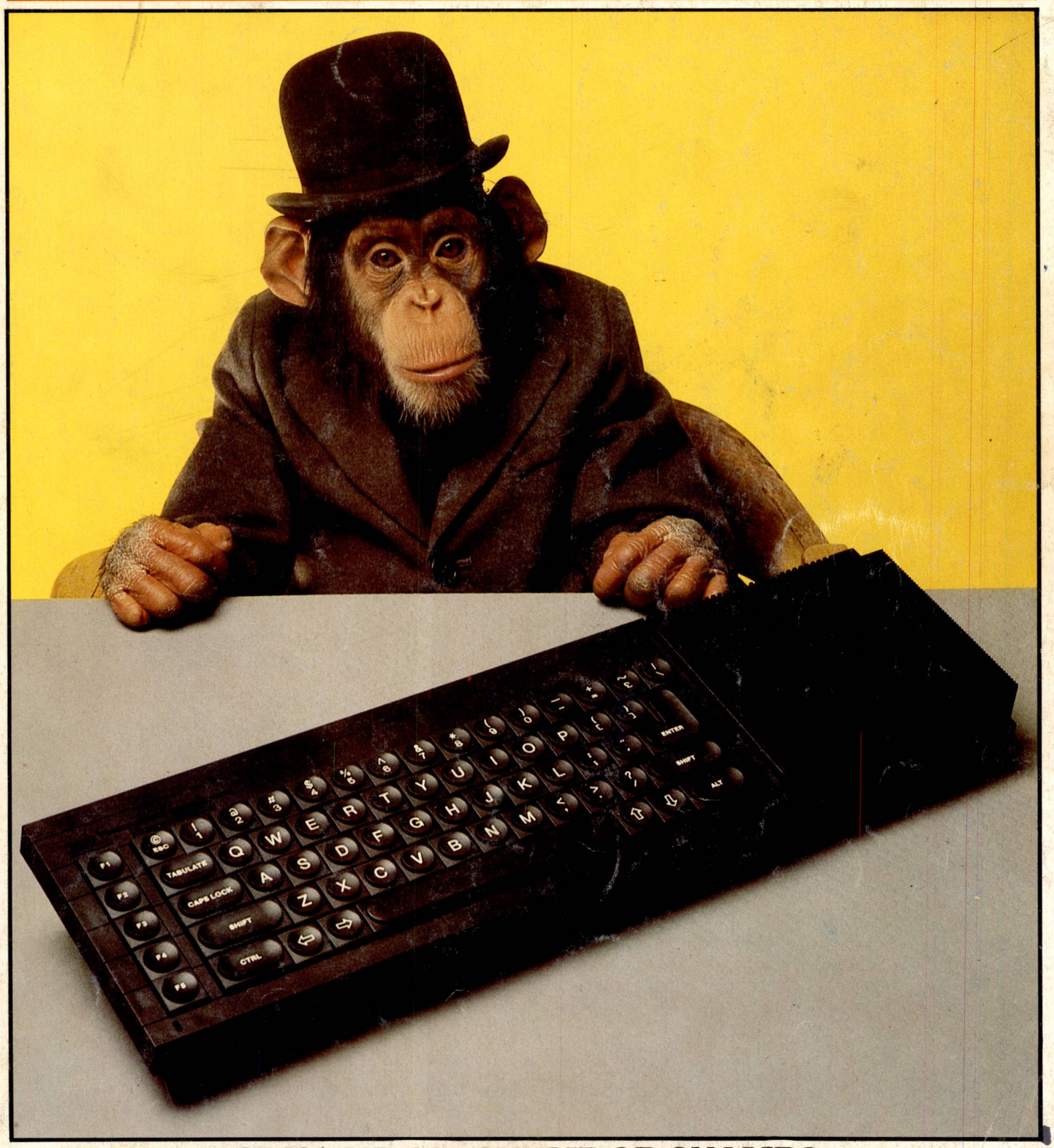
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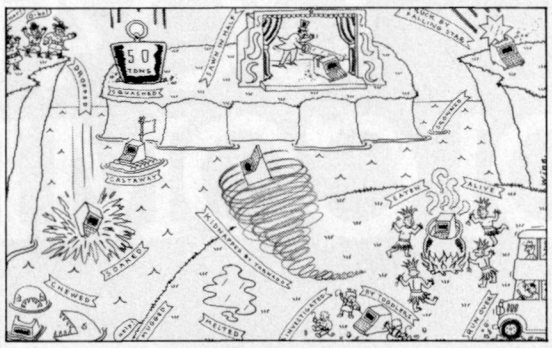
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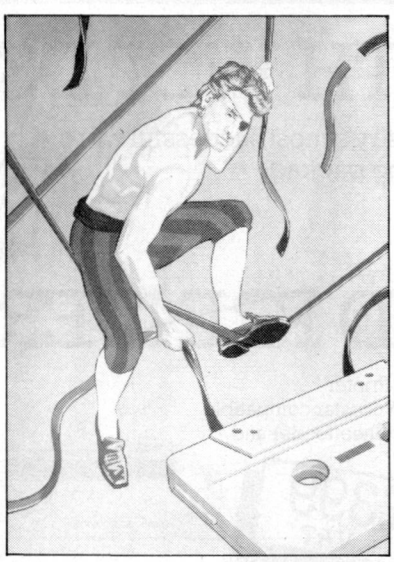
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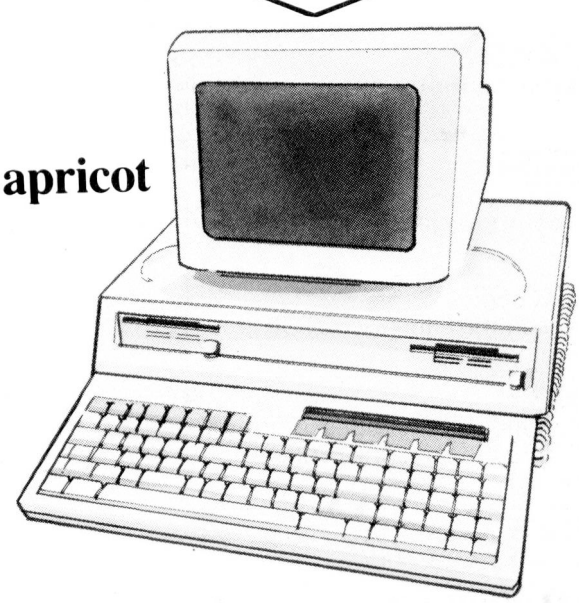
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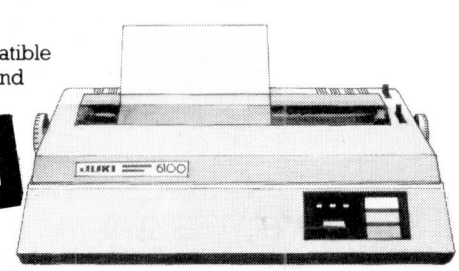
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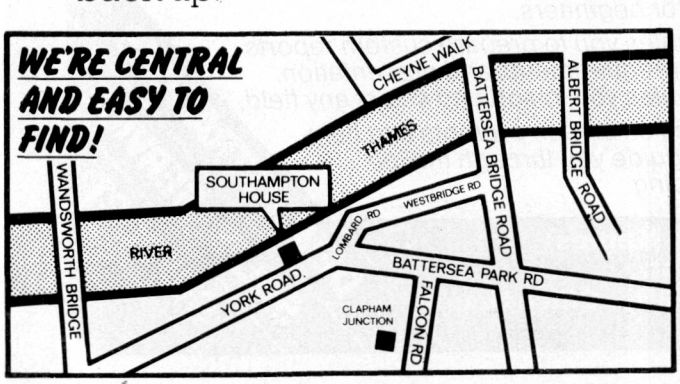
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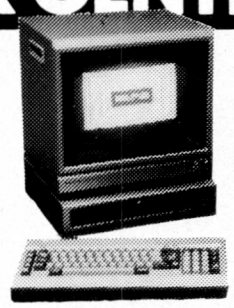


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74S74	75
74S85	295
74S112	80
74S113	90
74S124	300
74S132	110
74S133	60
74S138	100
74S139	115
74S140	60
74S151	180
74S153	182
74S155	39
74S158	195
74S163	300
74S174	250
74S175	260
74S188	140
74S189	140
74S194	295
74S195	275
74S197	400
74S201	250
74S225	240
74S240	390
74S241	250
74S244	290
74S251	225
74S257	225
74S258	250
74S260	50
74S260	70
74S262	950
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74S288	210
74S289	200
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LS13	30
LS14	45
LS19	56
LS20	25
LS22	18
LS27	30
LS30	25
LS32	50
LS38	60
LS40	25
LS42	40
LS47	38
LS48	40
LS63	55
LS72	20
LS73	50
LS74	60
LS75	40
LS85	70
LS86	28
LS90	30
LS91	60
LS92	35
LS93	35
LS136	30
LS138	60
LS139	60
LS148	110
LS151	50
LS153	50
LS156	36
LS157	35
LS158	35
LS175	40
LS240	120
LS241	100
LS242	75
LS243	75
LS244	250
LS245	250
LS273	120
LS274	150
LS373	100
LS374	100
LS393	100
LS640	200
LS641	200
LS645	200
LS668	60
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4001	20
4002	22
4006	65
4007	22
4008	48
4009	33
4010	33
4011	22
4012	25
4013	48
4015	55
4016	40
4017	60
4018	60
4019	58
4020	90
4023	30
4025	22
4027	43
4034	140
4039	280
4040	42
4051	45
4052	60
4053	50
4066	45
4068	22
4069	22
4070	22
4071	20
4072	22
4073	26
4075	22
4076	68
4077	22
4078	18
4081	22
4082	22
4093	20
4097	275
4099	75
4160	35
4161	99
4162	99
4163	99
4174	99
4175	105
4411	750
4412	805
4419	350
4490	450
4500	395
4501	38
4506	100
4511	46
4512	45
4519	32
4526	60
4528	50
4532	65
4549	400
4568	175
4583	100
4584	40
4585	70
4597	330
4598	290
4599	155
40101	130
40105	220
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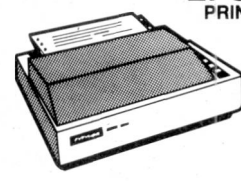
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1.6MHz	392
1.8MHz	395
1.843M	200
2.0MHz	225
2.457M	200
3.276MHz	160
3.2768M	150
3.57594	98
3.6864M	300
4.0MHz	150
4.032MHz	290
4.194304	200
4.433619	100
4.80MHz	200
5.0MHz	160
5.185MHz	300
5.24288	390
6.0MHz	140
6.144MHz	150
6.5536M	200
7.0MHz	150
7.7328M	250
7.168MHz	160
7.6MHz	200
8.0MHz	150
8.0833M	395
8.86723	175
9.0MHz	200
9.375M	350
10.0MHz	175
10.7MHz	150
10.24MHz	200
12.0MHz	175
12.528M	300
14.31818	170
16.0MHz	200
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22pin	25p	70p
24pin	25p	70p
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2x12 way	—	160p
2x15 way	—	165p
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2x23 way	175p	—
2x25 way	285p	275p
2x28 way	190p	—
2x30 way	310p	—
2x36 way	360p	—
2x40 way	380p	—

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Angle	160p	210p	250p	355p
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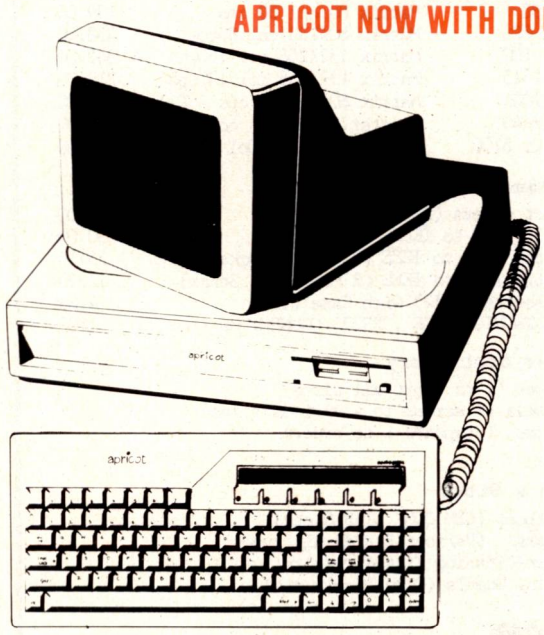
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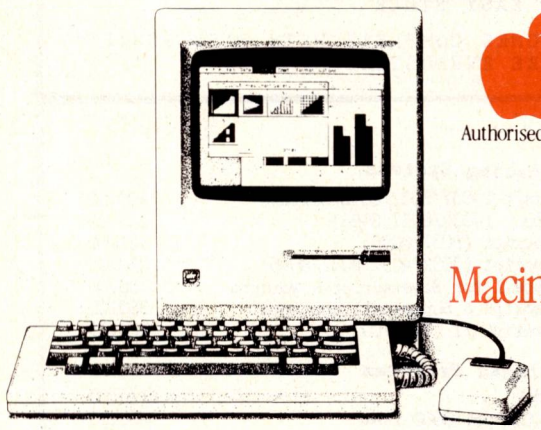


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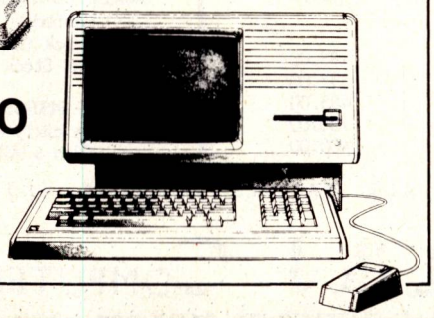


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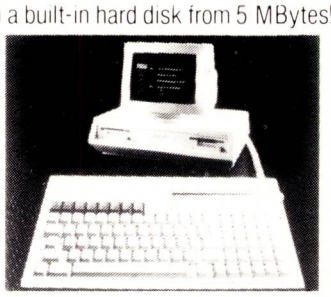
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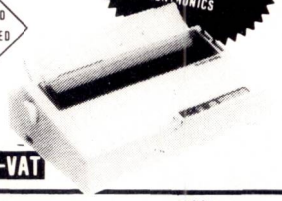
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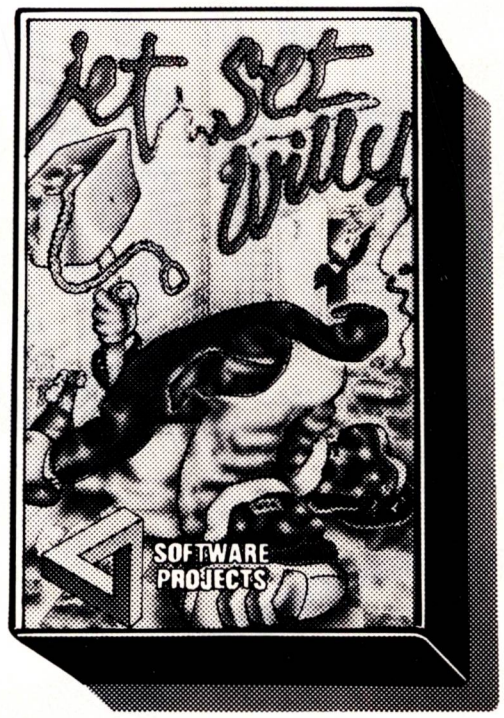
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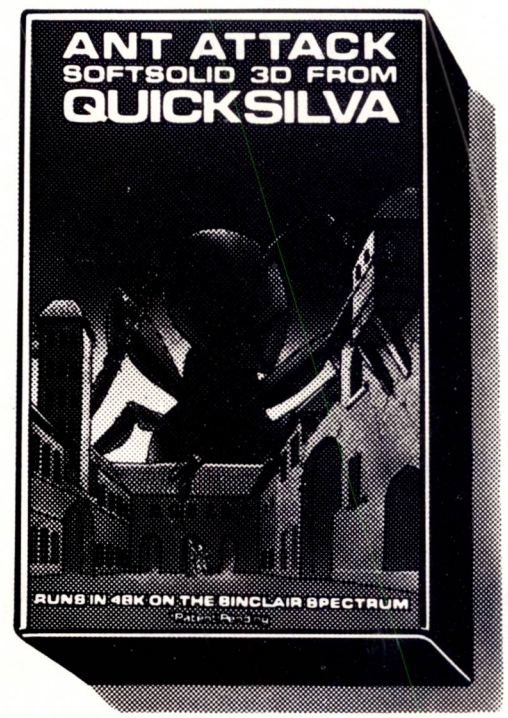


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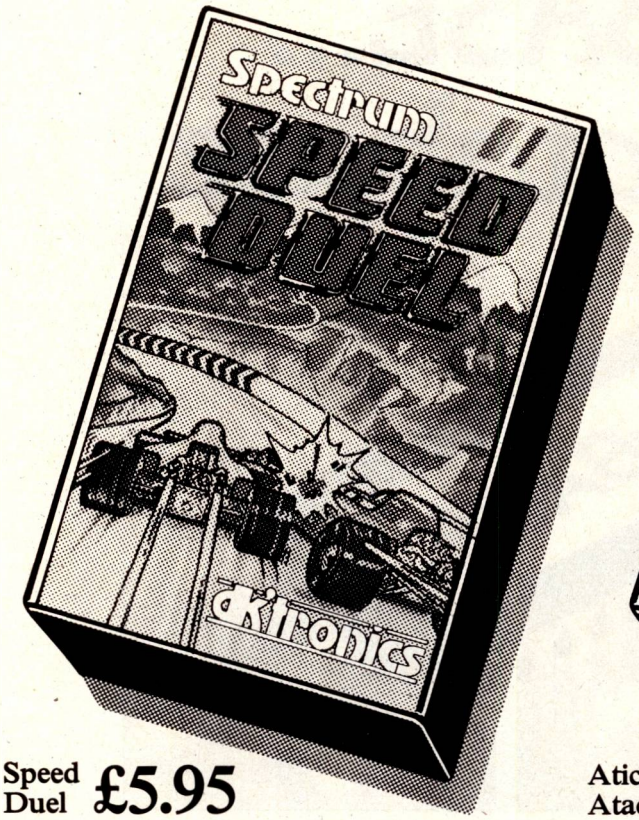
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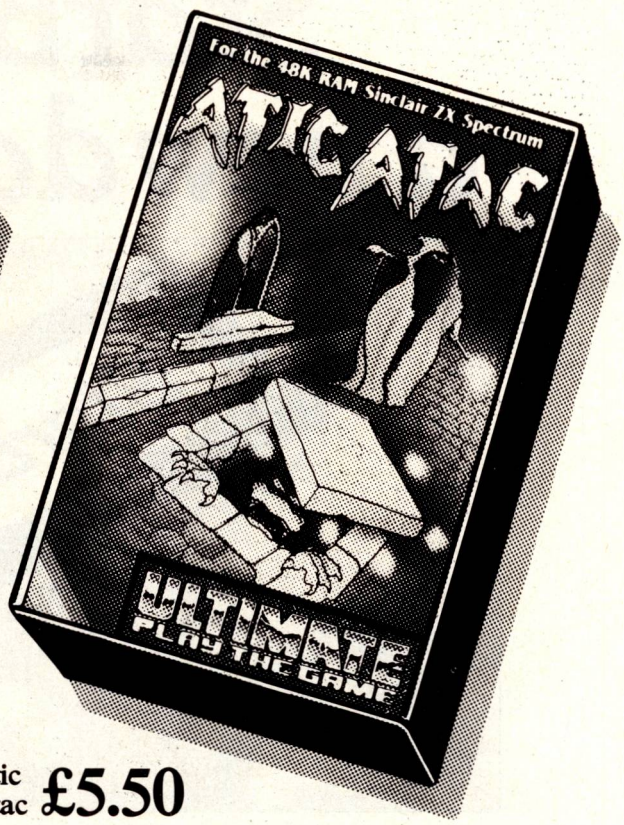
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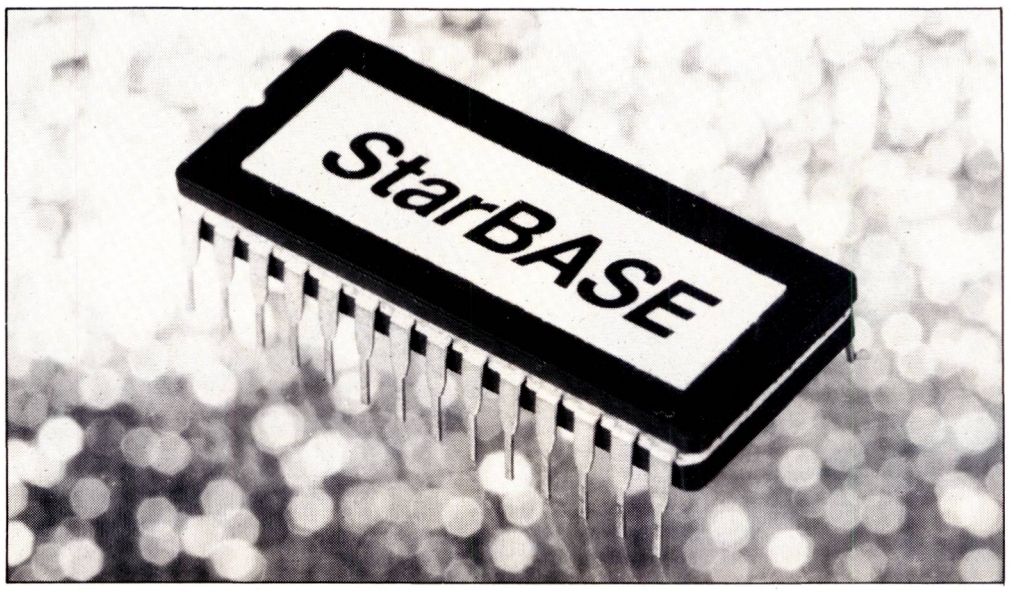
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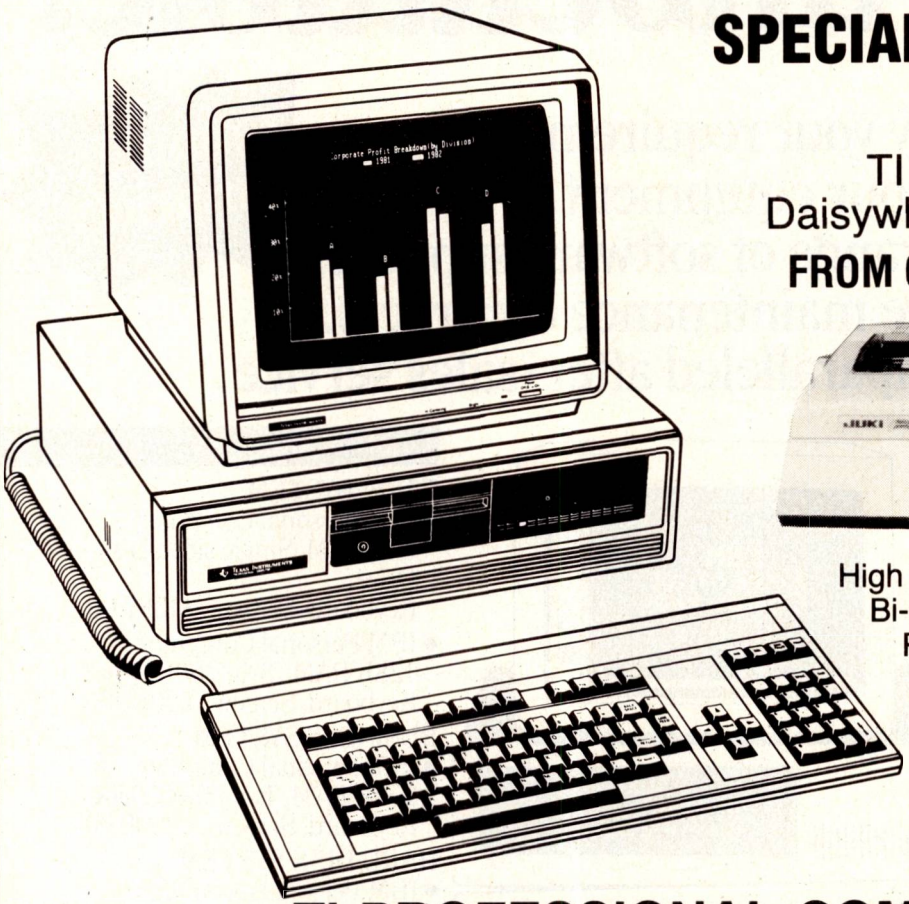
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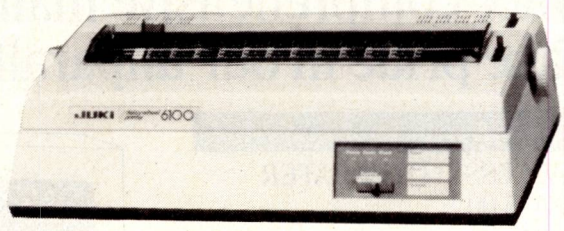
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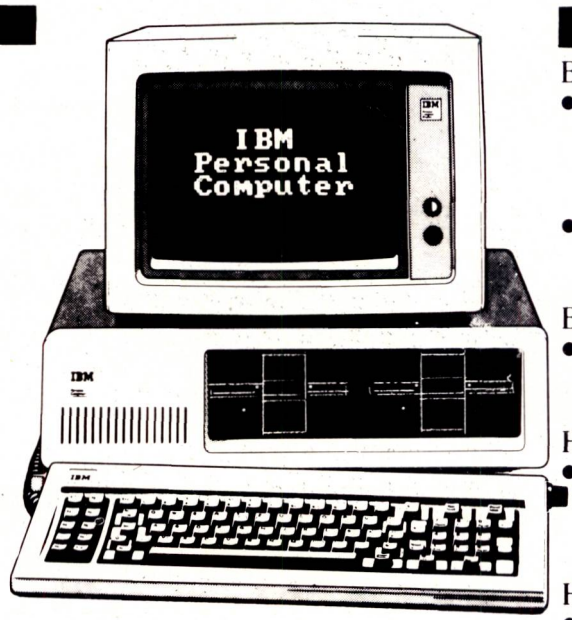
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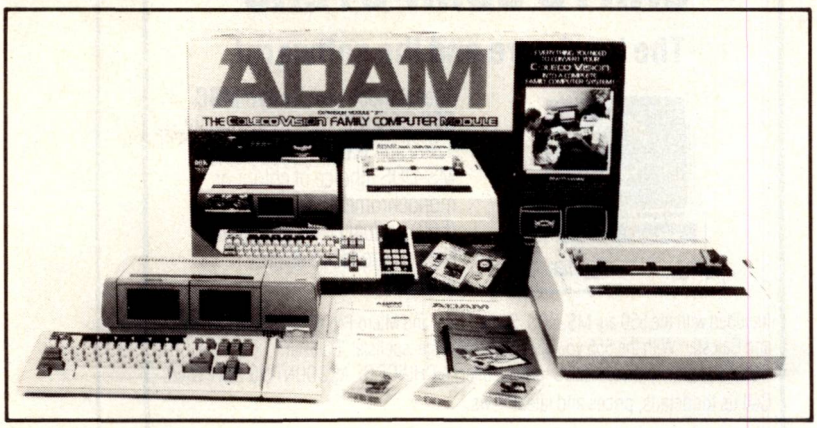
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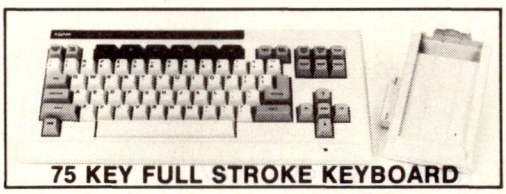
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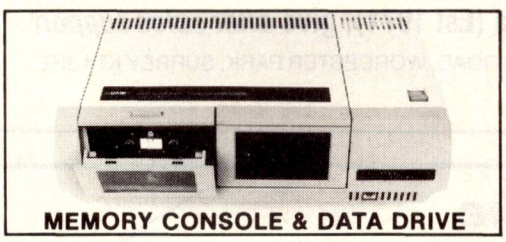


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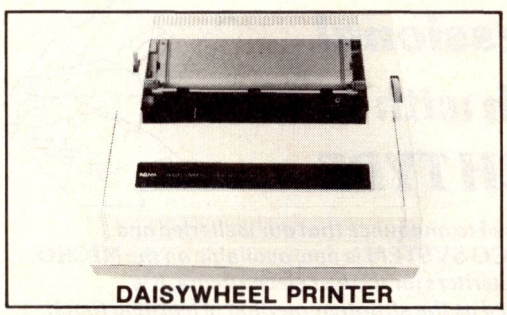
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MEMORY CONSOLE/DATA DRIVE: *The heart of the Adam system is the 40K ROM and 64K RAM memory console which combines with the 32K ROM and 16K RAM in Colecovision to give you a total of 72K ROM (including 24K cartridge ROM) and 80K RAM (expandable to 144K). Built into the memory console is a digital data drive which accepts Adam's digital data packs, a fast and reliable mass storage medium that is capable of storing 256K of information, that's about 250 pages of double spaced text! The console is also designed to accomodate a second optional digital data drive.

