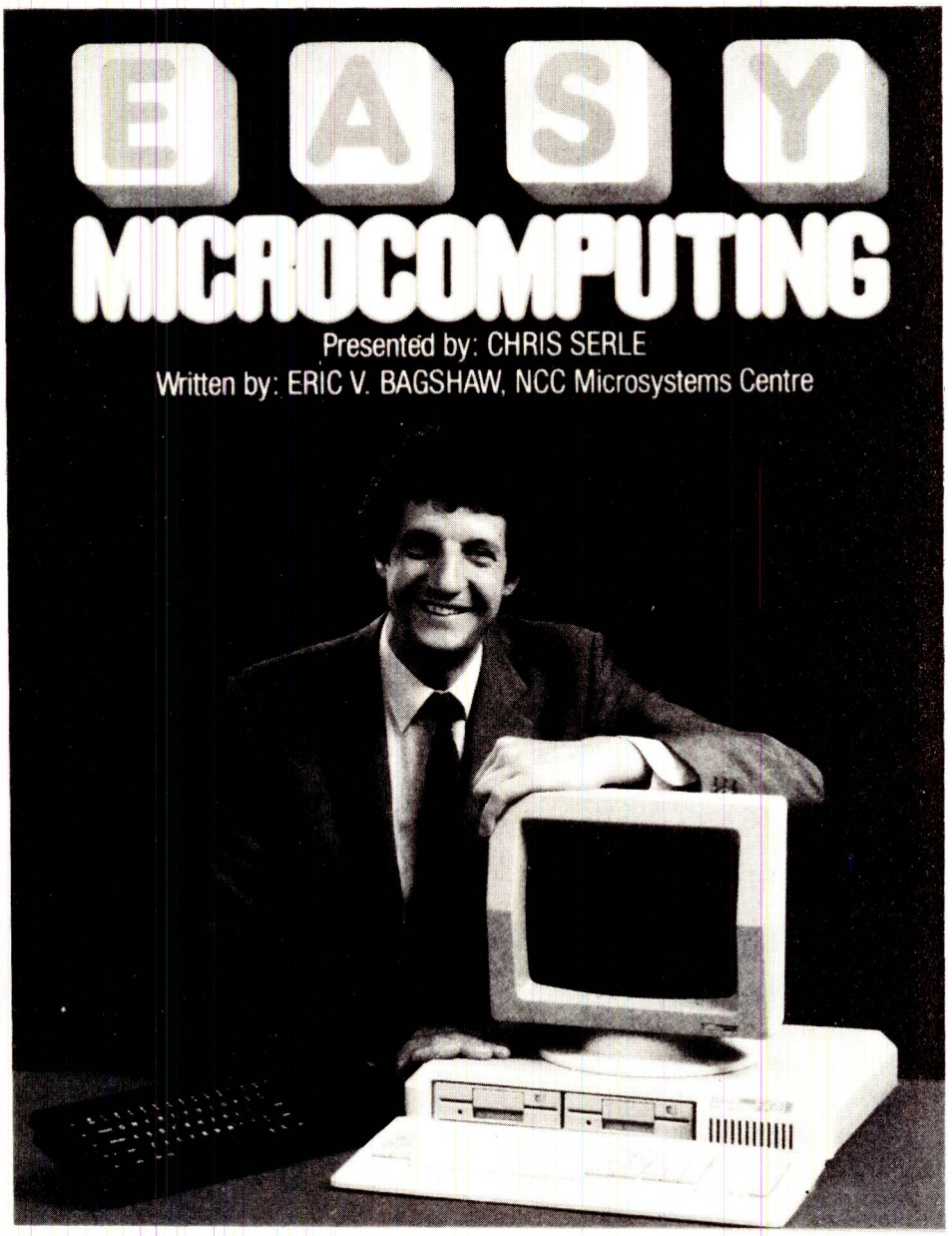

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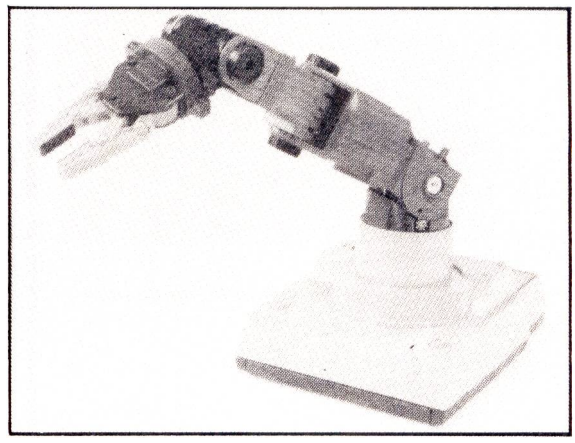

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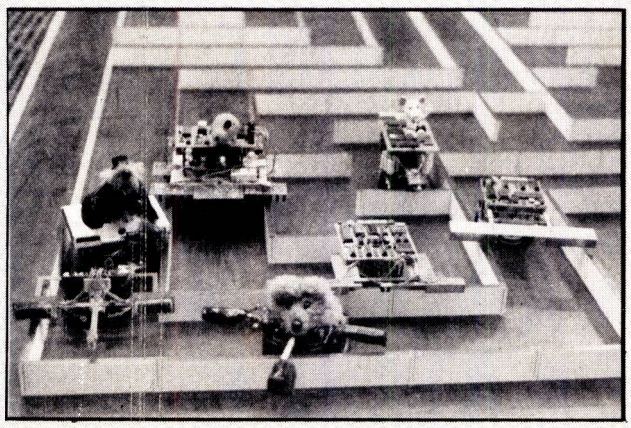
CHIP CHAT

On the ball: W H Smith must be a rather boring place to work. An issue of its staff newspaper describes the Atari 130XE (yes that's right, the old 800 in yet another new box) as 'one of the most exciting new products to be launched this year'.
Legalised piracy?: if a levy on blank tapes is approved in order to compensate loss of royalties through piracy, does this mean it will then be okay to copy?
Horror stories: tales of the treatment handed out to floppy disks tend to be apocryphal, but Xitan swears that the following is true. Underneath the warning 'Floppy disks — do not bend', one friendly neighbourhood postman penned 'Oh yes they do!' before proving it. Or there's the one about the user who cut his 5¼in disks down to 3½in before complaining that they didn't work. Also worth a mention is a call we received from an engineer. Sent to sort out some disk drive problems, he soon found the cause of the trouble — a mouse lurking inside the drive.
Armchair critic: bored with things to do with your micro? One enterprising BBC owner uses the machine to publicise a career as a film critic. Video films rented from Video Palace in London's West End sometimes carry a page of text from a Beeb at the very end of the tape, reviewing the film that's been loaned. So far we've agreed with all the reviews, except for the one for Dune.
The camera never lies: June's photo showing two of our contributors in less than complimentary poses brought some interesting suggestions for captions — but a lot of them are unprintable. For an aggressive-looking Guy Kewney clutching an Amstrad under his arm, RL Savage of Littleover suggested: 'Who said this handbag doesn't go with my jumper?' and wins £10. David Tebbutt was pictured gleefully holding various dismembered pieces of yet another Amstrad — a second £10 goes to A Neville of Newlyn for: 'Once you've taken these parts out, you have quite a useful box.' An honorary mention goes to William Poel of Amsoft for his, scurrilous but very amusing suggestions. How about sending us a photo of yourself, Bill, so that we can exact our revenge?
Mac attack: one dealer tells a story of removing the Apple logo from the Macintosh and substituting IBM's in order to win over corporate buyers. Don't these people know the saying that you'll never win promotion by buying IBM? Another Apple story currently doing the rounds concerns a magazine which suggested a shortage of Mac software. Apple had the bright idea of sending a very slow telex back listing every package that runs on the Mac. Just in case you're reading this, Apple, we agree the software exists — so leave our telex machine alone!