FULL STROKE KEYBOARD: The Adam keyboard has been designed as a professional quality keyboard that combines ease of use with an impressive array of features. It is stepped and sculptured for maximum efficiency and has 75 full stroke keys which include 6 colour coded Smart Keys which are redefined for each new application; 10 command keys which are dedicated to the word processing function, and 5 cursor control keys for easy positioning of the cursor at any point on the screen. You can attach a Colecovision controller to the keyboard to function as a numeric keypad for easy data entry. It can also be held like a calculator, a feature which makes working with numbers particularly easy. The joystick part of the hand controller can be used in the same way as the cursor control keys, to move the cursor around the screen.

LETTER QUALITY PRINTER: The Smart Writer letter quality daisywheel printer is a bi-directional 80 column printer which prints at a rate of 120 words per minute. It uses standard interchangeable daisywheels, so a variety of typestyles are available. The printer has a 9.5 inch wide carriage for either single sheets or continuous fan fold paper and uses standard carbon ribbons. It is comparable to many printers which cost as much as the total Adam package. The printer can be used either with the Adam's Smart Writer word processing program or as a stand alone electronic typewriter.

BUILT-IN WORD PROCESSOR: Adam comes with Smart Writer word processing built-in. This program is so easy to use that you only have to turn the power on and the word processor is on line and ready to go. Detailed instruction books are not necessary as the Computer guides you step by step, working from a series of Menu commands. It enables you to type in text, then completely edit or revise it with the touch of a few keys. Changes are readily made and a series of queries from the computer confirm your intentions, so that you can continuously double check your work as you type.

COMPATIBILITY WITH COLECOVISION: By using high speed interactive microprocessors in each of the modules, the Coleco Adam is designed to take additional advantage of both the 32K ROM and 16K RAM memory capability in the Colecovision. If you do not already own a Colecovision Console (£99 inc VAT), then you will need to purchase this when you initially purchase your Adam Computer package (£499 inc VAT), making a total purchase price of (£598 inc VAT).

WHAT IS COLECOVISION: Colecovision is one of the worlds most powerful video game systems, capable of displaying arcade quality colour graphics of incredible quality on a standard Colour TV set. The console (see picture bottom left) accepts 24K ROM cartridges such as Turbo and Zaxxon and is supplied with the popular Donkey Kong cartridge and a pair of joystick controllers. Colecovision has a range of licenced arcade hits available such as: Gorf, Carnival, Cosmic Avenger, Mouse Trap, Ladybug, Venture, Smurf, Pepper II, Space Panic, Looping, Space Fury, Mr Do, Time Pilot, Wizard of Wor and many others. So there you have it, Adam plus Colecovision the unbeatable combination. Send the coupon below for your FREE copy of our 12 page Colour brochure giving details on the complete Adam system.

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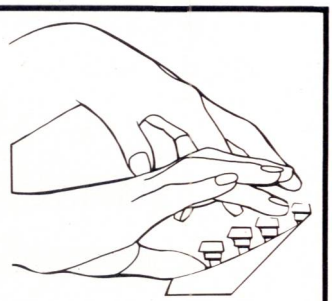
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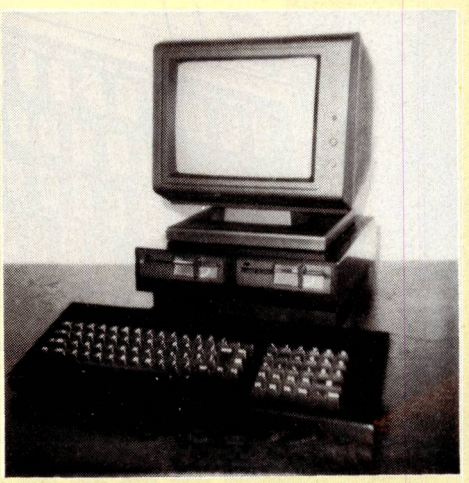
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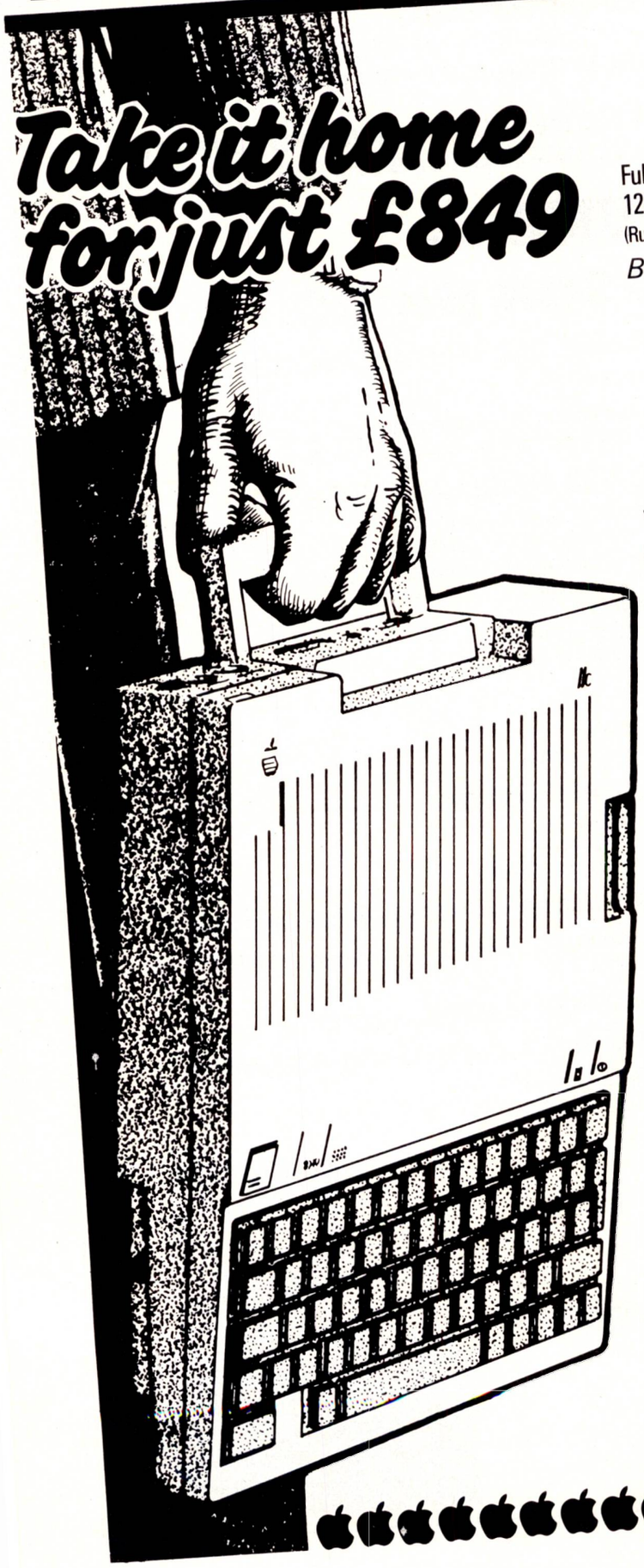


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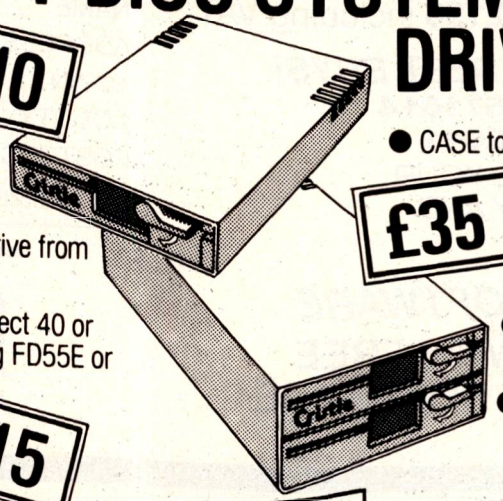
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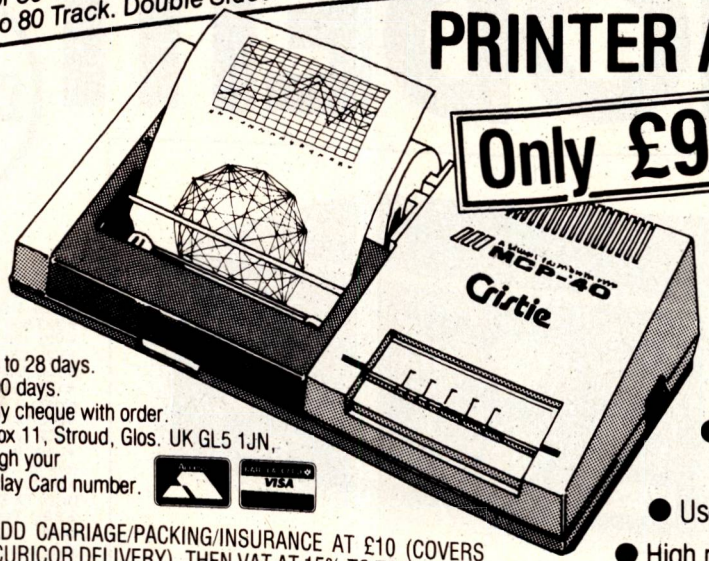
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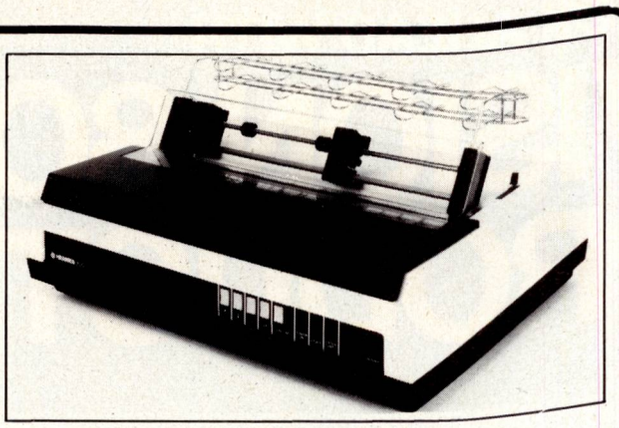
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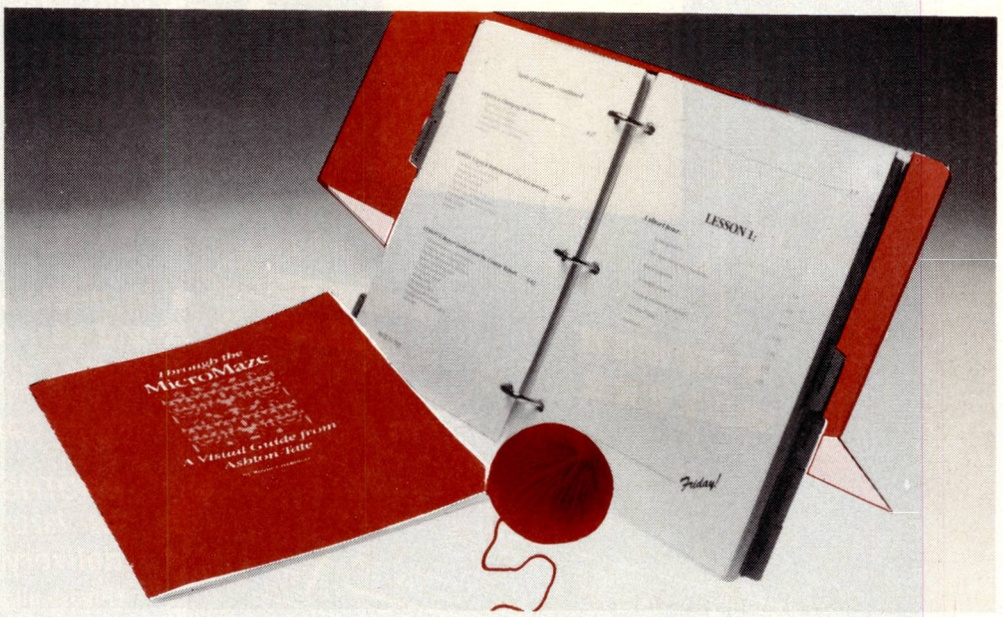


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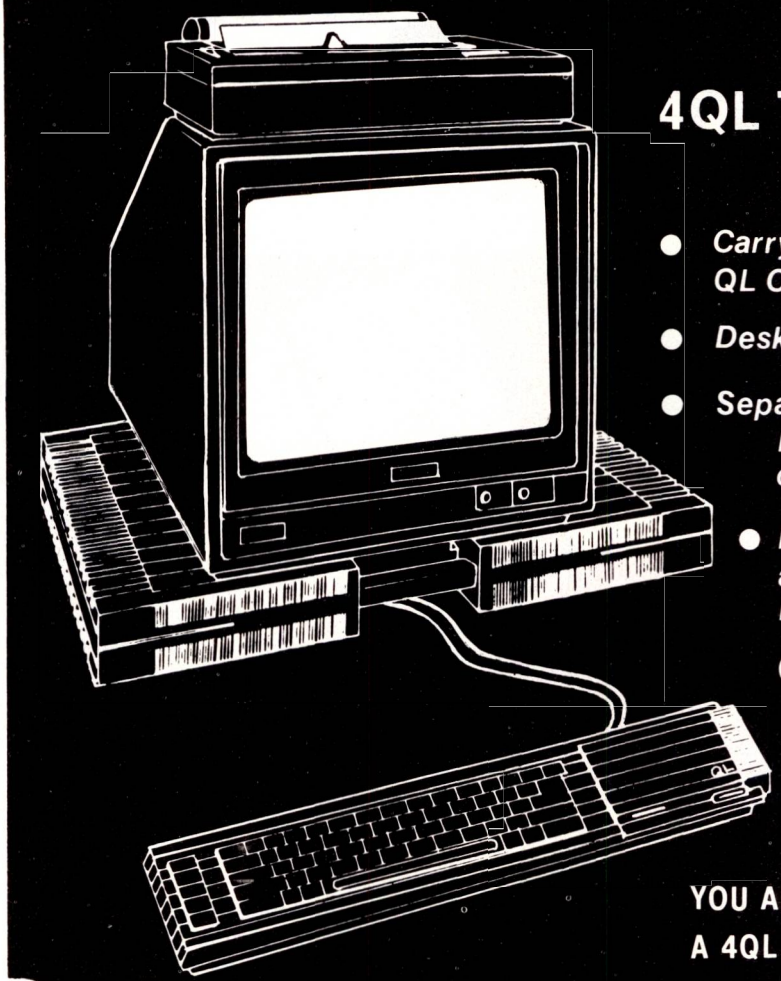
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A dBASE II User Group has been formed. For further details contact User Group Secretariat Caroline Tanner on 0908 568866.

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1GRM-001	IPB 16K (serial/parallel & buffer)	122.00	140.50
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1BRD-005	Arcade Machine II	40.80	46.92
1ROB-001	Bitstik 500 series	279.00	320.85
1PEN-001	Complete Graphics System	44.00	50.60
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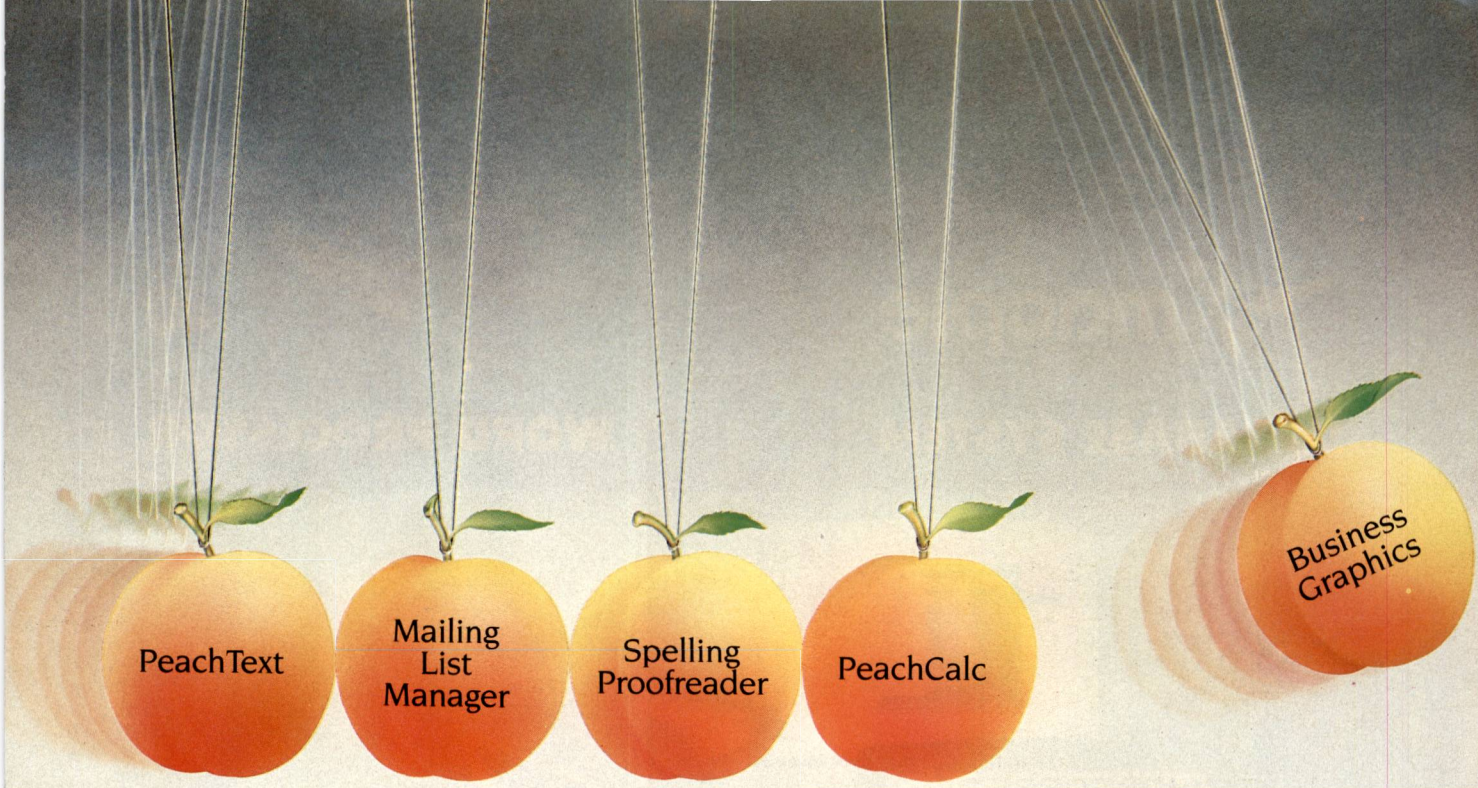
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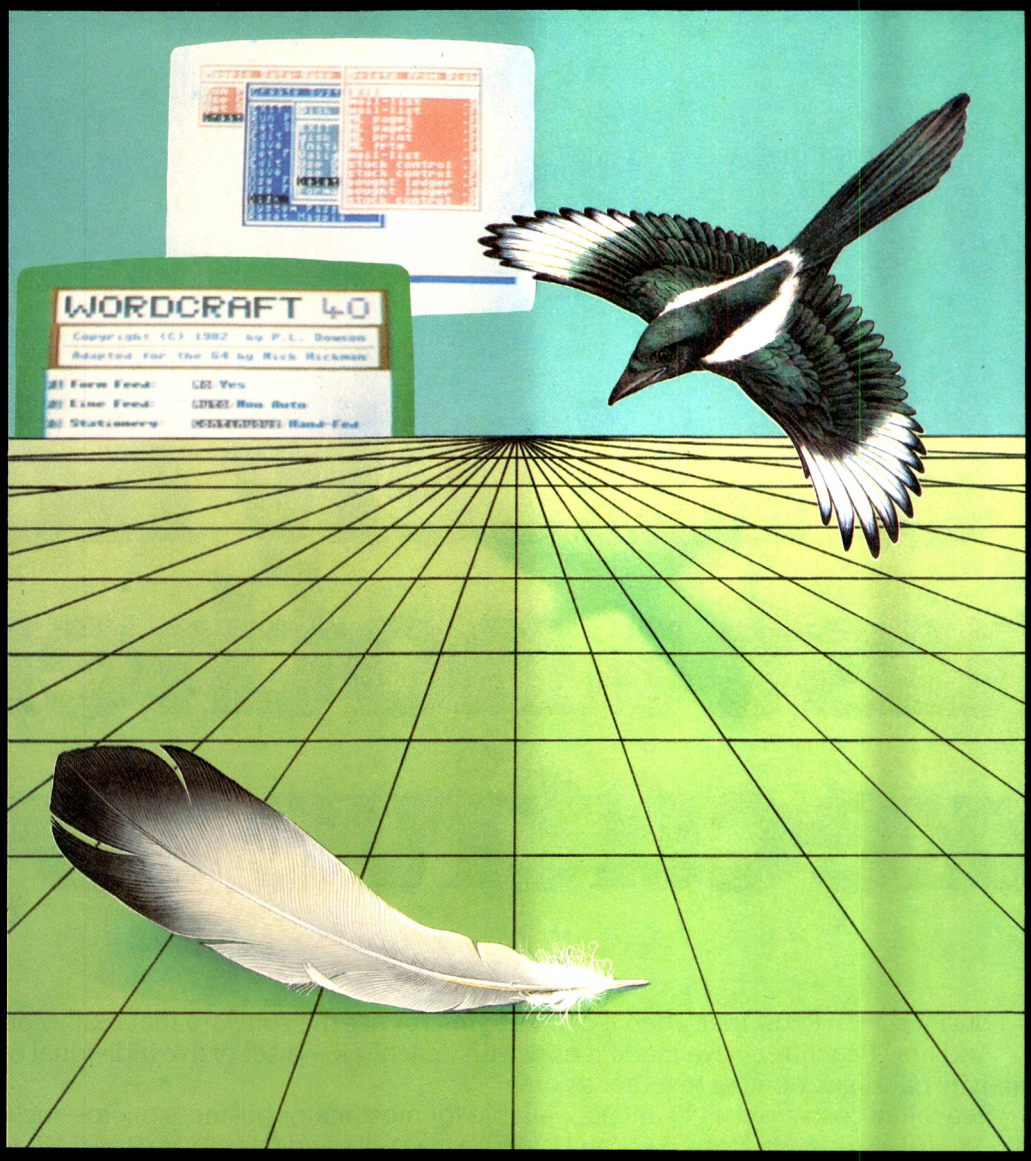
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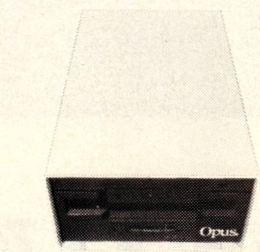
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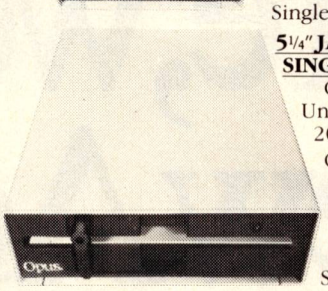
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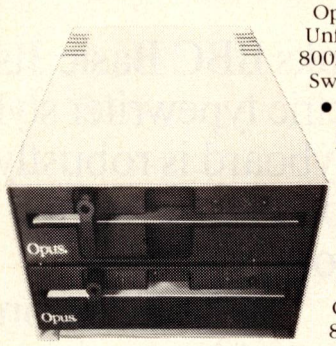
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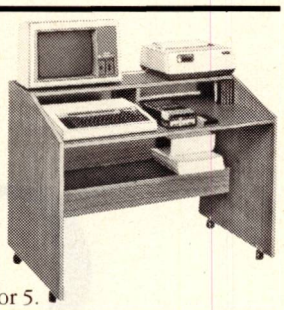
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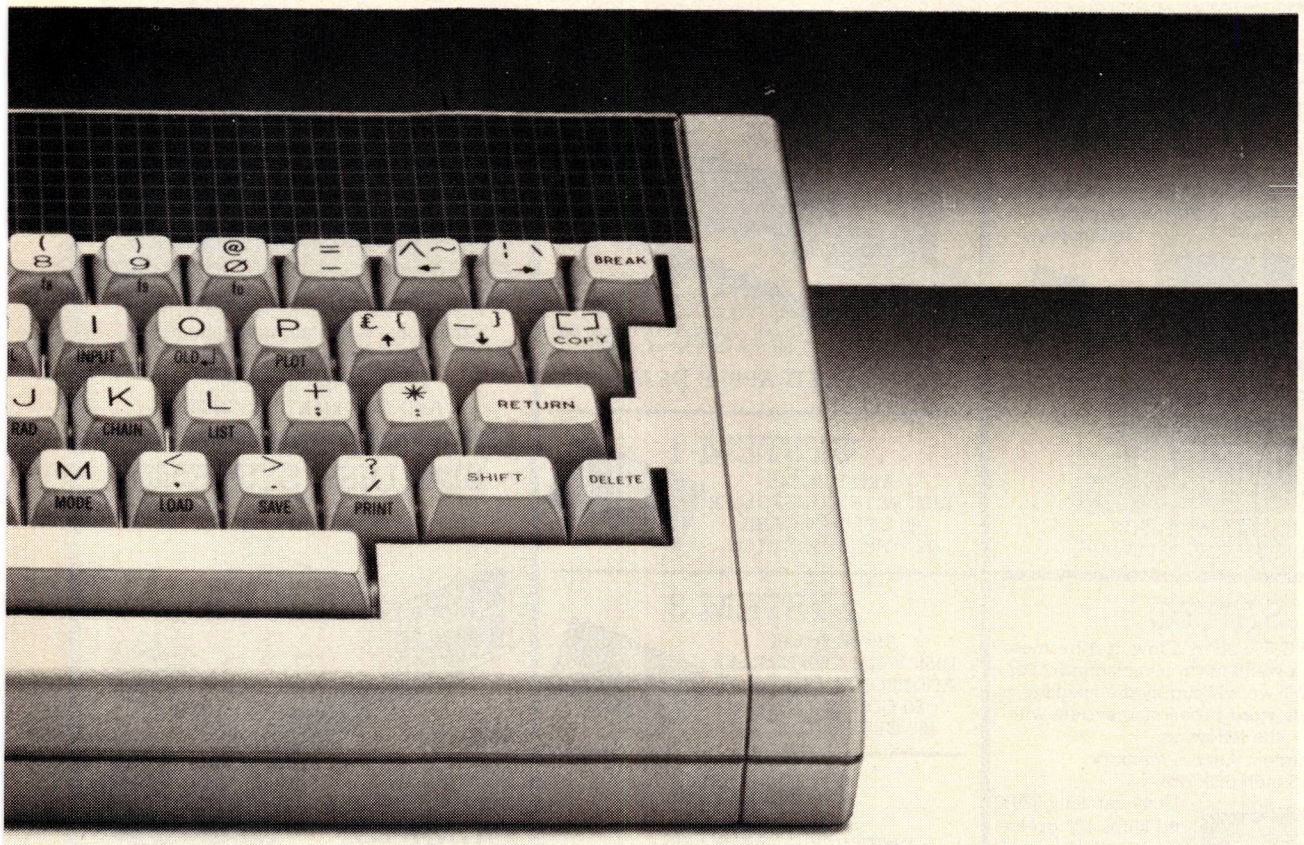
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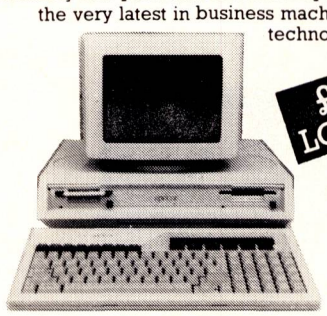
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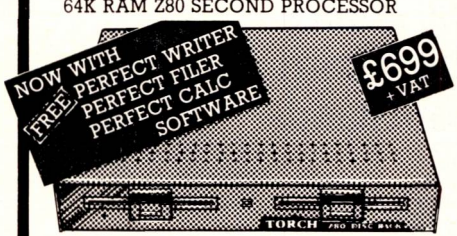
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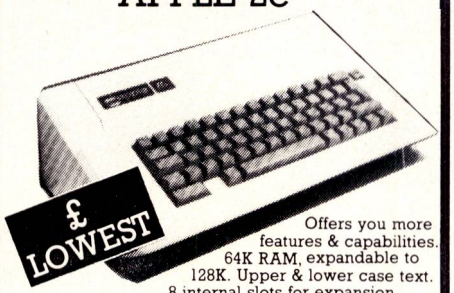
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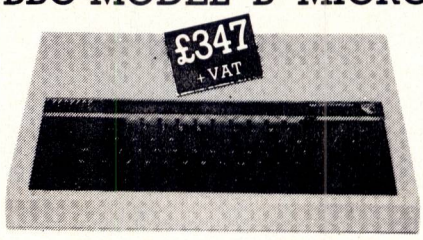
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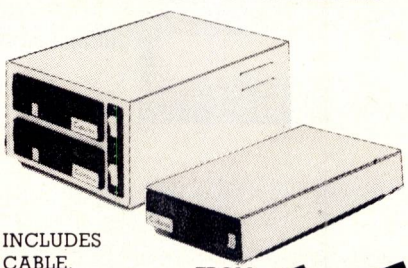
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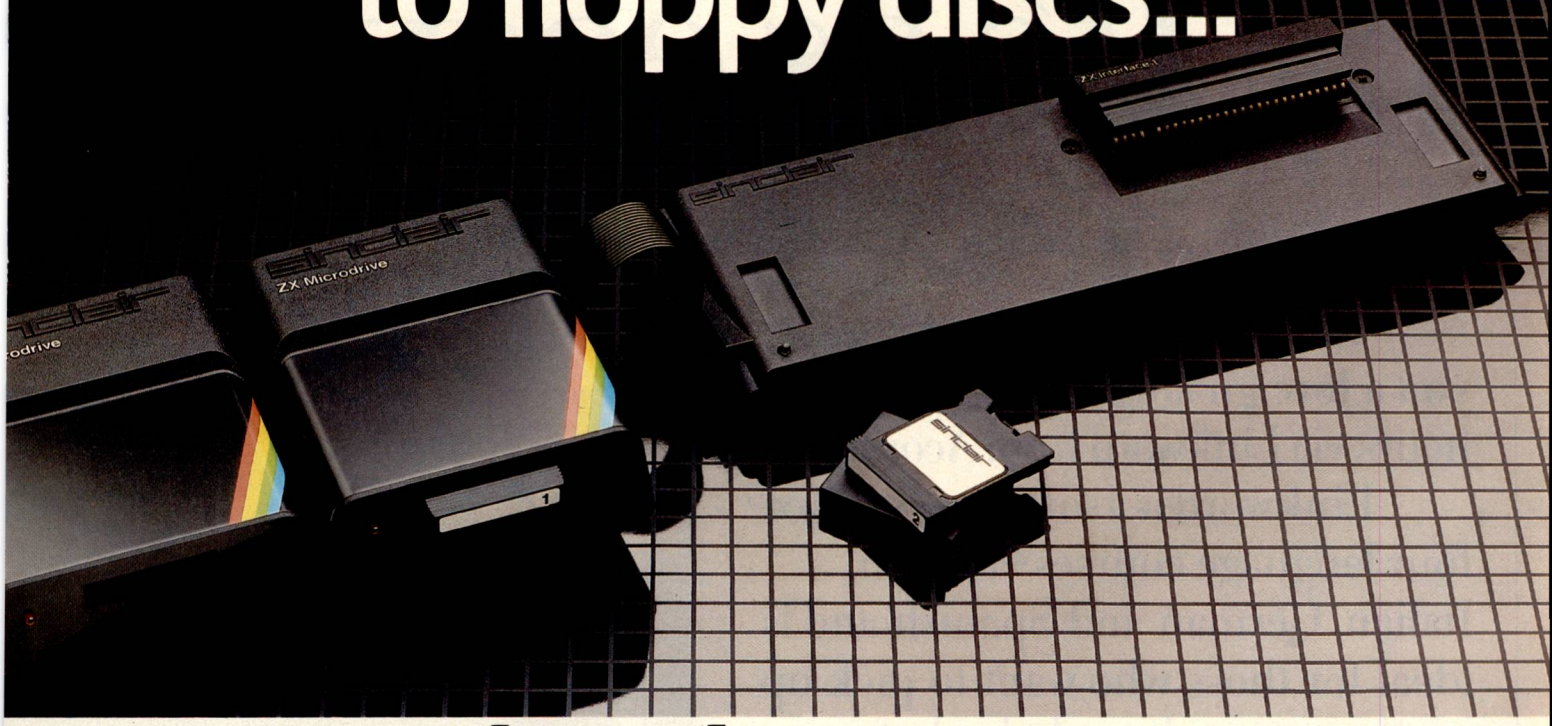
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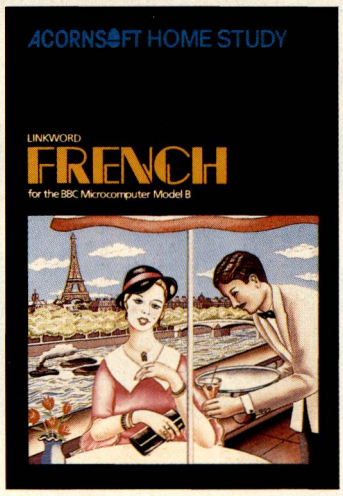
Each 12 hour program is based on a revolutionary new format, making learning enjoyable rather than laborious.

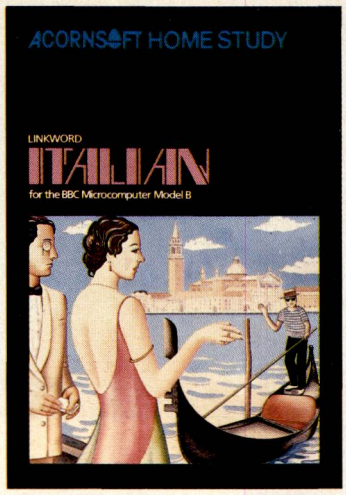
For instance, the Spanish word for bread is 'pan', so you are asked to imagine a pan full of bread and hold that image in your head for 10 seconds.

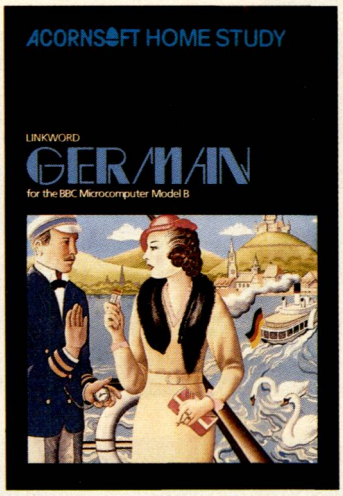
This method will rapidly enable you to

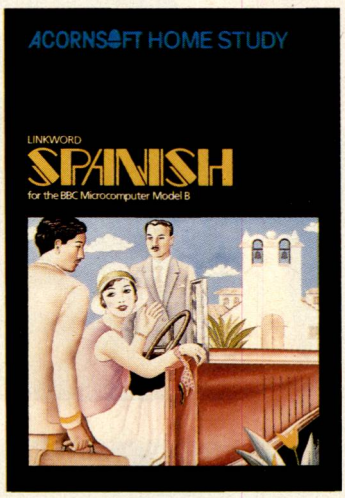


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build up a vocabulary of around 400 words covering a wide range of useful topics.

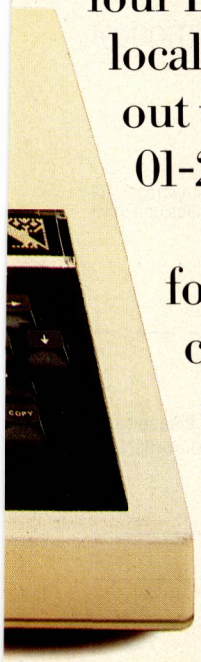
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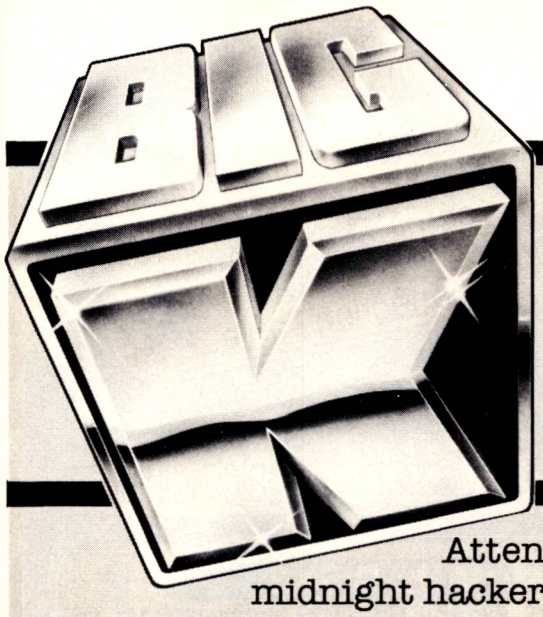
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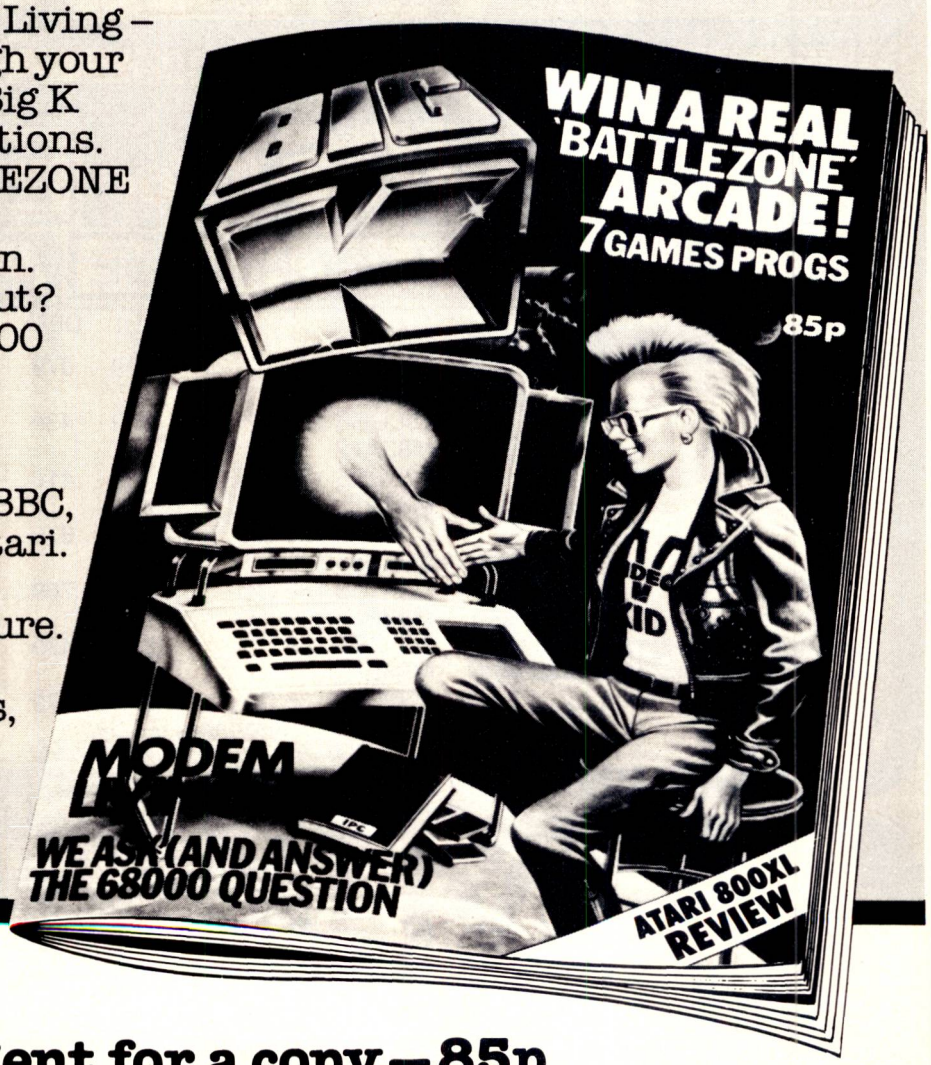
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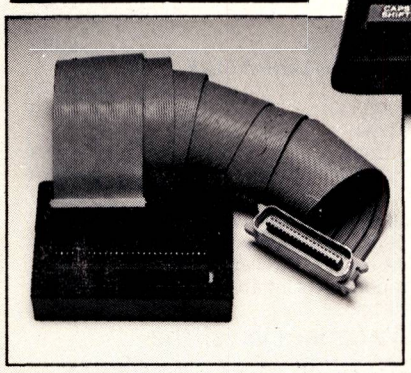
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The package will run other types of software like Memotech's MTX Accounting Package and programs in the First Lessons educational series (not to mention Goldmine and Kilopede!).



COMMANDS AND FUNCTIONS

^A	cursor word left
^B	align paragraph
^C	scroll down screen
^D	cursor right
^E	cursor up
^F	cursor word right
^G	erase to the right
^H	erase to the left
^I	cursor to tab
^J	help
^KD	save file
^KQ	abandon changes
^KS	save and resume
^L	find/replace again
^M	carriage return
^O	on-screen menu
^OC	centre a line
^OD	print control display
^OI	set tab stop
^OJ	justify on/off
^OL	set left margin
^ON	clear tab stop
^OR	set right margin
^OS	set line spacing
^OX	margin release
^P	print controls menu
^PB	bold print on/off
^PC	pause in document
^PS	underlining on/off
^Q	quick menu
^QA	find and replace
^QC	go to document end
^QF	find
^QR	go to document start
^QY	delete to end of line
^R	scroll up a screen
^S	cursor left
^T	delete a word
^U	escape
^X	line down
^Y	delete entire line

DOT COMMANDS

.MB	set bottom margin
.MT	set top margin
.OP	omit default page nos.
.PA	page break
.PC	set page number col.
.PL	set page length
.PN	set page number
.PO	set page offset
..	comment line

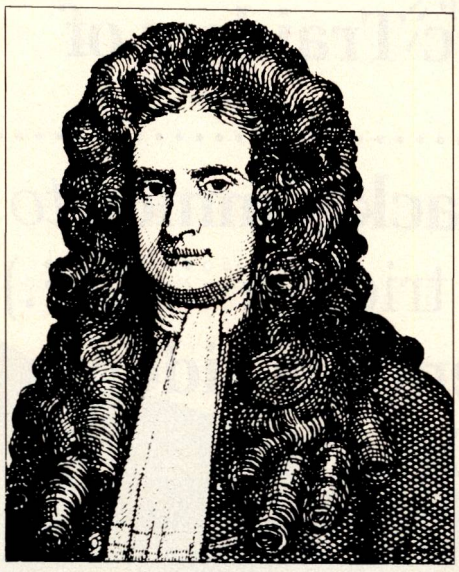
OPENING MENU

X	Exit
J	Help
D	Load a document
C	Create a document

OTHER MENUS

^O	Onscreen Format
^Q	Quick menu
^K	Save & printing
^P	Print controls
^J	Help pages

x software, from wton to Nemo.....





MEMOTECH EDUCATIONAL SOFTWARE

Memotech are currently producing two separate series of educational software. They are written for two age ranges; The FIRST LESSONS series covers ages four to seven years and the MATHS and PHYSICS series (each in four parts) cover seven years old up to "O" Level standard.

1st LESSONS is designed to teach younger children the basics of letter and word recognition, with option menus providing the parent or teacher with full control over the program's complexity and reward levels. The child is rewarded with full colour high resolution displays for the right answers.

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ASSEMBLER (INTRODUCTION)
SOUND VIRTUAL SCREENS

GENERAL PURPOSE
CHARTS AND GRAPHS
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...th to Blobbo (amazing!!!) *to* **Backgammon** *to* **...ting)** *to* **Reversi** (very tricky.....)

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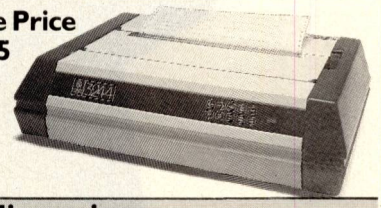
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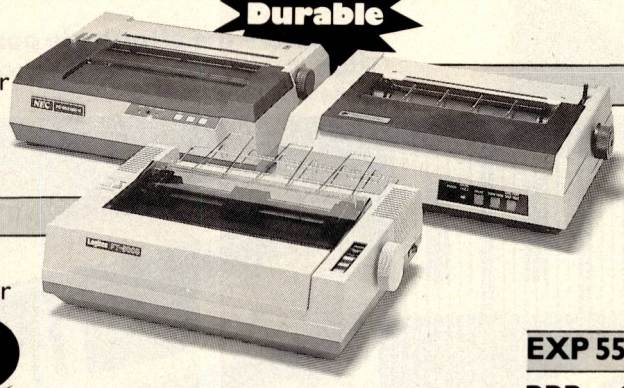


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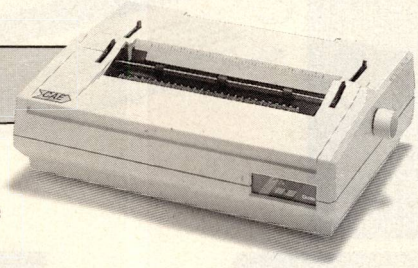
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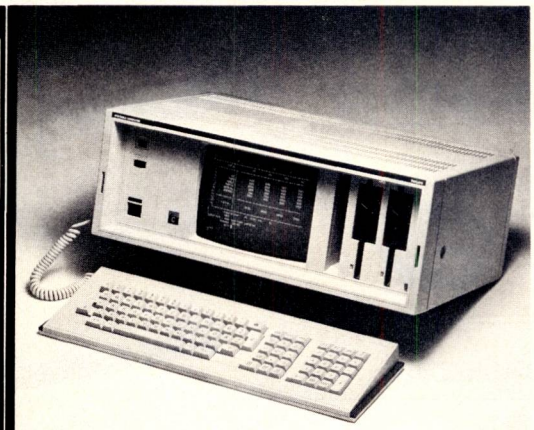
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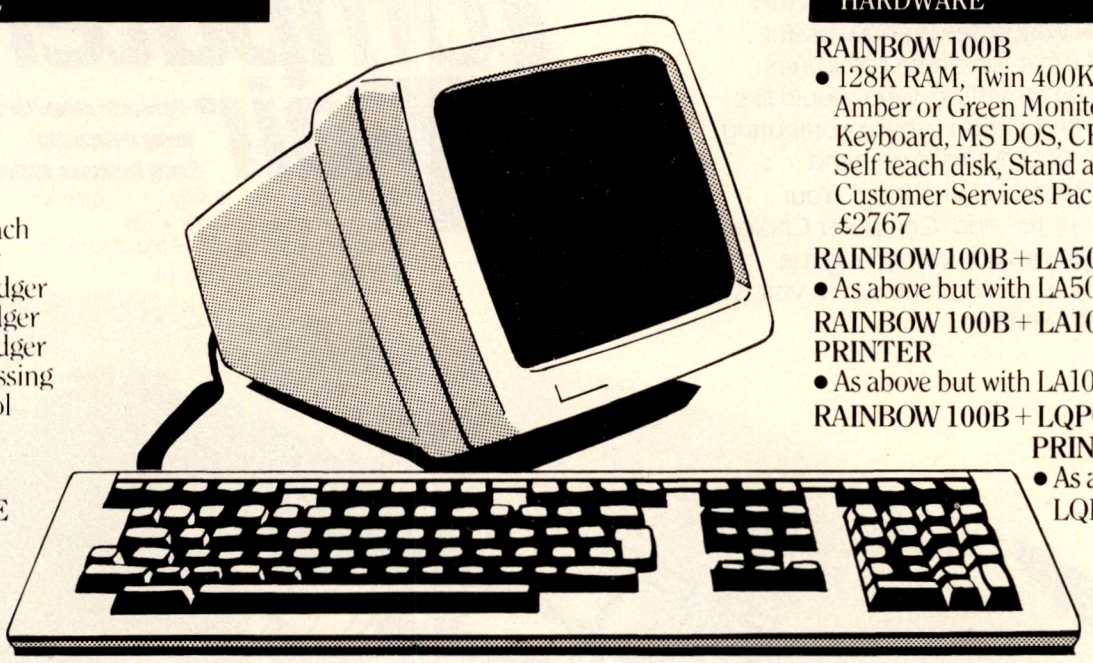
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With the vast amount of software running in so many widely differing fields, the Comart Communicator has already proved itself ideal for both software and hardware OEM's.

You'll find it at work ensuring that the field doctor in Kenya has the right medicines on board; the multiple caterer never runs out of buns and burgers and the dairy herd receives a balanced feed to achieve optimum milk yields. It's also doing jobs in a host of other areas — you'll find a few other examples at the foot of this page.

The most impressive thing about the Comart Communicator is it's sheer adaptability. Modular in concept, it can be expanded both inside and out. In under three years it has become a complete family of compatible, fully expandable microcomputer systems with a range of no less than 20 models — including single-user, multi-user and multi-processing systems. There's a choice of floppy and hard disk storage capacities with up to 1 megabyte of main memory plus cartridge tape and 8" diskette sub systems.