END



This summer's robot ping-pong competition attracted an intriguing array of entries, energetically being given their finishing touches the day before the finals.

Mike Geaney, Matthew Hampson and Eddie Forrester brought a lethal-looking contraption quickly christened the Guillotine. Within a square vertical dexion frame, stout cord drove a crossbar carrying the bat at a very respectable speed. The ball location system was rather optimistically based on a set of sonar transducers, but much needed to be done to close the position control loop.

The Bognor team of Julian Griffin, Aaron Ridout and Simon Butler had relay problems. The most obvious new feature on their pantograph-driven APPE was a square cage around the transparent bat. At great risk to his fingers, Aaron demonstrated the crisp response of the bat when the curtain of infra-red beams was broken. Even with the aid of elastic supports, however, the two motors at the base of the rhomboid mechanism seemed rather ineffectual. Behind the bat, an impressive lens assembly promised the use of an advanced vision system.

The Kung-Fu mechanism by John Knight and David Lowery had been masked in black to comply with the rules. The controlling computers, a Dragon and an Acorn Atom, were now mounted in a black pulpit topped by the vision system. In this, three rings of cylindrical lenses whirled to scan the scene in stereo, showing on the screen an accomplished ability to track the ball. The bat position was controlled by electromagnetic brakes which halt the bat in a spring-driven lunge, to be dragged by motors and cords back to the starting position in time for the next stroke.

John Marr's Zillian was a more dainty device altogether. Slender rods resembling an anglepoise lamp held a transparent bat. Behind the bat, a 45° mirror reflected the field of view to a lens system mounted on and parallel with the forearm.

The morning of the finals passed in a bustle of activity. APPE's new relay was fitted, only to fail as its contacts fused together. The old relay underwent surgery and hopes were raised. Guillotine seemed to be eroding as parts were stripped off for modification, and Kung-Fu was festooned with software listings. Despite frantic efforts, it became clear that the judges would have to make their decision based on design and potential, rather than actual table tennis playing prowess.

The judges were John Collins, Chairman of the British Robotic Association, Michael Shortland, Chairman of the Computing and Control Division of the Institution of Electrical Engineers, and Peter Pugh, representing the Institution of Mechanical Engineers, which offered a prize of £100 towards travel to complete at Euromicro in Brussels. First prize was £500 to enable the winner to travel to San Francisco to compete at IPRC — the second International Personal Robotics Congress.

First to the table were Kung-Fu and Zillian. The inability of the robots to play a full game led to the devising of a complicated scoring scheme for this first contest — one point for a touch to the ball served by the table, five for clearing the net frame and 10 for achieving a playable service, with return strokes marked up by a factor of five. 10 balls were served to each end, in groups of five, and Zillian showed its supremacy by detecting and reacting to any ball which came close enough. APPE then played Guillotine, although the table serving mechanism really played the prominent part. Although happy to snap at fingers, APPE refused to acknowledge the ball. Guillotine could be made to leap about by judicious dabs at its wiring, but was far from automatic control.

John Marr, a general practitioner from Middlesbrough, is now looking forward to a trip to San Francisco, while John Knight and David Lowery are preparing for Brussels. Each contestant won a Copy of Robots ***from Salamander Books, together with a copy of*** DIY Robotics, ***published by Sunshine Publications and written by John Billingsley (to whom ChipChat's thanks go for this report).***

Although the standard of play was rather short of Wimbledon, the robots all have great potential. Vision systems and actuators are coming together and great strides will be made before the autumn contests. Micromouse (pictured here in its latest incarnation) got off to an equally faltering start in 1980, and robot ping-pong was proposed because the maze-solving task was beginning to seem too easy. Robot ping-pong hasn't quite reached that stage yet!

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