The Comart Communicator can support the widest possible range of operating systems including 8 & 16 bit versions of CP/M, MP/M, MS-DOS, CP/NOS, CP/NET and BOS together with IBM and ICL mainframe communication protocols.

Because every model can be readily configured, the Communicator affords a greater flexibility in the final choice of system, making it suitable for a multitude of specialist applications. And by making use of industry standard S100 Boards, existing and future models can be enhanced and upgraded to take account of new applications.

Such flexibility ensures that the Comart Communicator is unlikely to become obsolete. So software based on the Communicator can be planned with the certainty that the hardware will be around in the future, protecting your possibly substantial investment in development time.

The Communicator is renowned for it's rugged reliability making it ideal for stressful environments. It's backed by a 12-month warranty and Comart have also met the stringent CCTA requirements. Also working for you are the resources and reputation of Comart as a major force in UK microcomputer development, with their innovative R & D team plus the support and back up of a speedy nationwide service organisation. And of course dealing with a British manufacturer you have direct access to our product support specialists for technical assistance.

What's more, you'll find the price of a Communicator very competitive. So if you're a system builder, OEM, software house or an end user looking for a solution for a specialist application, post the coupon for further details.

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The number of specialist software packages running on the Comart Communicator™ surprised even us.



COMART COMMUNICATOR SPECIFICATIONS

	CP100 Series Systems	CP1000 Series Systems
Microprocessors:	8 Bit Z80A (1 to 6)	16 Bit 8086
Memory:	64K-512K bytes	256K-1M byte
Storage:	390K or 790K byte diskettes 5M or 20M byte hard disks	390K or 790K byte diskettes 5M or 20M byte hard disks
Operating Systems:	CP/M, MP/M11 & CP/NET, Multi-processor, 1 to 5 users	CP/M86, MP/M86, MS-DOS, 1 to 8 users

Features common to both CP100 & CP1000 Series Systems

Keyboard/Display: 105 Key, detached 14" green screen, swivel/tilt,
Expansion: Internal - S100 cards, mainframe communications & protocols,
Expansion: External - stackable modules inc. cartridge tape & 8" floppy & hard disks.

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The following are just a few of the more complex applications where the Communicator can be found at work:

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THE EPSON PX-8.
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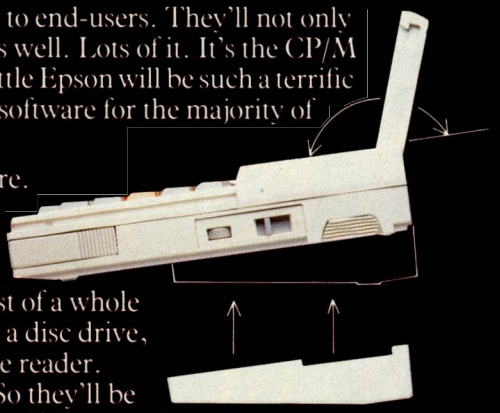
Meet the Epson PX-8. Up to 184K RAM, CP/M*, bundled software, a whopping great 80-character, 8-line LCD screen, runs off batteries anywhere you like, weighs around 4 lbs and is as big as a box of chocs.

And costs well under a grand.

All that, and it slips into a briefcase. And in a nutshell, there's nothing to touch it. Except thousands of end-users who will shortly be clamouring for one.

The PX-8 is tremendously user-friendly which means it's going to sell and sell. For instance, the bundled software it comes with is a specially-tailored version of tried and trusted industry favourites – Portable WordStar*, Portable Calc*, Portable Scheduler*, Portable Cardbox Plus* as well as MicroSoft Basic*. And there's a whole range of utilities including communications and file transfer.

The PX-8 is dealer-friendly too. After we've launched it to you, we're launching it nationally to end-users. They'll not only want the hardware but software as well. Lots of it. It's the CP/M operating system that means the little Epson will be such a terrific money-spinner, because existing software for the majority of desk-top micros will suit it too.



Yet the story doesn't end there. The PX-8's standard 64K RAM is upped to an incredible 184K usable RAM by the optional clip-on RAM pack. That's the first of a whole range of peripherals like printers, a disc drive, an acoustic coupler and a bar-code reader. And they're totally portable too. So they'll be in as much demand as the PX-8 itself. It goes without saying that the PX-8 runs straight off the mains too, and plugs easily into existing Epson mains-powered printers, our QX10 micro and most other desk-top micros as well.

In short, the PX-8 is the next leap forward in truly portable computing.

So it's going to be in demand. And that goes for the software and peripherals too.

If you want to be in on it, fetch your scissors.

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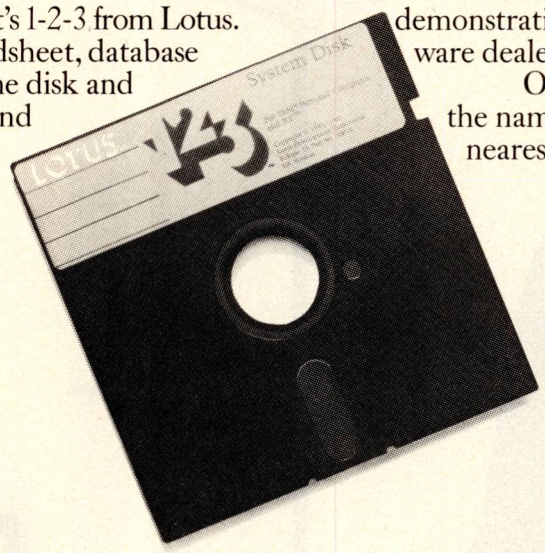
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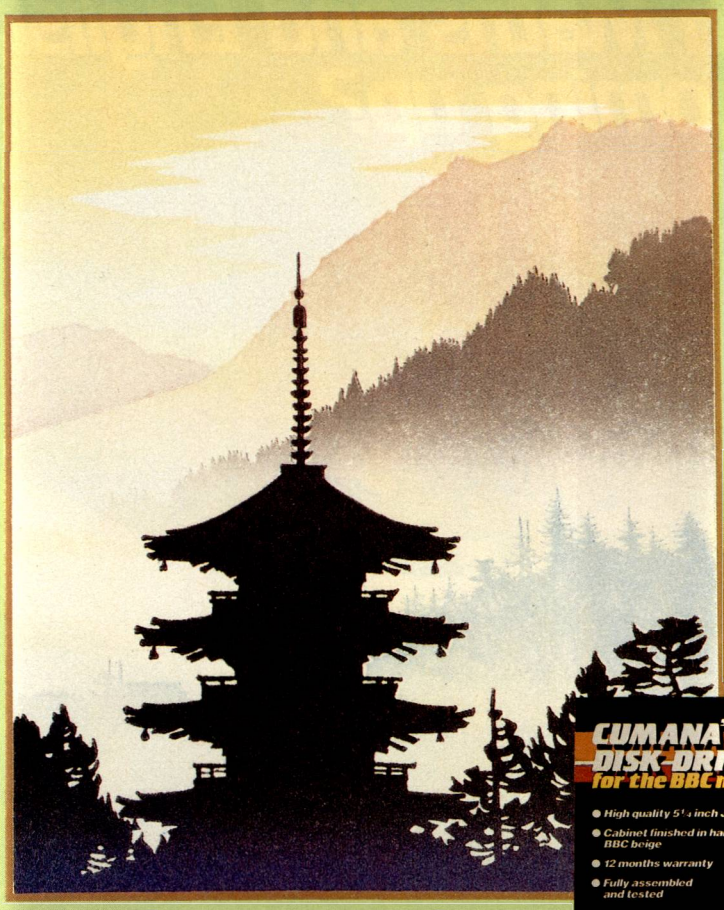
Computer ● Processor: 8086, 8087 (opt) ● Clock: 8 Mhz ● RAM: 128-896 Kb ● Serial I/o: RS-232 ● Parallel I/o: Centronics comp. ● Interfaces: Hard-disk, tape, lightpen ● Fl. disk controller: 8 inch + 5 ¼ inch ● Bufferd Keyboard: 104 keys **Storage** ● Floppy disk: Dual 5¼ inch; 1.5 Mb ● Hard disk – fixed: 5 Mb, 10 Mb **Display** ● Formats: 80 x 25, 64 x 31, 40 x 25 ● Low res. graphics 100 x 160 ● High res. graphics: 786 x 288 (opt) ● Colour: 8 ● Internat. char. sets: 8 softw. selectable.

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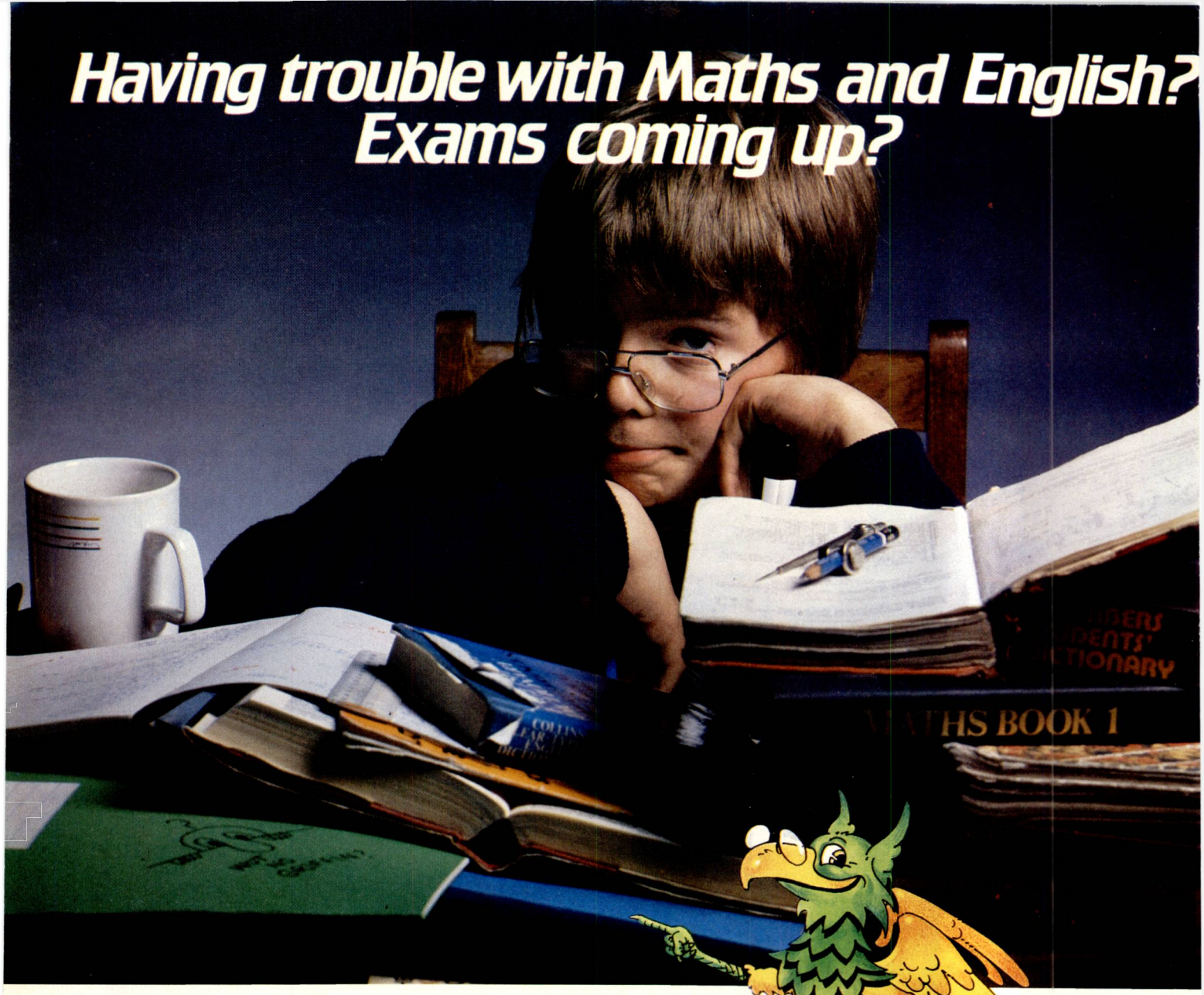
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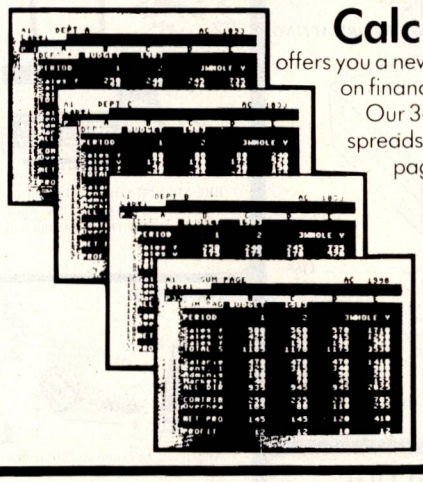
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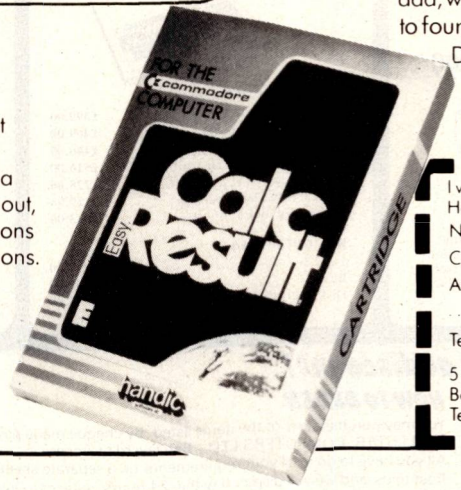
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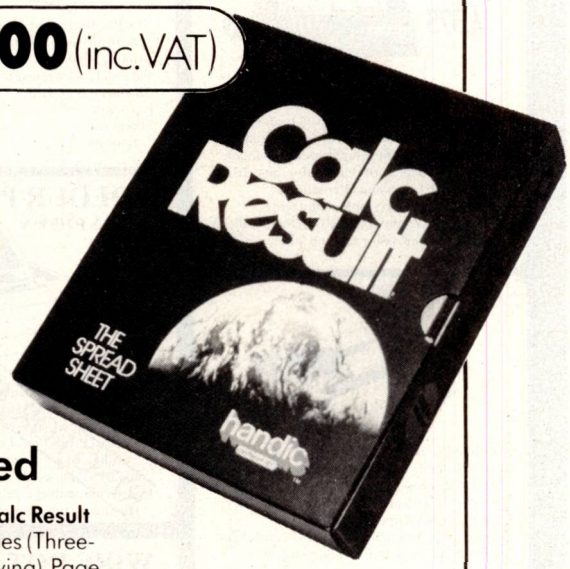
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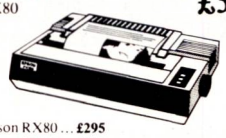
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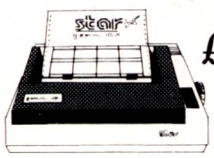
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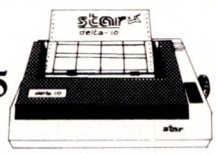
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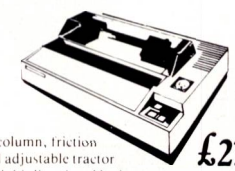
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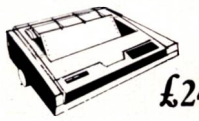
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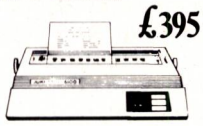


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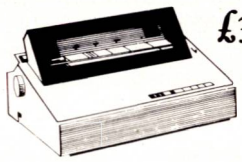
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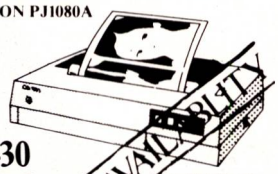


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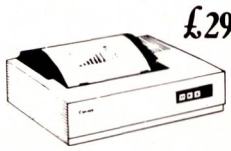
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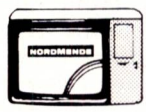
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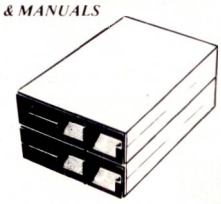
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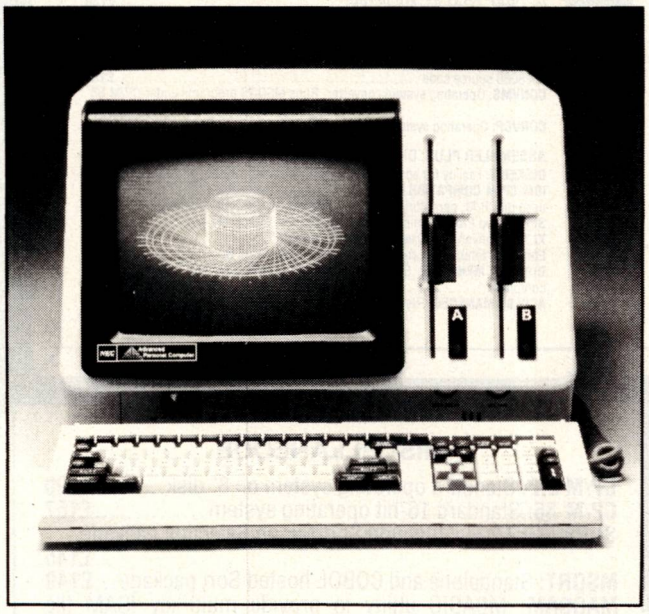
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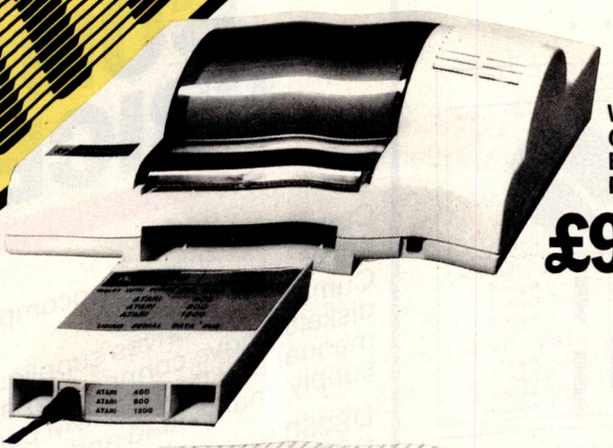
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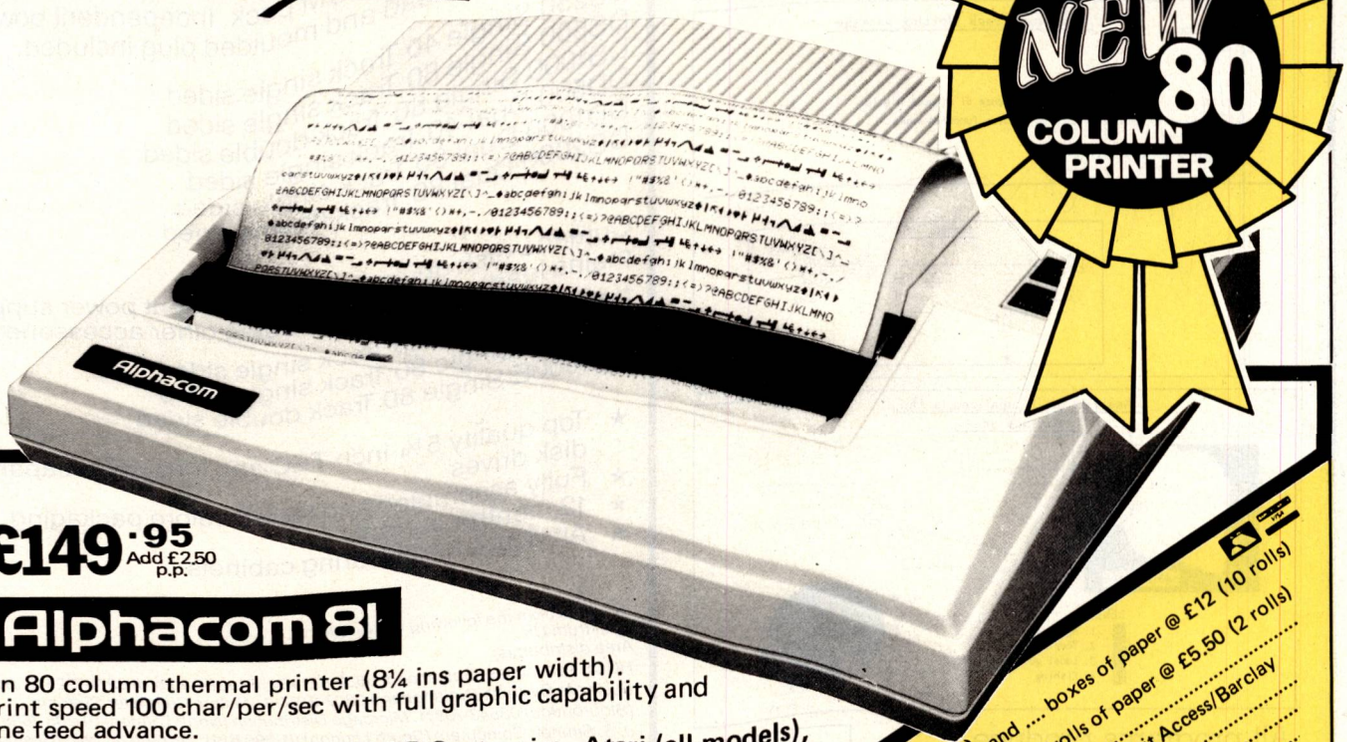


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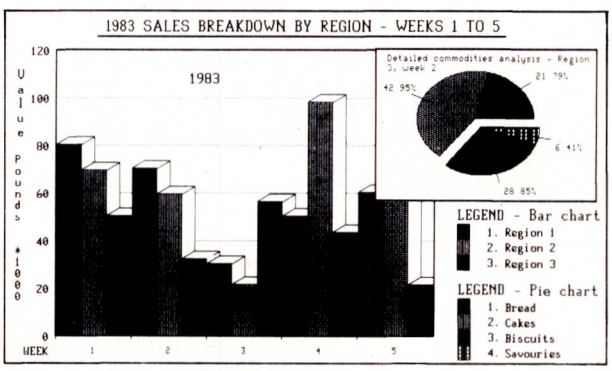
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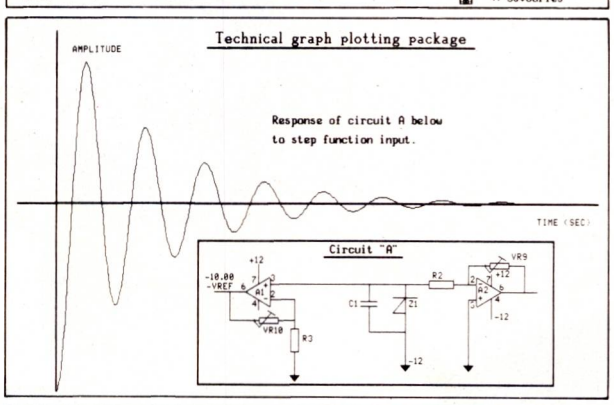
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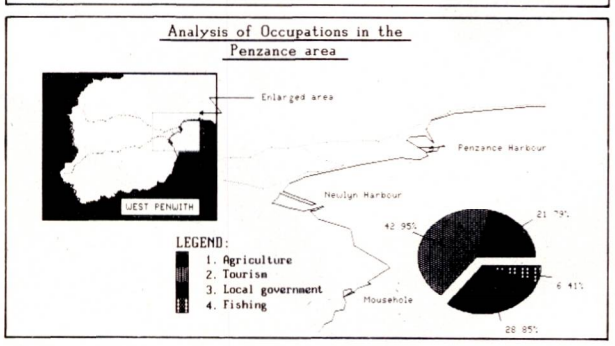
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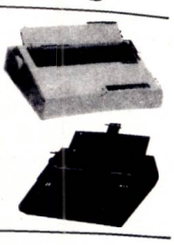
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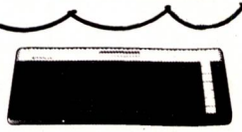
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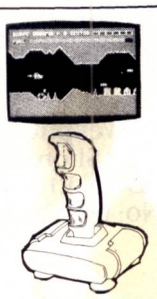
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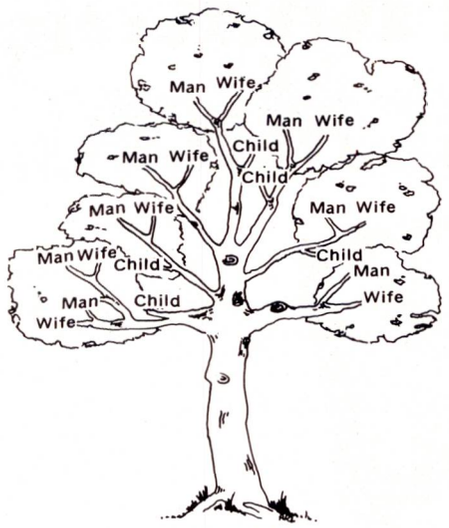
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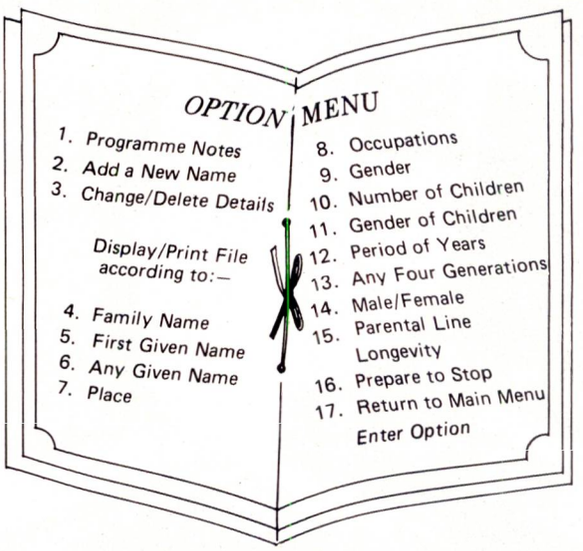
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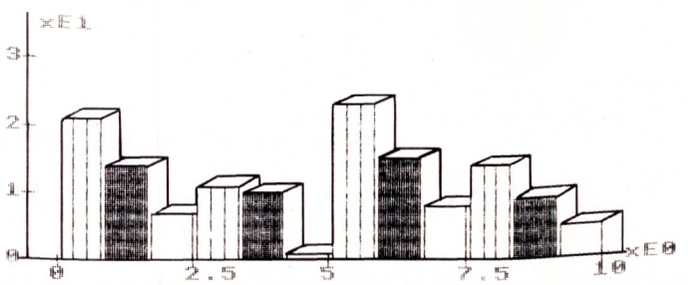
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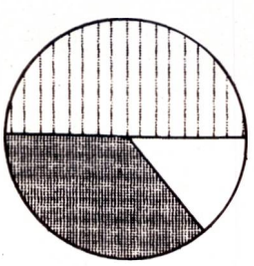


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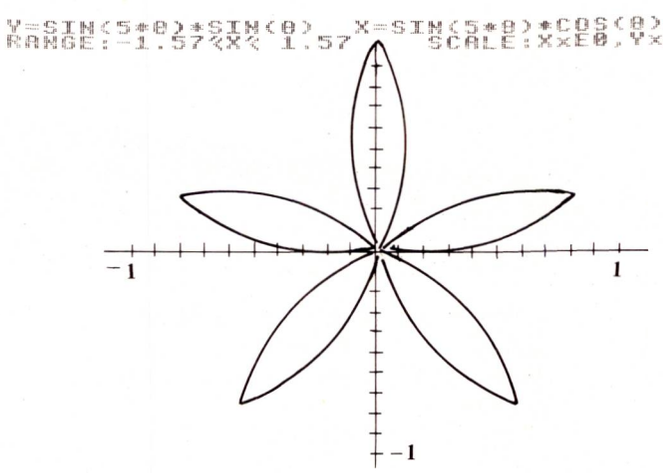
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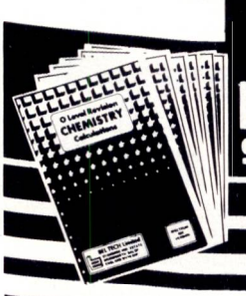
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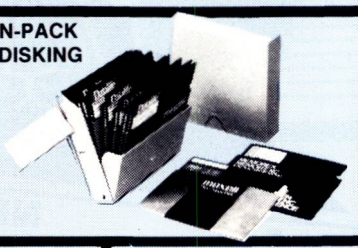
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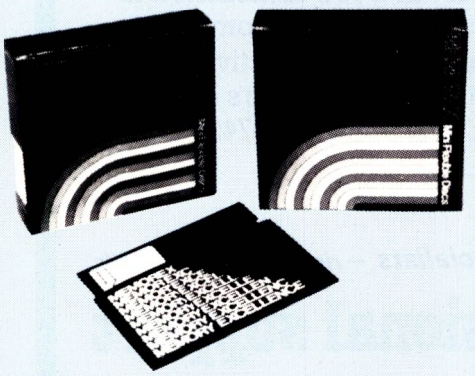
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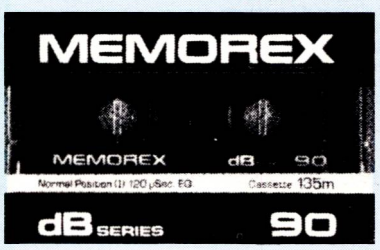


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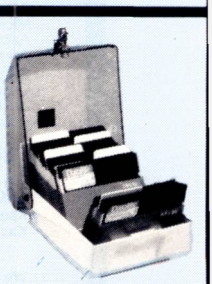
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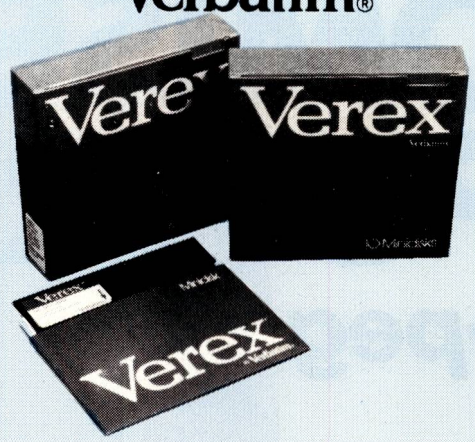
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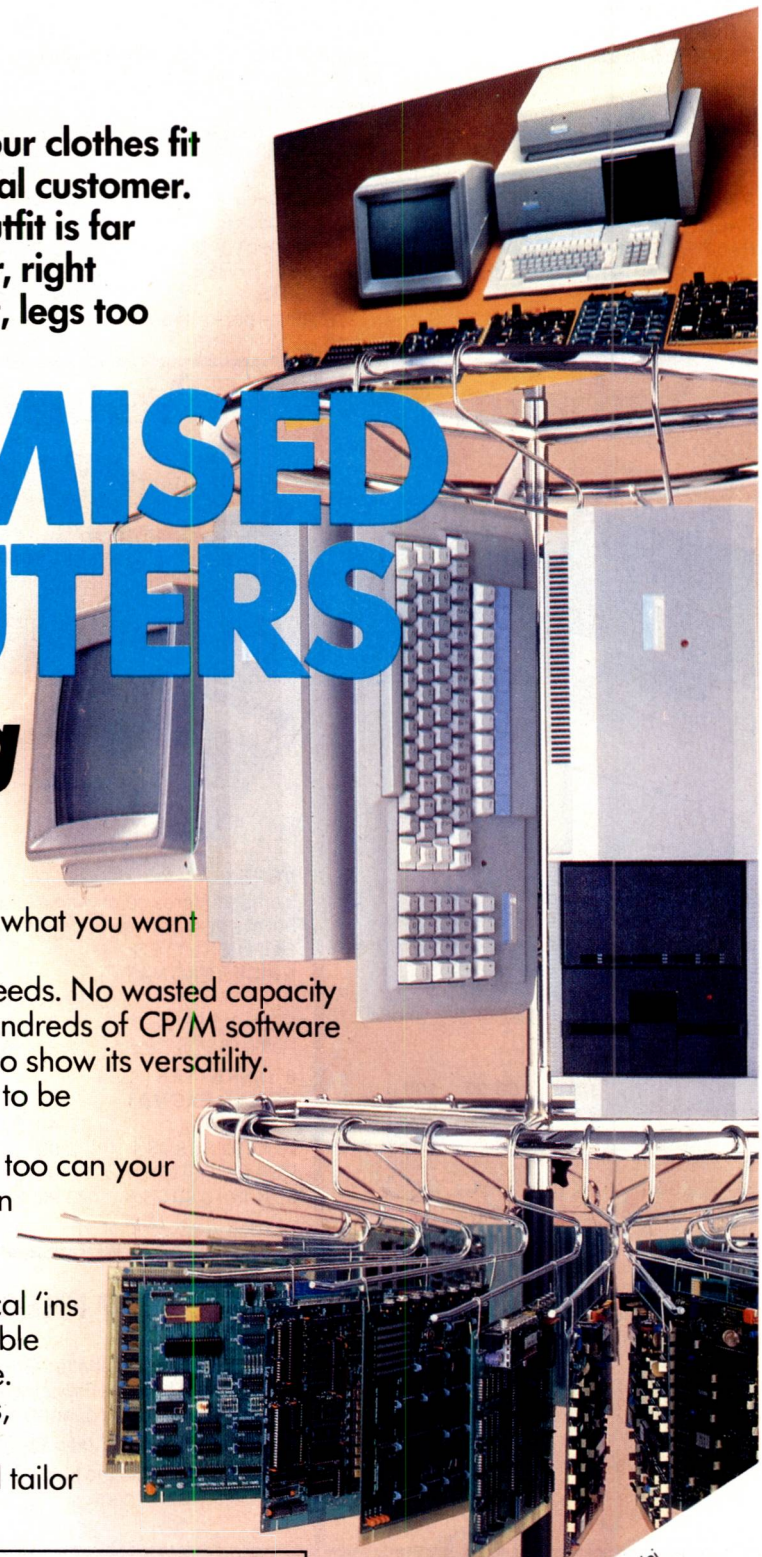
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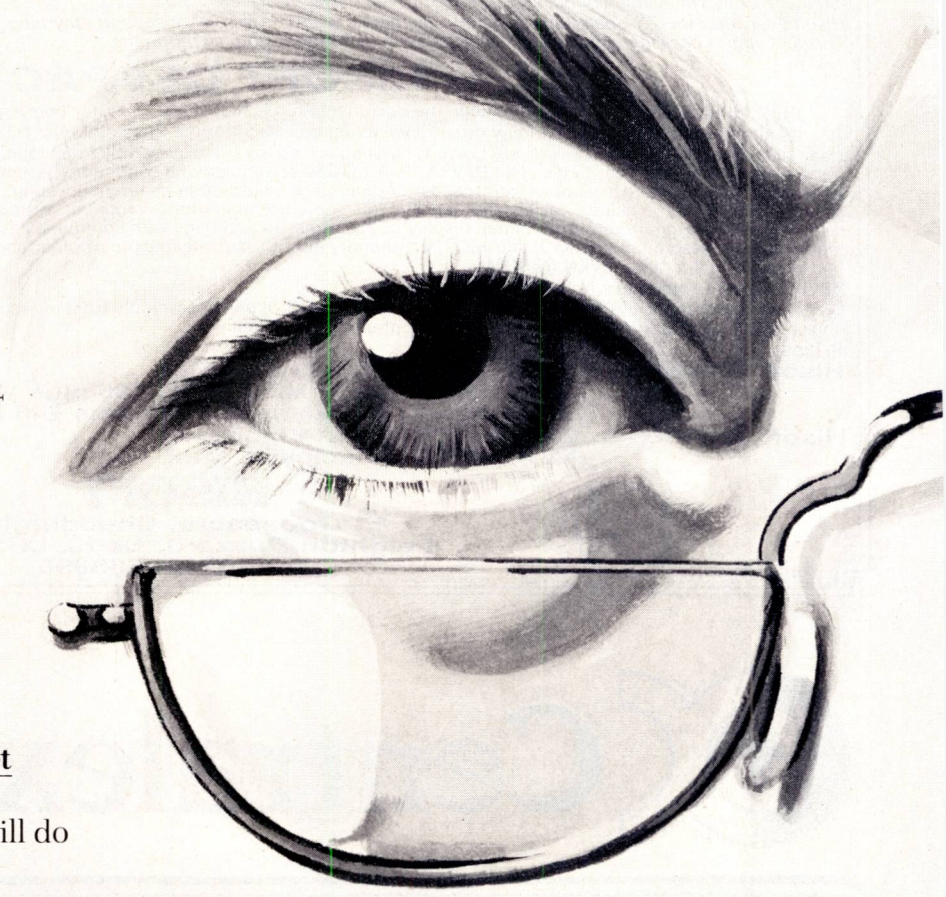
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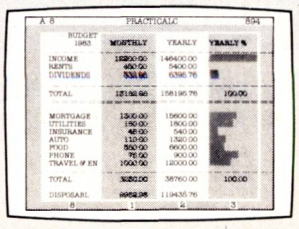
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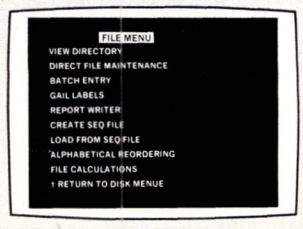
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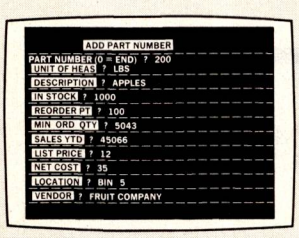
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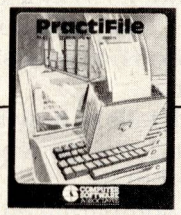
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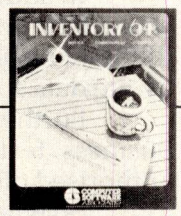
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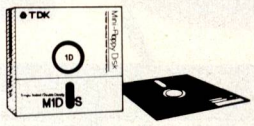
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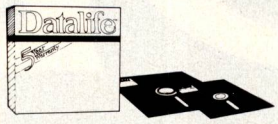
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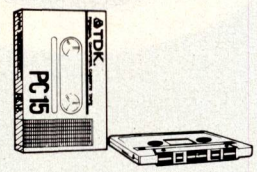
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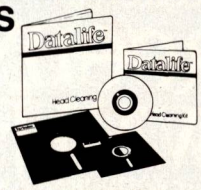
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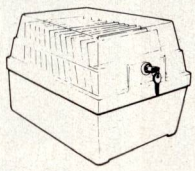


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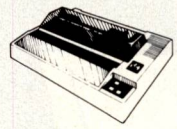
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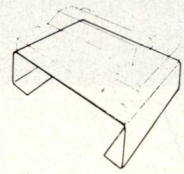
Features:—

Friction and tractor feed as standard
80 c.p.s.
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13 x 9 dot matrix giving true descenders.
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Print sample available on request.

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PRINTER STAND



Suitable for use with dot matrix printers. Lifts printer sufficiently to enable continuous stationery to self-stack. Painted steel unit.
Dimensions: 39cm wide
x 28cm deep
x 10cm high

Comes as package which also contains:—

200 sheets continuous stationery.
1 x 9½'' binder.
1 x highlighter pen.
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PRINTER STAND **£19.95**

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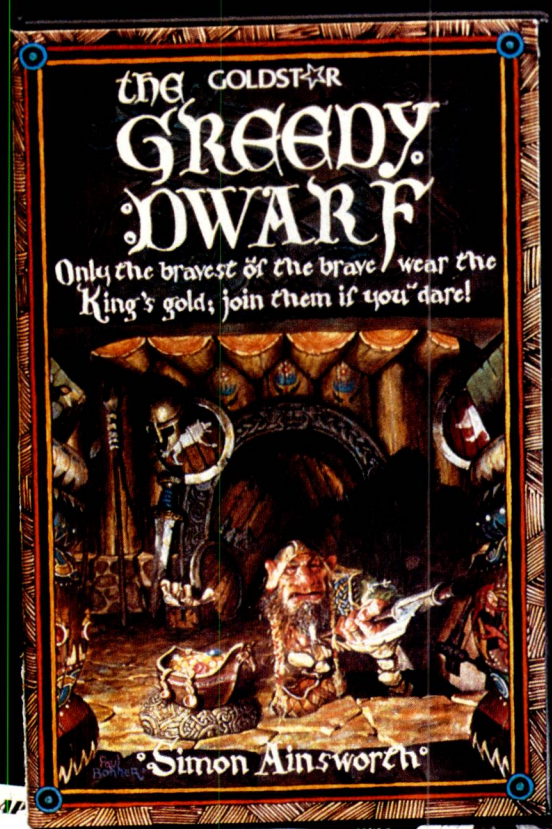
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informative and helpful programs which teach useful, practical skills

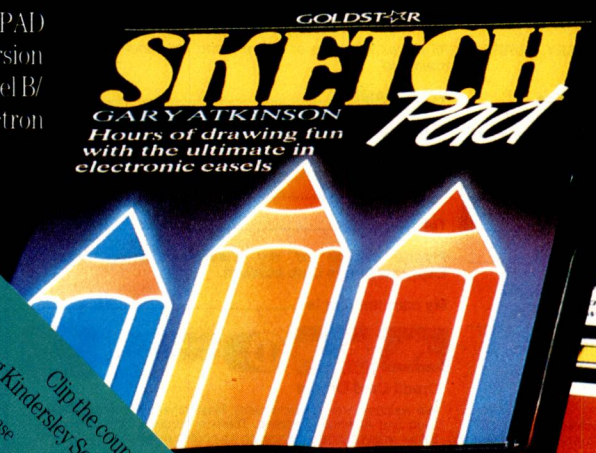
With applications to business and professional purposes as well, this is software which will turn your home computer into an invaluable learning resource.



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cassette version
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Commodore 64,
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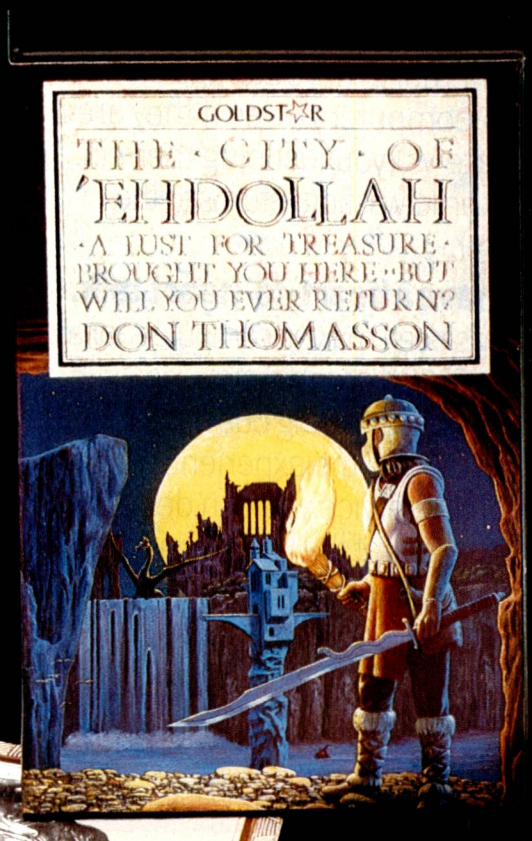
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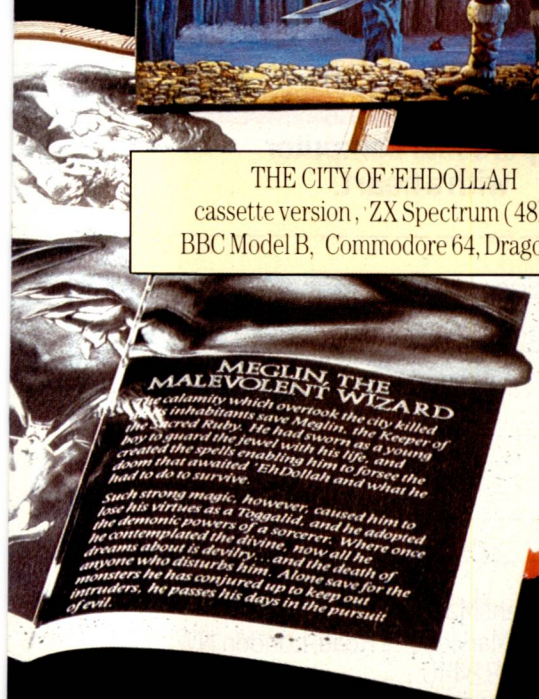
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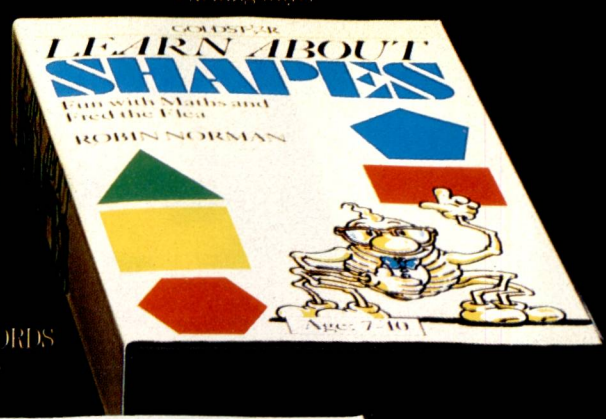


GOLDSTAR EDUCATION

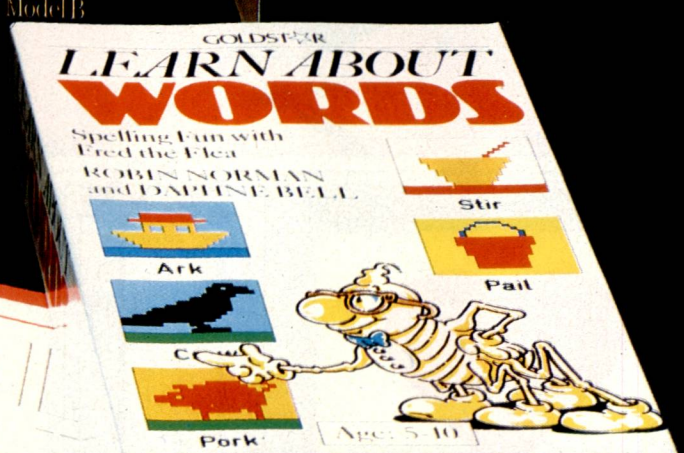
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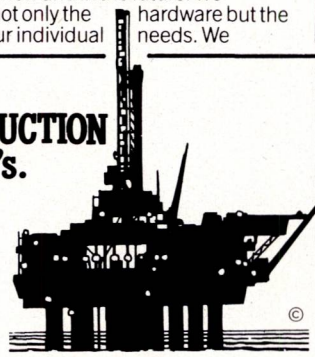
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Getting the right computer

At the Byteshops we've helped countless companies of all sizes improve their efficiency by the introduction of microcomputers. Generally these are required to perform routine business tasks – but, however similar the application, we invariably find that no two customers have *exactly* the same requirements. When you come to the Byteshop, you'll find that we are far more interested in finding out what jobs you require the computer to do both now and in the future. We then tailor a complete system including not only the hardware but the software, and the peripherals to meet your individual needs. We believe this is the only sensible way to sell computers. Many people talk about providing solutions, but it's often painfully evident that the customers problems only begin with a visit to his/her local computer supplier. We don't subscribe to the view that our role ends when we've made a sale or completed an installation. We're totally committed to after sales service and we're always happy to advise you on all aspects of running your systems. We can even help with staff training for example and provide a range of sensible maintenance plans to ensure your systems keep working. On this spread you'll find a number of "Typical Ready To Run" systems which will serve to give you an idea of comparative costs. However we won't sell one to you – unless you force us – without asking a few questions first!

HOW INGERSOL-RAND IMPROVED THEIR PRODUCTION CONTROL WITH IBM PC's.



Playing a key role in exploiting those crucial offshore petroleum and gas resources are Ingersoll-Rand, market leaders in the manufacture of compressors. Although the company employed a mainframe computer to perform routine business tasks such as accounts, an 'excellent' manual system took care of production control. With literally thousands of individual parts involved in each compressor, entailing efficient co-ordination between engineering, purchasing, machine shop and dispatch, this was no mean feat. However it was felt that levels of management reporting and in-depth analysis could be improved, so Ingersoll-Rand, following a recommendation, contacted The Byteshop Manchester. An IBM PC system running Lotus 123 was considered the most suitable choice and according to Ingersoll-Rand's Kevin Ward "we are pleased with the time saving the system has made and also the excellent service we have had from The Byteshop".

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microserve

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At a glance Computer Checklist

	BBC Model B	Act Apricot	IBM PC/XT	Comart Communicator
Colour graphics	●		●	
Multi-user				●
Hard disk storage		●	●	●
Upgradeable				●
Expandable			●	●
Communications	●	●	●	●
Transportable	●	●		
Networking	●		●	●

THE BYTE SHOPS-W ON GETTING THE R

COMART COMMUNICATOR

Exciting news is the arrival of 16 bit single and multi-user Communicator Systems incorporating Digital Research's very latest operating system – Concurrent CP/M. This allows full multi-tasking facilities for up to four different functions supporting up to 8 work stations. You'll also find that Communicators are competitive with the best desk tops as a single-user system, are perfect for companies planning to expand and for multi-users, nothing compares. And the Communicator's modularity means you can add-in extra capacity and add-on storage back-up units to keep pace with your future needs.

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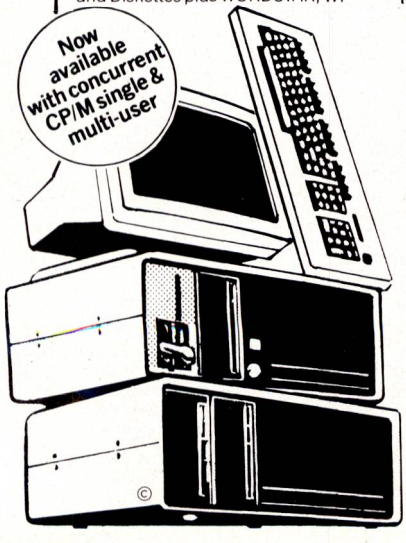
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COMPLETE SYSTEM FROM £1800 PER USER*

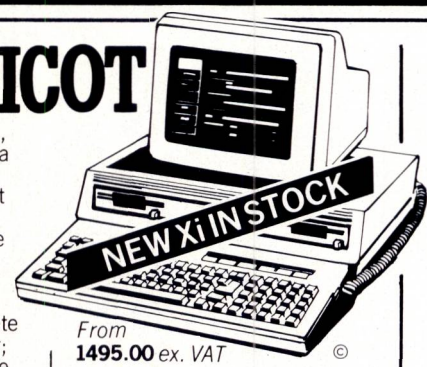
This allows each user to have their own dedicated Z80A processor and 64K b of memory while sharing printer facilities and data from common disk storage. So two users, for example, could be running word processing, one accessing databases, one updating a sales ledger, while the fifth is preparing budgets using a financial planning package.

Communicator CP520 MP 5-user Multi-Processing System .....**5995.00** ex. VAT

* To include 5 × WY50 Display Terminals and all cables.....**9,095.00** ex. VAT



ACT APRICOT



Already an outstanding success, the transportable Apricot offers a comprehensive specification at very low cost, making it a perfect solution for the small businessman. Noteworthy is the 'Microscreen', a two line LCD display with six associated keys on the main keyboard. The Microscreen can display day, date and time; double as a calculator; provide labelling selection; serve as an information entry line or act as a display window when a full monitor is not available. Other features include a 'mouse trap', 256K b memory expandable to 768K b and Sony 3.5" disk drives offering 315K b of storage each. Included in the price are three operating systems MS/DOS 2.0, CP/M-86+, Concurrent CP/M-86 together with Microsoft and Personal BASIC, Supercalc, Superplanner and Asynchronous File Transfer Software.*

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* Subject to availability

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Spotlight Nottingham

Torvill & Dean have recently highlighted some of the latent talents available in Nottingham. Earning a full set of marks for initiative even if not always for technical merit, are the extra curricular activities of the staff at Byteshop, Nottingham. Manager, David Slater's method of relaxation (?) is to renovate houses; Engineer, Clive Davison is into amateur TV and can even transmit his own pictures. The Sales Executives haven't been left behind and Steve Mayes is writing a book about a Nottingham architect; Alan Smith plays hockey and both David Iliffe and Simon Gunn are keen photographers.

If you're not interested in these subjects it's a relief to know that they can all talk enthusiastically and knowledgeably about all facets of microcomputers.

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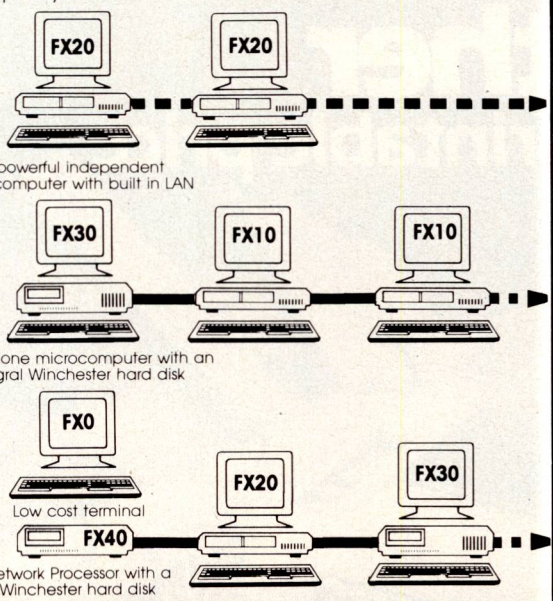
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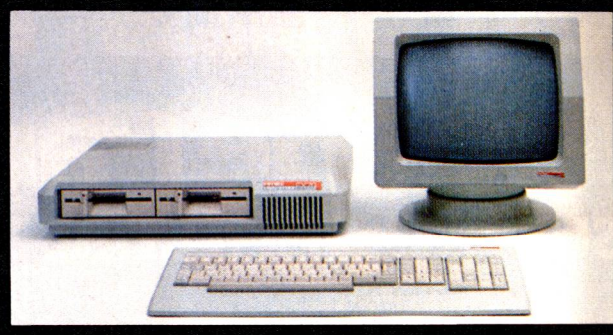
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BENCH MARK TIMING (b)	**21**	55	37
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CP/M86	**INCLUDED**	**INCLUDED**	OPTIONAL
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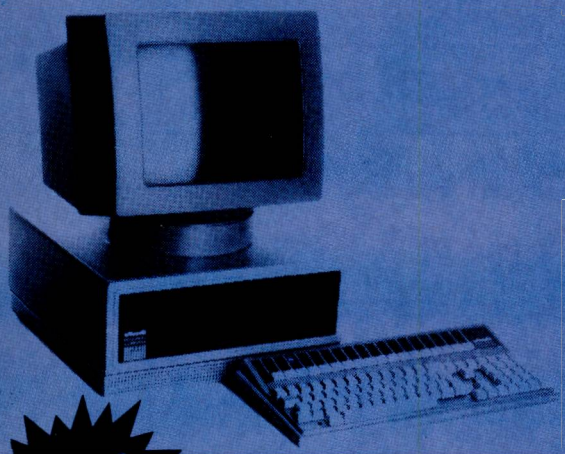
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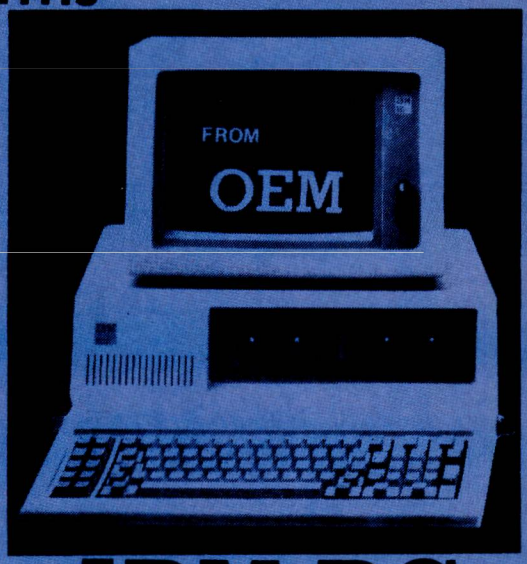
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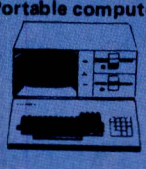
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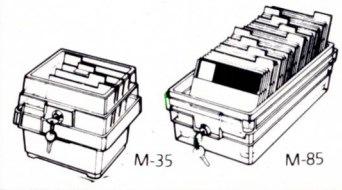
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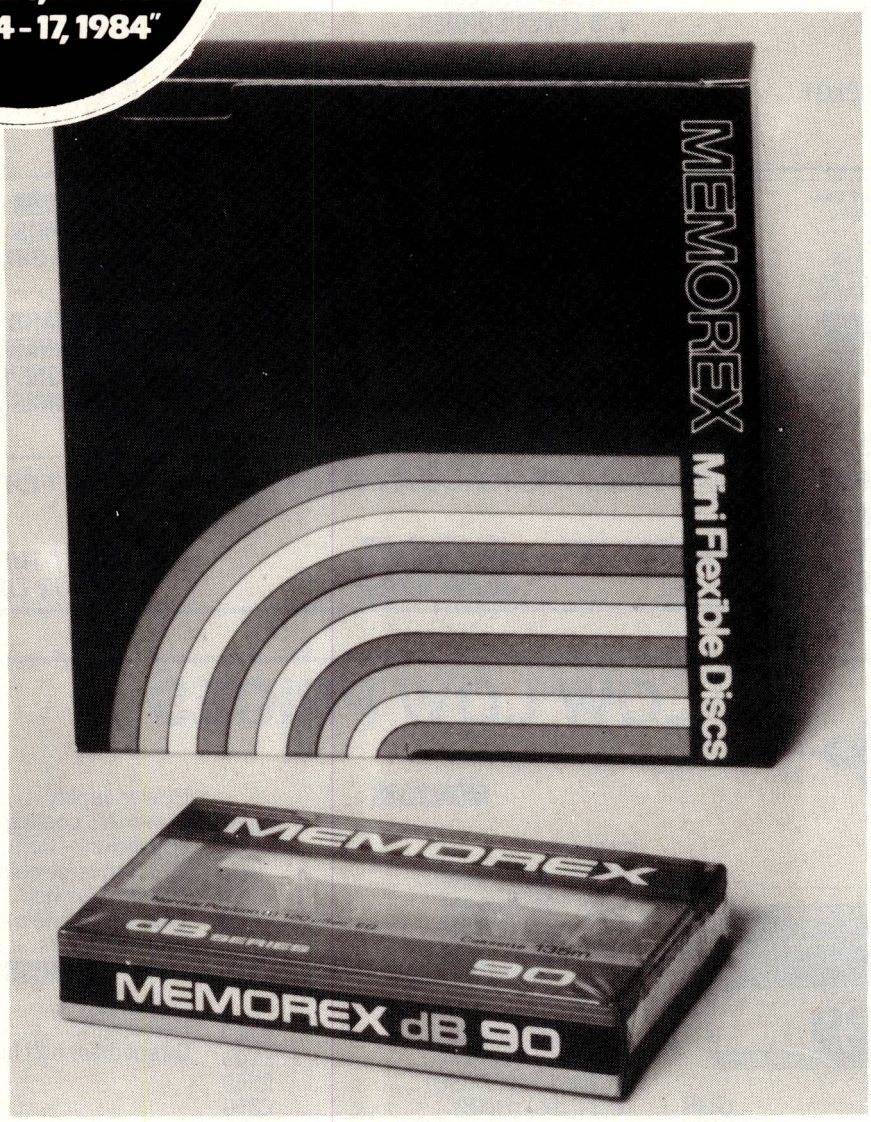
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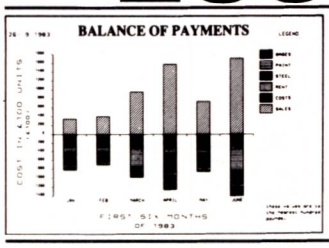
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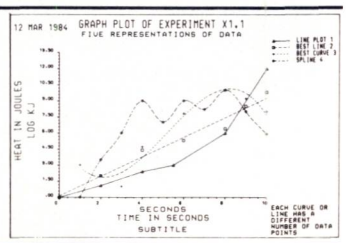


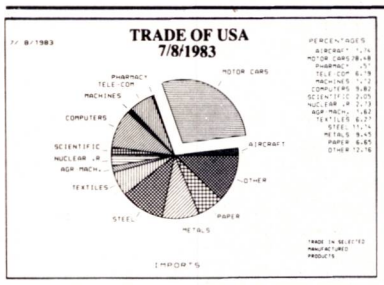
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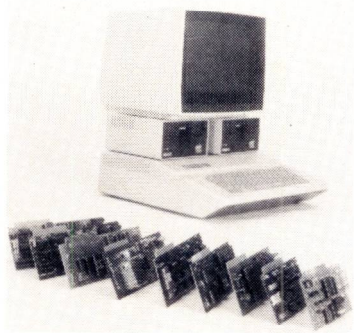
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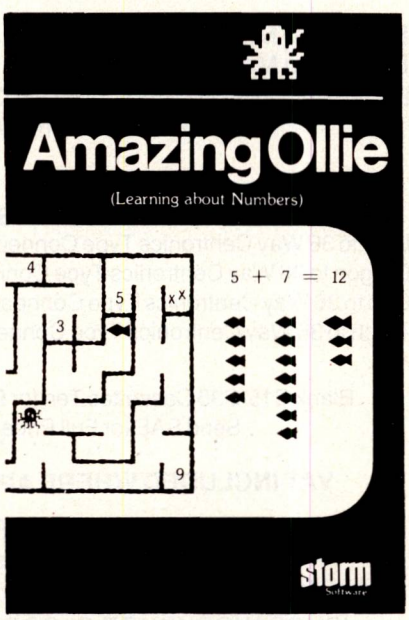
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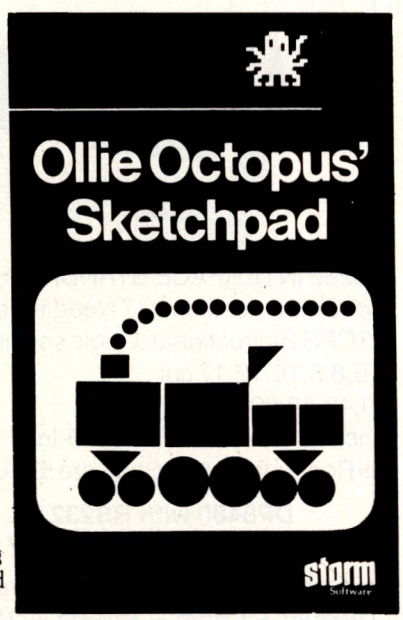
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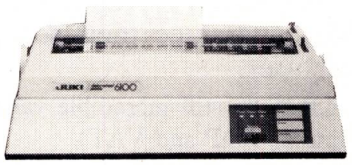
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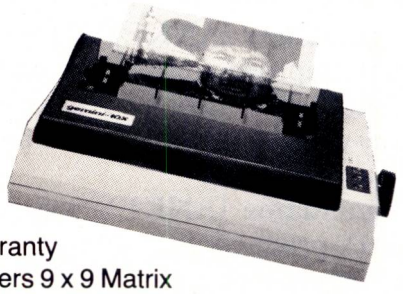


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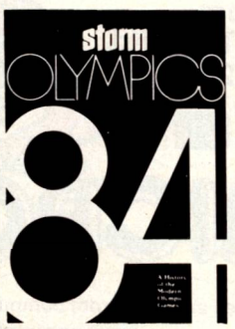
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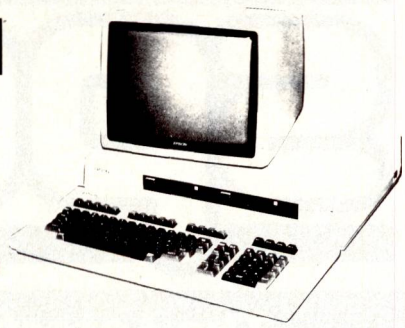
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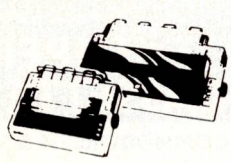
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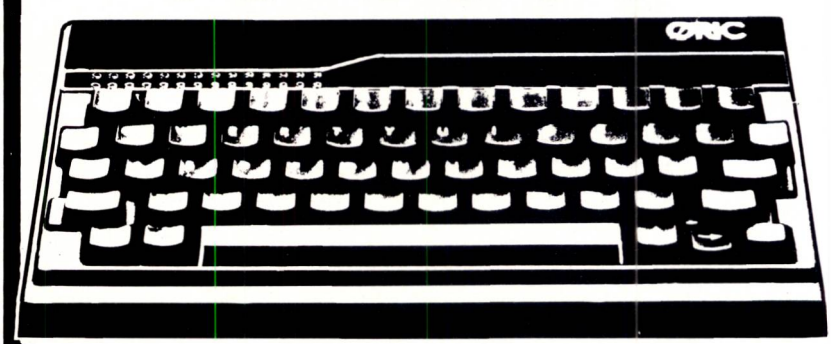
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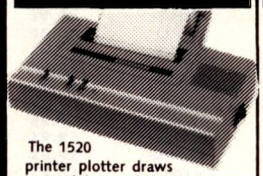
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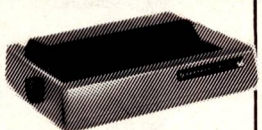
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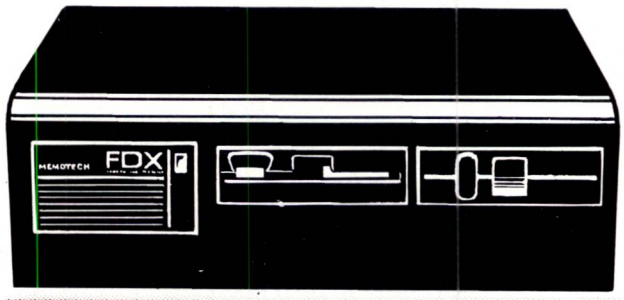


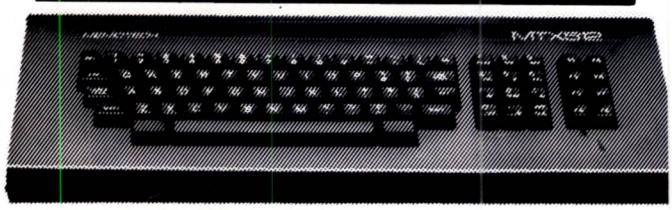
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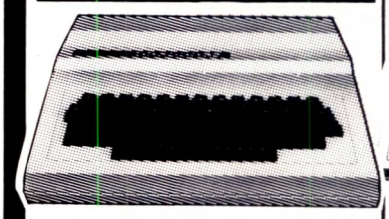
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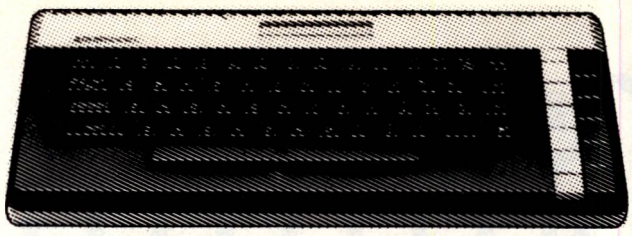
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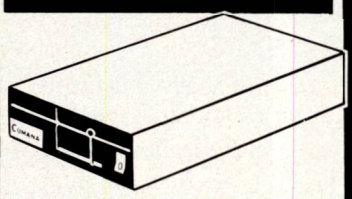
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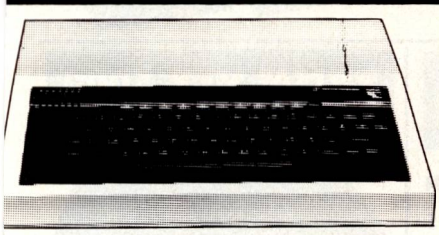
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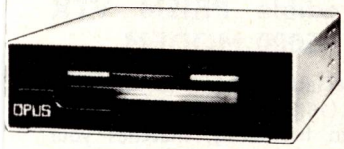
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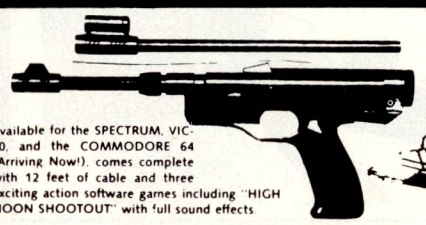
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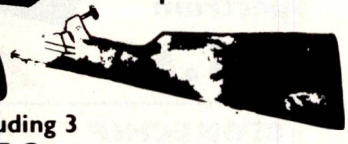
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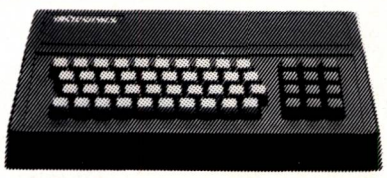
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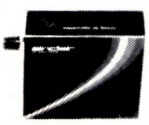
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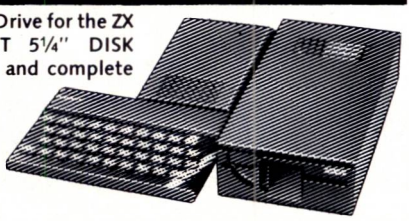
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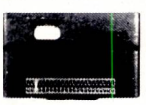
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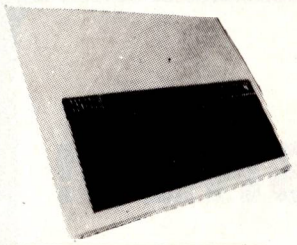
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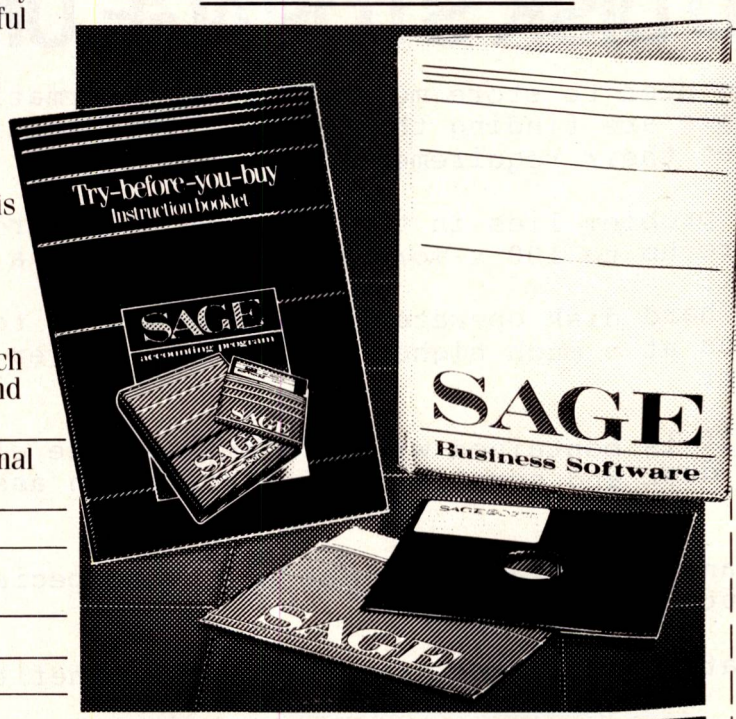
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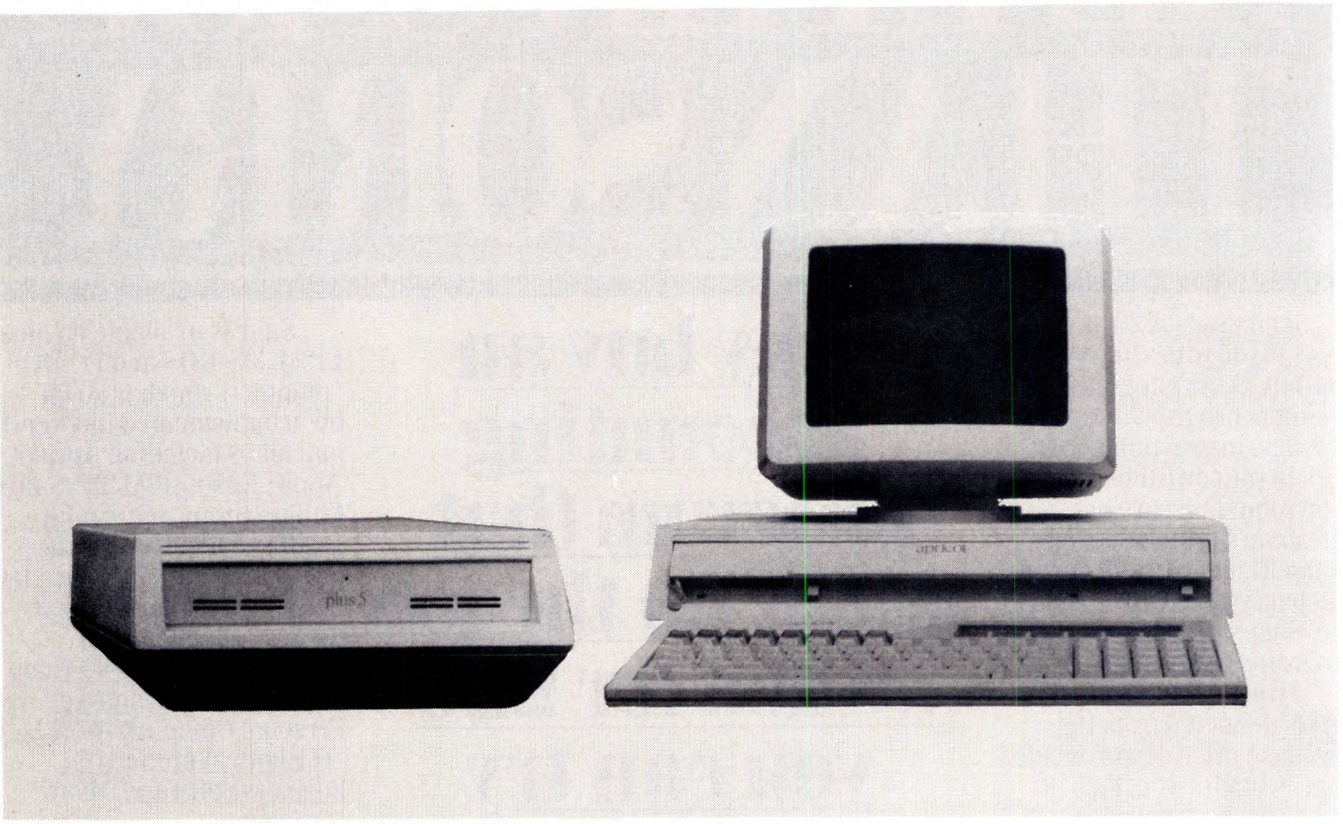
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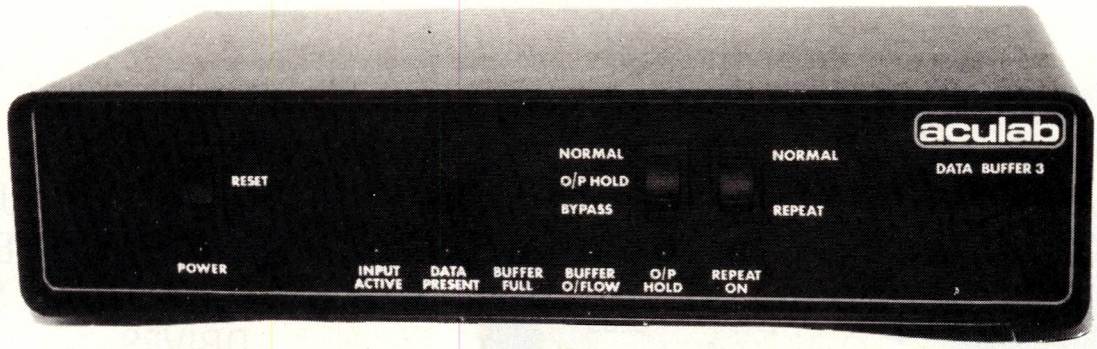
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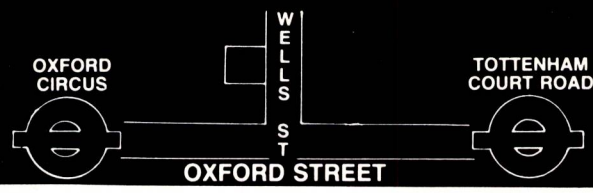
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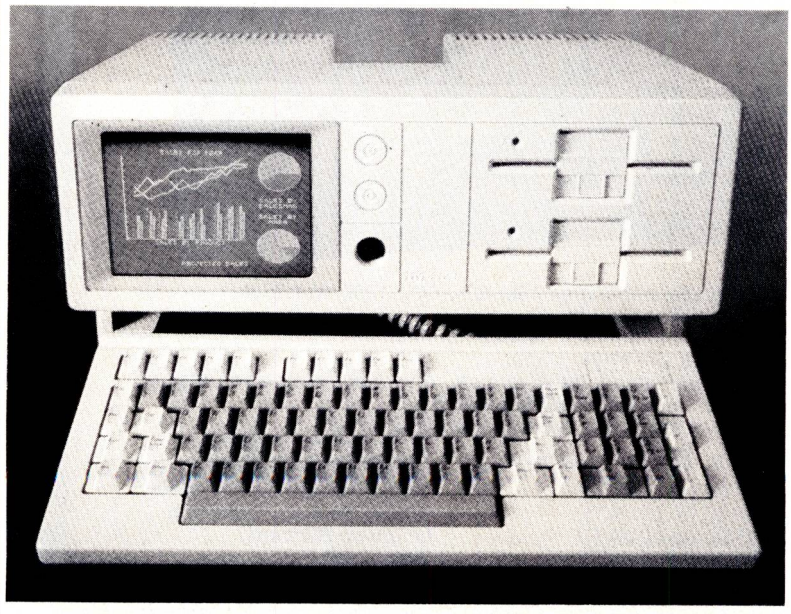
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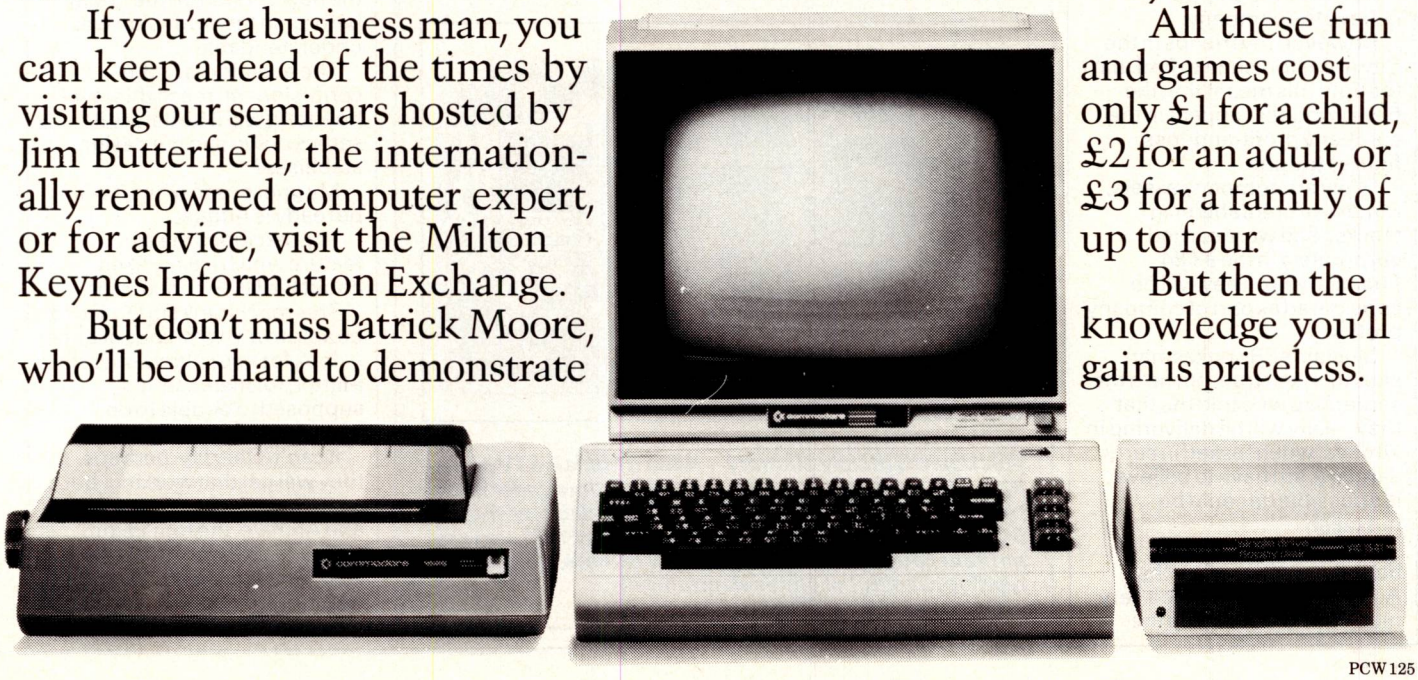
But don't miss Patrick Moore, who'll be on hand to demonstrate the Commodore Astronomy software, and unravel the mysteries of the Universe. He'll also attempt to answer any questions under the sun.

The kids will have fun meeting B.J. the Bear, Gortek, and adventuring in the games arcade.

There's lots more to enjoy, including music from Radio Luxembourg, so be sure not to miss this year's show.

All these fun and games cost only £1 for a child, £2 for an adult, or £3 for a family of up to four.

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PCW 125

NEWSPRINT



Guy Kewney unearths the story behind Sinclair's pre-announcement of the QL and looks at the controversial issues of price control and software piracy. Plus, what's this, Commodore applying for 'Government aid'? It'll be British citizenship next!

Strategy behind QL

Having just spent a day with the QL, I have some advice for anybody who hasn't, but is thinking of parting with money.

Spend a day with a QL first.

Before I explain that in detail, here is a prediction for you to chew on.

First, Sinclair Research is investing heavily in Research and Development. It is expected to put a substantial number of shares onto the Stock Exchange later this year.

Now, when that happens, the amount of money people pay for Sinclair shares will be very much dependent on the profits made by Sinclair Research in the previous year, ending June.

Because the QL was announced in January, with order forms, a number of people have paid their £400 by cheque in advance, in order to get their place in the front of the queue.

That money, amounting to well over a million pounds, and possibly over £10 million, is not paid into Sinclair's bank. It is paid into a 'trust fund' and will not be transferred to Sinclair until deliveries are made, says the company. I believe the company.

However, my friends in the City are astonished to find that I thought this meant that the funds wouldn't appear in the company profit-and-loss figures to June.

'They are company assets,' remarked one dabbler in stocks, 'and were earned corporately in the 83/84 financial year. They will be considered as part of company profits.

Sinclair's PR spokesman says this isn't true, but he's the same chap who told me that they 'really will be delivering in 28 days' when I asked in early January, so I have to believe it's possible he could be mistaken.

It was known, at the beginning of this year, that Apple would announce a very nice machine based on the 68000 processor chip. I did suspect Sinclair of having rather pre-announced the QL, in order to steal Apple's MacIntosh thunder. But there may be more to it than that.

That the QL was pre-announced, and deliberately so, cannot be doubted. Apart from my own personal recollection of Clive, last year, saying that it would be ready for announcement in April, there are other signs.

Too many Sinclair staff, challenged on the defects in the QL today, retreated into comments like 'We did argue against announcing it in January' and 'We would have preferred that it wasn't described as 32-bit,' and 'Users who get the early versions will get free upgrades.'

They'll need the free upgrades. The old saying about 'Never buy a computer you haven't tried in a shop' applies in spades to this one.

The QL has no tape drive. Instead it has Microdrives. By comparison with Microdrives, even Commodore 64 diskettes are fast.

The QL has an operating system, called QDOS. By comparison, CP/M, one of the world's most hated purgatorial experiences, is delightful.

To examine a CP/M document, stored on a disk, you type:
"TYPE CP/M.DOC"

If you get any part of the file name wrong, you have to start again, because Auntie CP/M doesn't like naughty users.

To examine a QDOS document, you have to type:
"COPY MDV1-QDOS-DOC TO SCR"

If you get any part of the command wrong, you have to start again, because Auntie Sinclair doesn't permit errors.

This is a Quantum Leap?

Four of us, all journalists, were driven to Cambridge to see the review QL machines, in the third week of April.

Nearly every feature of the hardware we tried out, bar the network, didn't quite work. The real-time clock didn't work, the Psion software didn't work, the Basic didn't work. Every time something nearly worked, there was a buzz, and the machines reset themselves. Long before time was up, we were queueing, dispiritedly, asking to be taken home. *Why* did they show the thing to us?

Excuses, excuses. 'We have a new version of Quill coming this afternoon.' 'That's an interesting problem, we'll get the systems people to sort it out right away.' 'Oh, yes, it's quite possible, but you still need machine code to set it up.' 'We've decided to call it that in the manual, then they'll have to do it like that in the hardware.' 'Really, we only just got the most recent version of QDOS, and the versions of the applications you have are all the wrong ones.'

As the day wore on, the four of us, locked in a half-built room, became increasingly despondent.

'Let's try to export a file from Archive (the database) to Quill (the text editor),' said one.

The system told him that there were no cartridges in the Microdrives.

That happened quite often.

Everything we tried that actually did work, worked so slowly and unreliably that all one really could do was acknowledge that the system wasn't ready, and wouldn't be ready for some time.

Disappointment must have shown on our faces. Shortly after we returned to London, the phone lines began to hum with messages from Sinclair and Psion, explaining that quite a lot of the things that had plagued us were already sorted out, and it was a 'simple cock-up' and 'you were given the earlier versions of the software, which worked with earlier versions of the QDOS.'

Psion said that it had only got the new version on the Friday before, so the confusion was understandable.

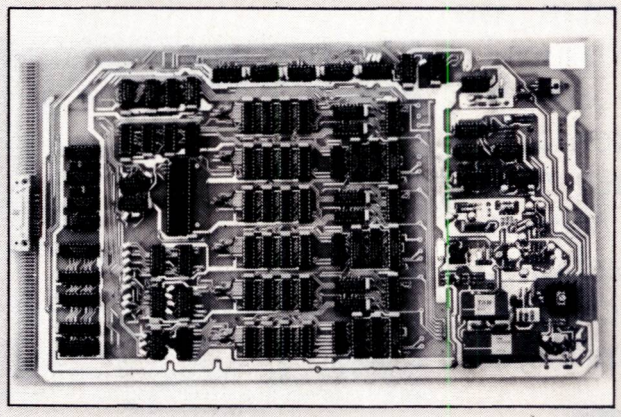
The question is: if the confusion can reach this level, how long will it be before it settles down and the design stabilises?

My guess as to when it will be ready is August.

That excludes the one feature which I really liked about the QL — concurrency.

This machine is supposed to be able to do two things at once — look for your diary, and print a letter, for instance. It's supposed to be able to do twenty things at once.

It can't. One day, perhaps, they will get that working, but not with Quill, Easel, Abacus and Archive, the four Psion business software packages supplied with the system. They don't use relocatable code, and they sit in the same part of



This board is mainly memory — what it holds is a TV picture. It's a picture frame store, developed by Eltime under licence from British Telecom. It stores 512 by 512 pixels, with up to 64 grey levels, which means that for a mere £1275, you can get your computer connected to a TV camera, and start reading car number plates electronically. Details on (0621) 59500.

memory. And there are no plans to change this. If they appear on other machines, as has been rumoured (like Sirius and IBM) they will be concurrent (and faster), but not on the QL.

And concurrency won't work with your own Basic programs, either. One day, perhaps, but the command isn't implemented at the moment. 'It can be done, but you have to set it up with machine code,' said our adviser.

Machine code, yes. Something like a real-time monitor, for example, would be handy. They tend to be written in machine code.

You probably realise that the first people to see a machine are always the couple of hundred trade writers. It's a good way of checking that a design has got beyond prototype, into a production state—ready for a factory to start making.

In an attempt to find out when the final version of the machine would be available, finished, one of our party asked: 'When will review machines be available for us to work on at home?'

The official line, delivered with a straight face, was: 'The users come first.'

I wonder how many people who have signed cheques feel as if they come first. I haven't paid a penny, but I know I feel that I've been had. In a year, maybe, when the machine is finally finished and wonderful, all will be forgiven; for now, the taste is sour. And the news that the £10 RS232 cable has been turned into £15 'free gift' for patient purchasers, by putting its price up to £15, doesn't sweeten it at all.

Consultant Editor David Tebbutt has got hold of the first working QL; see his world exclusive Benchtest on page 170—Ed.

Osborne in paperback

Adam Osborne has changed his mind about resigning the chair of the board of Osborne Computer—but his main activities have moved to his new software company, Paperback Software.

At the West Coast Computer Faire in San Francisco, Osborne announced the new name of his Software Seed Capital Corporation, which is his way of pouring finance into the little companies.

Osborne has considered the software market of the future, and found it too costly. 'Low price, high volume,' is the way he reckons to sell even business software—aiming to have a $40 price tag on the most complex business programs.

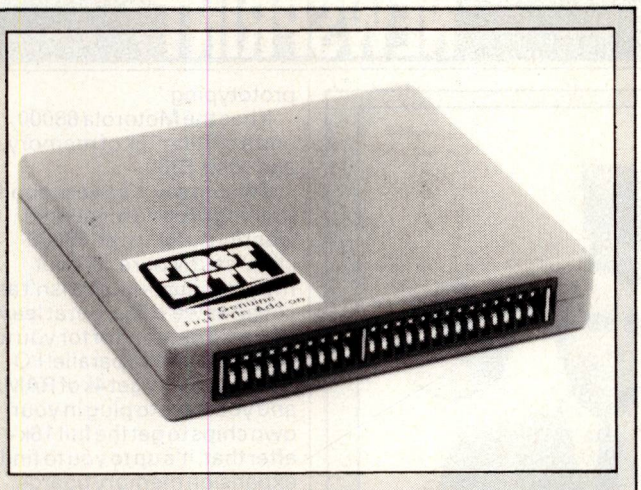
'Initial sales will be through book shops, office equipment supply stores, selected computer stores, and other retail outlets capable of selling books or records,' is his prediction.

In other words, the software salesman need no longer have any deep understanding of the products—just be aware of how many are sold each week, how to display them, and when stocks are running low.

Evaluation of the success of this concept will have to wait until Osborne actually announces some titles. All the things I have seen in his house are pretty ordinary games and business utilities.

However, the basic idea behind it is obviously sound. 'You can get venture capital for a $10 million project,' Osborne told me, 'but not for a $500,000 project. So I'm setting up a $10 million project to finance a whole lot of small guys.'

Actually, he's only raised $500,000 himself, so far, but I understand the principle.



Joysticks for the Electron: from FBC Systems in Derbyshire. No this isn't a joystick: it's a joystick interface. 'At last,' says the company 'an Electron add-on that exists.' Yes, perhaps; but what about software that knows about it? 'FBC has been talking to all major Electron software houses, and they have had pre-production interfaces since January.'

FBC stands for First Byte Computers, and when you see one in the shops, ask what it costs. The press release doesn't give the company's phone number, just a photograph. Maybe it doesn't exist, after all. But it's a nice idea.

More IBM look-alikes reach UK shores

Talking of machines that work like the IBM, the Compaq is now available from a couple of dozen shops, mostly in the London area.

Word is that IBM will very shortly announce its portable PC in the UK.

The one thing you can't get hard information about is: How many machines will either of these have available in the UK?

Rumour says that supplies are short for both models.

The other major manufacturer of look-alike portables is Corona. This is shipping—to Philips, to Wordplex, and to one or two others. I can't even get a rumour on the supply situation on any of these labels.

Olivetti has decided that outside Italy, Europeans will never see sense and buy the M20 range. So it, too, has launched a PC look-alike. It looks heavy, but otherwise OK. And I don't expect to see millions until the end of summer.

In the circumstances, the news that Commodore is launching the Hyperion (with a bigger screen and some important modifications) as a Commodore machine is welcome, and the only question is: which September?

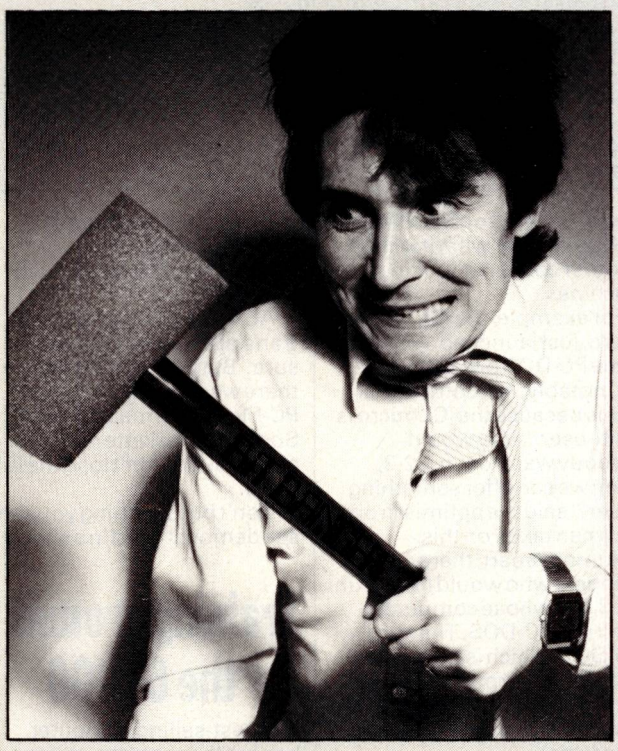
Watch this space.

Concurrent dilemma clarified

We need a little clarity about the abilities of various business machines to run IBM software—particularly under Concurrent-DOS.

Concurrent-DOS is the official new name for Concurrent CP/M and in its latest version it is possible to take an IBM micro, and run programs like Lotus 1-2-3 concurrently with CP/M programs.

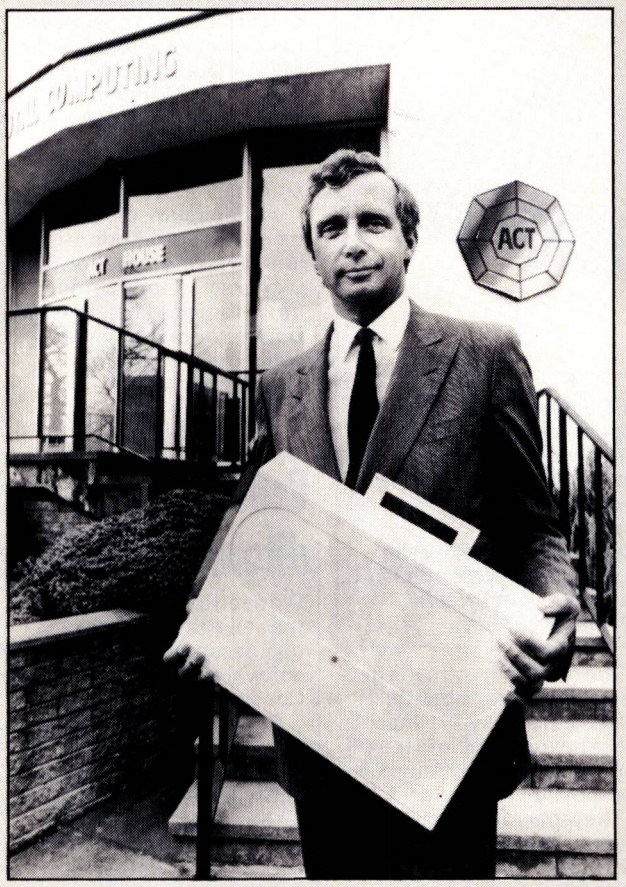
But whereas this PC-mode



'Bit Bangers are compatible with most makes of computers, from sophisticated Cybers to Sinclair's new QL,' claims Gordon Smith, President of WTiC.

It's a foam-headed mallet, to keep in the cupboard next to that foam rubber brick which you throw at the TV set. The theory is that you can vent your fury on the machine without regretting it later.

It's described as 'the newest piece of software coming out of Silicon Valley . . . Phone Brussels—+322673 60 86.



Sober as a judge after the stress of winning so many awards at the British Microcomputing Awards, Roger Foster displays his Apricot in a bid for money.

ACT has announced a rights issue, to raise appoximately £17.2m.

Last time the company did this, everybody heard it was for a new machine, the Apricot.

This time, it is also for a new machine. The company isn't saying, this time, what sort of machine. I hope it's a lap-held one. . .

works very well on the IBM, it isn't quite clear what it will do on other concurrent-using machines.

For example, the ICL 16-bit micro, just launched, will load some PC-DOS programs—but, notably, not Lotus 1-2-3. This is because the ICL micro is multi-user. 'Why would anybody want to run 1-2-3, when we can offer something better?' said the optimist from ICL when taxed on this.

Humour apart, there are lots of people who would like to run 1-2-3, but whose computers don't use PC-DOS. They use MS-DOS, which is the same thing for many purposes, but not from the point of view of Lotus, or many other powerful programs.

Take the Apricot, for instance. If I have Concurrent-DOS on my Apricot, and I want to load (as one of my tasks) 1-2-3, do I have to get a PC version to run under PC-Mode? Or must I find an Apricot MS-DOS version, to run under MS-Mode?

I asked this question of Digital Research, and president John Rowley said 'Yes.' Hm.

ACT's people, asked for a translation, said 'We aren't sure.' But they agreed that there wasn't a lot of point in PC-Mode on a machine with Sony 3.5in diskette drives, since you couldn't load the IBM disks.

Don't buy anything you can't see demonstrated in a shop.

Training ground for the 68000

The best-selling computer book at the moment, says a bookseller friend, is the 68000 programming manual. Everybody has bought one, in the hope of being ready to write code for the QL.

Enter Tim More, head of Kuma, with a 'simple hobbyist lashup we found with our associates, Apollo, for prototyping.'

It has the Motorola 68000, and a piffling 16k of memory, and costs £300.

'I would say it's a very good training ground for people wanting to learn the 68000 chip,' said Moore. 'It's not mass production, so it isn't as cheap as we'd like, but at least there is a 4k monitor for you to control it, and 24 parallel I/O lines. You only get 4k of RAM, and you have to plug in your own chips to get the full 16k—after that, it's up to you to find expansion memory boards.'

Moore describes the 68000 as 'very fierce' and says that he does indeed do some software prototyping with the Apollo board. 'We do our serious work on a Sage—but that costs upwards of £3600. The Apollo is very useful indeed for people who want to learn the habits of the new chip.'

Note that you need to have a micro of your own with software to make it emulate a dumb terminal. The Apollo board has no screen, just an RS232 interface.

Details on (07357) 4335.

KGB moving in for 'swap'

An insight into second-hand prices of computers: Superbrain specialist KGB Micros in Slough is offering £400 or even £500 for each used Superbrain traded in on its new Sanyo or Sirius micros.

'It's for spare parts for customers with Superbrains,' said Sandy Sanderson, quizzed about the deal. 'Spares are available from Intertec, but they take an inordinate time to get here, and are expensive.'

Sanderson, head of KGB, reckons he can sell them, refurbished, for £700 or £800.

But if you have one, a Sanyo 550 will cost you £376 in part exchange.

And every week, word reaches me of people building new designs of traditional CP/M micros almost half as nice as the old Superbrain, for a mere three times the cost. . .

Commodore challenges Micronet

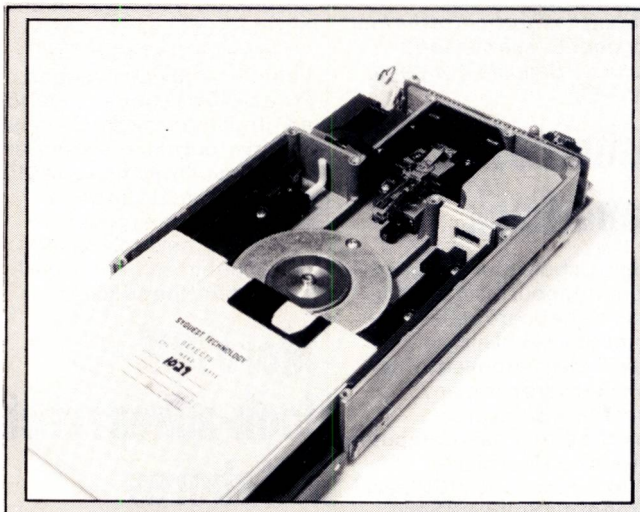
Commodore has deliberately stayed aloof from the Prestel-based Micronet: now it becomes clear that there was indeed a rival plan behind its stand-offishness.

The rival system will be called Compunet, and will be Prestel-compatible in the sense that Prestel-style modems will be provided.

Commodore is currently stockpiling these modems, which can (it claims) be used for logging onto Prestel and to Micronet, providing the user has a membership number and pays the membership fee.

But Commodore's club will not have a fee—or only a small one. Instead, it will provide an online database, and users will pay for the amount of traffic they put on the net.

Commodore marketing boss, John Baxter, sounded



Syquest has taken an awfully long time to get this removable 'winchester' storage onto the market. The company uses specially hardened disks to make sure that if dust gets between head and magnetic surface, it doesn't wipe out data. Storage is around five megabytes, the drive costs under £700, and UK enquiries go to HAL Computers on (0252) 517175.

IN 1965 IT WOULD HAVE FILLED A HOUSE...

distressed when I queried him about this. 'Oh, that really shouldn't have been allowed to leak out,' he protested. 'We don't want to announce it until we've run a trial, a pilot project.'

Ideas which (my sources say) are to be included are: electronic mail, local call access for most UK population centres, and gateways to other networks, like Telecom Gold.

'All those things are possible, but not decided,' said Baxter.

The service will be provided on mainframe computers, by a bureau company called ADP Network Services.

I understand the pilot is now running, and Baxter is not anxious to be plagued by people who think they have something vital to contribute to the project.

The eventual launch, of course, will be in September or later, but definitely this year, says Baxter.

Not a chance...

A passing comment on the ComputerLand piece (see 'ComputerLand planning UK strategy'): the ComputerLand people have now set up their own UK dealer network.

James Minotto, president of ComputerLand Europe until he left recently, and Brian Allmey, previously managing directory of a franchise, have founded Interface Network (shops called Interface Centres) with the brand new Compaq as the star product.

No IBM, I note. Texas Instruments, yes, but IBM, no. Ah, well, and no Apricot either. No MacIntosh...

Government prejudice?

Commodore probably feels a little piqued by the two-handed way Government money is handed out and is withheld from the company.

Because Commodore is not British, it doesn't qualify for consideration as a BBC Microcomputer Mk II. (Actually, that's just an excuse. You can't get much more British than Sir Clive Sinclair, and he doesn't qualify, either.)

But because it is setting up a factory, and becoming British, it qualifies for massive Government and EEC aid in setting up production in Corby.

Total cost of the Corby venture, where Commodore expects to make 350,000 machines a month (mostly from kits from the US) is estimated at £20m. Some estimates put the various official contributions at around 40 per cent to 50 per cent of that total — funds at Commodore's disposal include such strange things as a loan at 5 per cent below normal rates, through the European Steel and Coal Community — because Corby is a steel town without steel. And Commodore doesn't pay rates there, for another seven years.

It's the schools business that Commodore really, truly, wants. And that, despite the money available from the Government to build the factory, is not available to Commodore.

It has had to subsidise its schools push itself, where Acorn, RML and Sinclair have had the option of subsidies.

The irony of it all is that schools are the one area where Commodore UK has been permitted to cut prices. The head office has firmly vetoed any price cuts 'for the foreseeable future' (in Commodore, that means three months) on the 64.

So the cash to offer half-price 64s to schools has had to come from UK profits, not the Education Department.

I guess it'll just about manage with the Corby money.



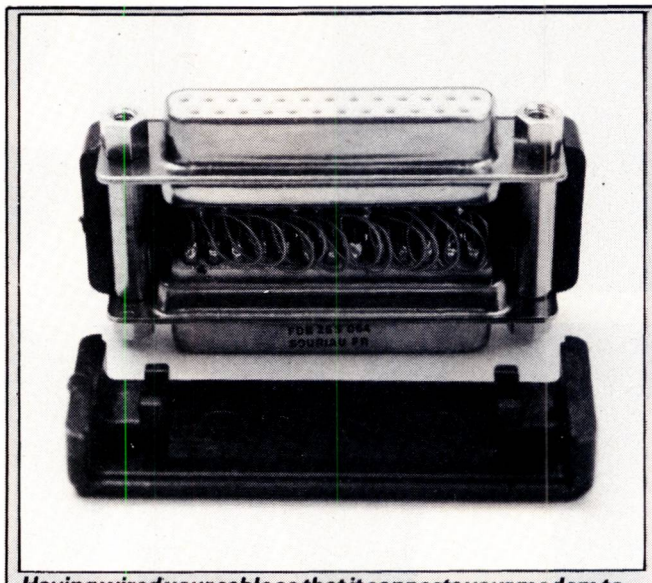
This is the ICL microcomputer — 16-bit — which delightfully illustrates the limitations on 'terminals' as opposed to 'computers'.

This machine uses Digital Research's Concurrent-DOS, but has a multi-user version. So two people can connect the nice new ICL colour terminals to one 16-bit processor, and share files, and each can also run more than one application at a time.

As everything that appears on the screen has to be prepared inside the computer, then fed as 'screen data' into the terminal, fast programs, treating the screen as an integral part of their memory, won't run.

ICL says that this doesn't matter because the programs concerned — notably Lotus 1-2-3 — aren't as good as other spreadsheets, word processors and databases which you can run concurrently on its micro.

But since the IBM micro is the world's best-selling business system, and something like half its sales are attributed to people wanting to run Lotus 1-2-3, I am prepared to record my disagreement with this theory.



Having wired your cable so that it connects your modem to your own computer, you find that you need a separate cable to connect the modem to your boss's machine.

Alternatively, you get this piggy-back adaptor, with the wires changed round inside.

You can also get ones that convert female (socket) connectors into male (plug) connectors, and so on.

Details on (0734) 884825 from Cableforms & Connectors.

ComputerLand planning UK strategy

Once again, 'ComputerLand, the world's largest retailer of personal computers, has announced aggressive plans for a network of stores in the UK.'

The quote is from ComputerLand's International Division, not the highly successful US franchised shop operation. It recalls almost precisely what the company said when it started up in this country two years ago.

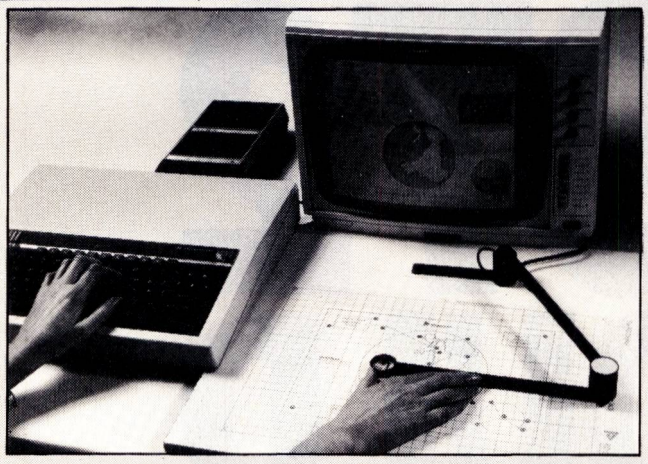
The power of ComputerLand lay in the fact that it had the Apple franchise, and just when Apple fired it, it got the IBM franchise. A year ago, you could plot sales of American micro stores, and it was obvious that ComputerLand had done pretty well on the exchange. It was selling half the computers sold there.

'Our progress in the UK was retarded by two factors,' remarked Michael McConnell, president of International. 'First, we spent several years obtaining clear entitlement to the use of our name. Then we made the mistake of contracting, for our first store, with a franchise company whose plans eventually turned

IN 1972 IT WOULD HAVE FILLED A ROOM...

out to be inconsistent with our own.'

Excuses, excuses. ComputerLand didn't have an enormous network of shops, and it didn't have a clear market leader to sell. Until it does, I doubt whether it will dominate UK retailing.



Getting a map into a computer graphics program isn't easy, without a tracer. This is true of most graphics applications, and so RD Laboratories has sold (it says) thousands of tracers for Spectrum users, and now has produced a version for the BBC Micro.

It costs £70, including software. If you order, and you want to use it on a disk system, make sure you specify disk-compatible software. Both diskette and tape versions are supplied on tape, but the disk version alone can be transferred to disk.

Details on (06333) 74333.

GoSH! That's no way to prevent piracy

There is no doubt that the Mafia, or some UK equivalent, is involved in duplicating games software.

Evidence from Imagine Software is that, in some cases, there are many times more copies made by organised criminals, than are actually made by them.

'We had one product which got to Number Four in the charts, which had only sold 2000 cassettes,' commented Bruce Everiss at Imagine. 'A lot more than 2000 were stolen from our warehouse, and the duplicates eventually showed up in most legitimate stores, having been fed into the distribution chain. We can't find out where. We had great trouble distinguishing between our tapes and the fakes.'

While tapes cost 40p and can be sold for £10, organised crime will continue to plunder this market. Imagine's first attempt to fight this was to cut prices to £3 or below. There was an outcry from rivals, who said that most small independent houses would go bust if they had to match it. Imagine raised prices again.

The company has a serious problem.

The Guild of Software Houses (GoSH), however, is gradually working towards the 'King Herod' solution to piracy: anything which could conceivably contribute to the copying of programs should be eradicated.

One of its members forwarded a letter (anonymous) from an Irish correspondent, who attacked the 'user groups' listings in the end of *PCW* as a source of piracy.

This correspondent informed the software company that a Dragon 'user group' in Belfast was advertising copied programs openly, charged no membership fee, and held no meetings. It was, he said, purely a marketing outfit which obtained software — in some cases, by writing reviews of the programs — and copying the tapes.

The solutions to this problem aren't easy: the suggestion of the writer was that they could all be by-passed, simply by eliminating the user group listings.

Now GoSH has written to *PCW* suggesting that 'magazines can assist in restricting the threat of illicit copying, by adopting a responsible attitude in the acceptance of advertisements which may be considered against the best interests of the industry.'

The phrase 'may be considered' should, of course, be replaced with the more candid 'which we at GoSH consider' to be bad for the industry.

My own considered opinion is that copying is a problem. But to pretend that amateur users are responsible for a situation where there are 10 copies for every program sold, and that prevention of this copying will increase turnover of GoSH members, is daft.

As long as software houses try to prevent people making 'safety' copies of their own programs, for their own use, people selling program-copy machines or software have a legitimate product to sell.

As long as there are genuine user groups, we have a duty, almost, to report who they are.

Who can doubt that: 'It is time for the press to be seen to act in a creditable manner, and support this campaign to eradicate piracy?'

Well, the two don't necessarily go together. As long as organised crime is the problem, attacking the user-made copies by suppressing advertising in magazines is not going to help.

I'll add a little opinion entirely of my own.

As a part-time software reviewer, I have a lot of programs, some of which I run from time to time, none of which (naturally) I paid for. Most people who 'borrow' programs, have a similar library of games.

It is very important to understand that *under no circumstances at all would I have bought these programs*, which are ordinary, quickly become boring, and cost too much anyway. The same applies to my 'borrowing' friends.

If GoSH doesn't want to take on the Mafia, I quite understand that. But going home and kicking the cat, by abusing the program-swap habits of the schoolchild with £5 pocket money a month, is not going to get the pocket money allocation increased, and won't add to the money earned by software houses.

And trying to use moral blackmail on me by urging me to 'behave in a creditable manner' isn't going to be a very effective tactic, either.

Think again, GoSH.

The prince and the hawk

Slightly cheaper than a Sage, but with the same chip, a business-aimed 68000 micro has been launched by the renewed minicomputer company, Digico, under the Hawk name.

Digico spent a decade or so being the British Data General, and not finding the part a well-cast one, before dying. It was taken over by Centreway, and now sells micros, with an ordinary Z80 system costing



Unix is (as we all know) a standard operating system. This means that you can just take a Unix program, and run it on any computer with Unix. That's why this Unicorn, from Torch, has now been featured in a contract with Tamsys' subsidiary, Pipeline, which will 'pre-configure' its software for the Unicorn. (The Unicorn, by the way, is a 68000 add-on for the BBC Micro, costing under £2900 'making it the cheapest Unix system in the world.')

No, I know it doesn't make sense, but that's what it says in the press release.

Details on (07535) 57647 from Pipeline.

IN 1978 IT WOULD HAVE FITTED IN A CAR...

£1500, the lowest cost 68000 system fetching £2700. Prices rise to the £6500 mark for multi-user systems with MS-DOS running on an 8088 chip together with Xenix and CP/M 68k.

The Digico name was last seen on a machine called the Prince, which the new owners say they are happy to be burying. Ian Lenagan was quoted as saying: 'The Prince was all wrong, it was ugly, had reliability problems, and only offered a 25 per cent margin.'

Boy. Do I remember the stink it caused when I said that at the time!

Assemble for your freebie!

The partwork, the *Advanced Home Computer Course*, is apparently breaking all records for partworks, outselling everything except *Golden Hands*, says the publisher (Orbis). It may yet do that, too.

The machine code section of the course will have started by now, publishing an assembler/dis-assembler/monitor package, for three home micros.

With it, you can do some neat things, because the author, PSS of Coventry, has arranged for it to compress the code it works on.

'It can assemble itself, though it looks as though there wouldn't be room for this inside the BBC memory,' remarked one of the PSS programmers.

The idea is that, with the assembler, users of BBC, Spectrum, and Commodore 64 computers will be able to try out the assembler course in the partwork.

But, of course, there is nothing to stop you using it for your own programs, too.

PSS says that it isn't sure when it will put the product on the market independently. 'But it is bound to cost more, then,' said a spokesperson.

Computer holiday for handicapped

With 400 applicants for last year's Computer Holiday for the Handicapped, and only 25 places, there were a lot of disappointed people. This year, the good news is that there will be 180 places, say the organisers.

The idea was developed by Dr Lionel Wardle, who this year has had help from the Kent Education Department and the staff of Valence School.

'For too long, the handicapped have suffered the frustration of being told about all kinds of wonderful devices to help them, only to discover that they cost far more than they could ever afford,' remarks Wardle.

'The cheap micro has changed all that — but they need help in identifying new opportunities — of earning a living, working from home.'

Details of the camp on (0703) 558621, or send self-addressed, pre-stamped envelope to 37 University Road, Southampton.

Help for graphic artists

Paintbox Computers, a company specialising in graphics, aims to help people who like the idea but can't sort out good products from bad.

The company was established by Lionel Wardle (see Computer holiday for handicapped story) who believes that people in Britain are hopelessly behind the US in the use of computer graphics, and that ignorance is the cause.

'There are more than 350 programs on the market, just for producing presentation graphics,' Wardle remarks. 'It takes a great deal of time and effort simply to discover what's available, let alone to assess the merits of the different packages.'

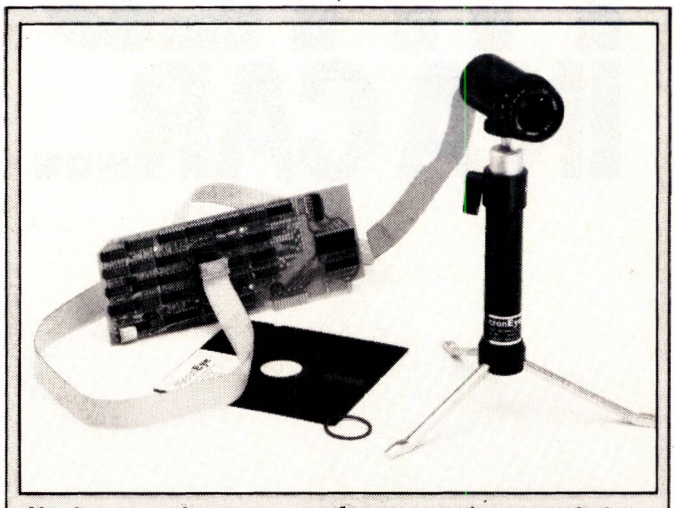
His centre is contactable on (0703) 558621.



I suppose if you have to put a picture of a computer user in a story about the Digital Microsystems new computer, the DMS816, you might argue that it is more aesthetically pleasing to show a wind-tossed glamour model as the typical bearded programmer, but I doubt it. Accordingly, I've asked our publisher to cut the operator out, except for the hand. The computer costs £1600 and runs both 8 and 16-bit software, with the 16-bit half being IBM-compatible.

But most important, it is part of the Hi-net family, which means that you can link one to another, and to other members of DMS' Hi-net micro range.

Now, wouldn't that have been more interesting at the top of the list of features?



You have to write your own software to make sense of what this camera 'sees' — but the camera itself can feed its video image into your computer.

The device fits into Apple Commodore or IBM micros, costs £299, and an 'optic RAM' memory costs £33 extra.

The device was developed by Micron Technology of Boise, Idaho. 'It has produced the optic RAM, which features two 128 by 256 arrays, giving it a total of 65536 light sensing elements. A lens focuses the image onto the active area of the memory, thus enabling what it 'sees' to be displayed onto the screen of the small computer.'

Information and a descriptive leaflet available from UK stockists, Mercatek, Springmead House, Cookham Dean, Berkshire.

A cut above the rest

Having crossed swords with Apple and won, retailer C/WP has now started attacking ACT for trying to control retail prices.

Apple refused to supply C/WP when that store discounted the machine below what Apple regarded as desirable. But retail price maintenance is illegal in Britain.

The Office of Fair Trading has issued a statement saying that Apple has promised not to do it again.

As one dealer said: 'It won't change anything. The suppliers have ways of putting pressure on dealers — they are very important to us, after all.'

ACT has been similarly pilloried by suggesting that people who don't price

IN1983 IT WOULD HAVE FITTED ON A DESK TOP...

...IN1984...

The Flagship...



In keeping with a long tradition of producing fine quality dot matrix printers, Epson have now launched their new flagship. The LQ-1500 is a new breed of printer, that will give you the best of both worlds. A dot matrix printer, although capable of 200 CPS in draft mode, can be set to produce letter quality at 66 CPS by simply flicking a switch.

Like all Epson products, versatility has been a primary consideration of the LQ-1500, incorporating friction feed as standard with optional tractor and hopper feed and a carriage width of a full 15".

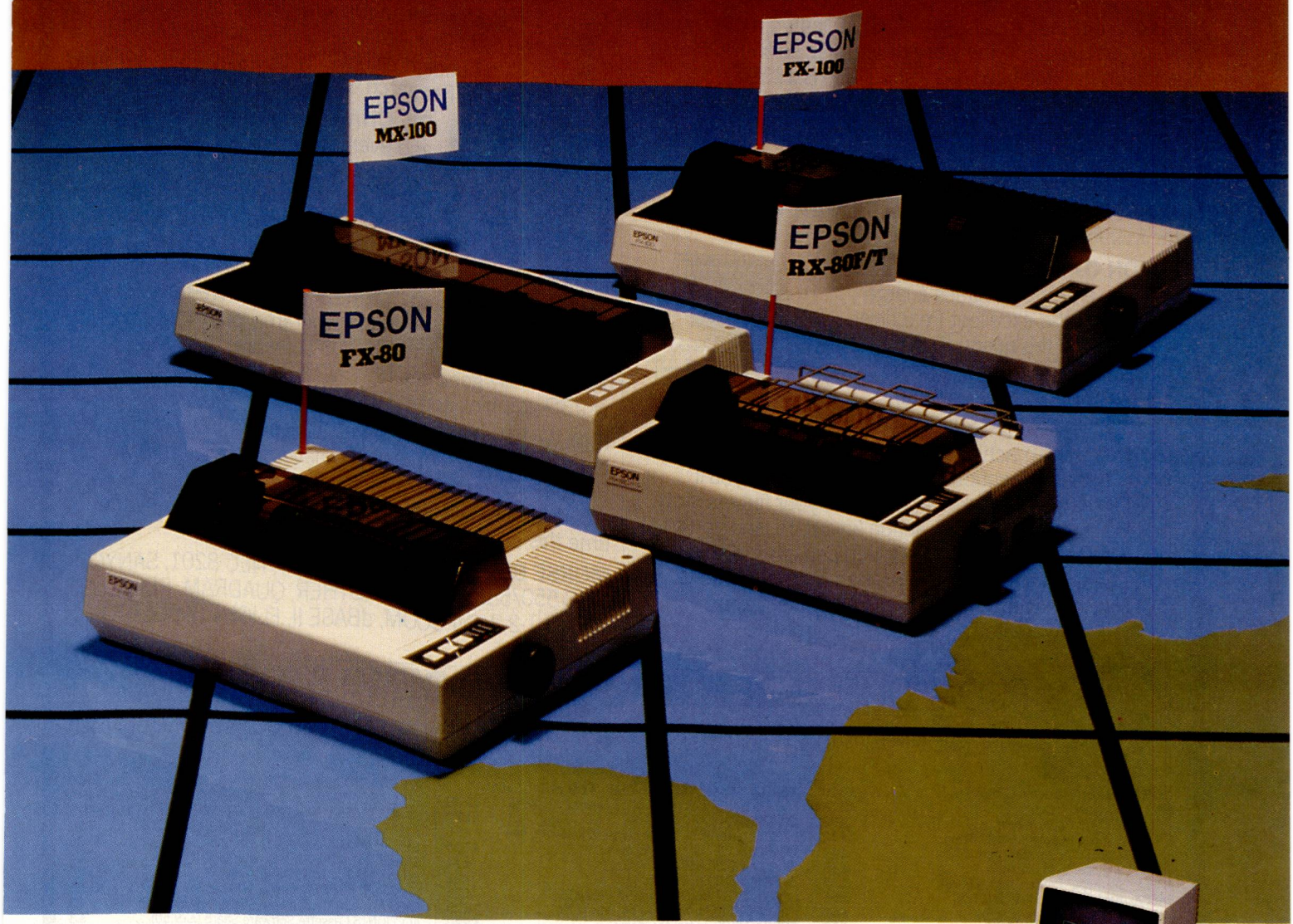
You now have at your fingertips all the advantages of a daisywheel machine, in terms of quality, together with the added benefits of condensed or enlarged characters and proportional spacing, plus very high speed when set to operate in draft form.

Having superb graphics capabilities and optional 8-bit parallel (Centronics) RS 232 and 1EEE interfaces, the LQ-1500 has taken its rightful place at the head of the Epson fleet of fine dot matrix printers.

Epson have been leading the field in the design and production of printers for many years. Printers that are now successfully operating in all kinds of business environments, like the ever popular RX-80 and FX-80. With speeds of 100 CPS and 160 CPS respectively, dot addressable graphics and optional tractor feed available on the FX model, these two machines are extremely reliable and widely used.

The RX-80F/T has the same

The Fleet



advanced features as the RX-80 but having both friction and tractor feed as standard, it's a totally versatile machine at a thoroughly realistic price.

With an ever watchful eye on the changing face of the printer market, Epson have identified a growing need for a high speed printer with the ability to accept wider paper. Thus was born the FX-100, again including all the advantages of its predecessors.

Epson are always looking for ways to improve products, a policy which has kept us one step ahead during a lifetime of being the first name in printers.

Fill in the coupon now to find out which member of the Epson printer family meets your requirements.



EPSON

Extraordinary product.
Exceptional quality.

Epson (UK) Limited, Freepost,
Wembley, Middlesex HA9 6BR.
Sales Enquiries: Freefone EPSON.
General Enquiries: 01-902 8892.
Telex: 8814169.

☐ I would like a demonstration of the LQ-1500 printer.
☐ Please send me details of my local stockist.
☐ Please send me details of the range of Epson printers.

Name _____

Position _____

Company _____

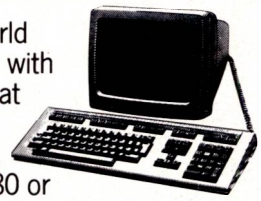
Address _____

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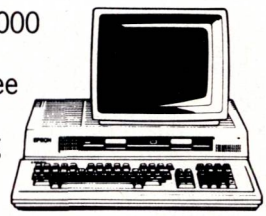
PCW 6 DMP

UPSTAIRS, WE HAVE THE TECHNOLOGY: DOWNSTAIRS, IT'S A DIFFERENT STORY



DIGITAL EQUIPMENT CORP. (world no.2 computer manufacturer) have with their RAINBOW 100 a computer that replaces three normal machines. It runs both 8 and 16-bit programs, automatically selecting either its Z80 or 8088 processor. It's also got a full, dedicated, 103-key w/p keyboard. Just add the word-processing software. Morse price on the Rainbow 100 (list £2767) is £1995.

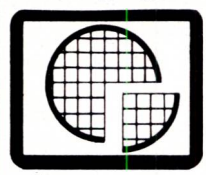
HYPERION has the best power/size ratio of any computer we sell. Sub-Osborne dimensions and weight, clear 80 col. by 25 line amber display, 256K RAM, built-in phantom third disk drive for instant access to files or programs, we now include the sophisticated ALADIN database manager, all for £1995.



EPSON QX10, another below-£2000 system - and that includes a large "bundle" of the excellent Peachtree software and the Epson RX80 printer. The QX10 has an amazing capability to display (and print) a variety of type styles and sizes.

KAYPRO is the machine that has swept the US market. Of course it is an exceptionally ugly device which you'll probably hate at first glance. But once your fingers stray over the man-size, positive-action keyboard, and you treat your eyes to the large, steady green-phosphor display, you'll see the solid virtues of this bomb-proof portable. Complete with word-processing, spreadsheet and assorted software items; Morse prices from £995.

TELEVIDEO. This manufacturer got big by dominating the mainframe VDU market. In a quiet way, Televideo are now easing their way to the top of the microcomputer charts. The new Model 1605 is a big-screen IBM-compatible that also runs IBM-format graphics. The acid test in the trade is to load the Lotus 1-2-3 Graph disk, or the Microsoft Flight Simulator. Both of these run straight out of the box on the 1605. Also at Morse: Televideo TPC-1 portable & 803 full-size, both bundled with plenty of applications software including Digital Research GSX80 graphics package.



PIE CHARTS, bar charts, line graphs, and even color 3-dimensional charts can be created out of your business data in just a few keystrokes, and either displayed or printed. A nice way to get maximum impact is to pre-define the graphs, then call your associates in, hit the appropriate key and watch the graphs "paint" on screen. We have quite a choice of business graphics programs, part of our growing library of MS-DOS and PC-DOS software. New and sensationally good is OPEN ACCESS, a spreadsheet/data/wp/3D-graphics combo with 'help' windows.

IBM. We have been appointed IBM dealers. Our staff have been on the IBM courses. We have ordered the IBM Personal Computers. IBM have ordered the chips. So we are just patiently sitting here, waiting. Hopefully, by the time this ad appears.....

MORSE BEST SELLERS: APRICOT, NEC 8201, SANYO MBC 550/555, QUME, BROTHER, QUADRAM, PEGASUS, LOTUS 1-2-3, INFOCOM, dBASE II, FLIGHT SIMULATOR.

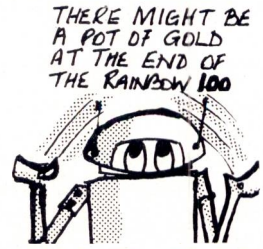
FROM OUR **SURPLUS, USED** AND **DEMO STOCK** (DOWNSTAIRS SHOWROOM)

Morse specialise in taking used microcomputers and hardware in PART EXCHANGE. We also buy for cash.

APPLE II Europlus, demo (£845)	**£310**
APPLE Disk Drive II, demo	**£175**
VISICALC 3.3 for Apple II, new	**£55**
APPLE Hi-Speed Serial Interface, demo	**£42**
EUROCOLOUR Card Apple II, new (£73)	**£40**
APPLE Language Card, demo	**£45**
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PASCAL package Apple II, new (£185)	**£65**
MULTIPLAN Apple II, new (£185)	**£60**
QUICKFILE Apple IIE, new (£60)	**£35**
APPLEWRITER Apple IIE, new (£119)	**£55**
C.O.R.P. Program Generator	**£90**
PFS Word Processing Apple II, new (£84)	**£48**
SYSTEMATICS Business Software for Apple II, choice of Sales Ledger, Purchase Ledger, General Ledger, Invoicing, Stock Control, Payroll, Job Costing, Financial Planning, demo, per module (£350)	**£30**
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APPLE III Floppy Disk Drive, new	**£275**
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SYSTEMATICS Business Software Apple III, new, per module (£300)	**£45**
PFS Apple III, new, (£106)	**£60**
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XEROX Model 590 Golfball Typewriter, auto-correction, 15" carriage (£495): New £290, demo	**£230**
COMMODORE VIC 20, new	**£70**
VIC 20 Starter Pack with recorder & software, new	**£95**
COMMODORE DISK DRIVE, demo	**£130**
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EPSON HX20 computer, demo	**£280**
EPSON DIARY software, demo (£30)	**£5**
EPSON "INTEXT" software, demo (£50)	**£18**
EPSON FX100 PRINTER, demo	**£320**
Epson printer/Apple computer interface, demo (£109)	**£60**
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HEWLETT PACKARD HP83 computer, shopsoiled	**£450**
HEWLETT PACKARD HP87 computer, new (£1595)	**£695**
Hewlett Packard printers, plotters, RAM, ROM, accessories, cables etc etc etc: **½ price or less!**	
HEWLETT PACKARD HP41C, demo (£130)	**£75**
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ANDERSON-JACOBSON ACOUSTIC MODEM, (£348)	**£100**
BROTHER HR-1 Daisywheel Printer, new (£695)	**£450**
"ACCOFILE" Filing System components	**-50%**
OSBORNE computer, with software, single/d, from	**£370**
OSBORNE double density, with software, demo	**£640**
DISK DOCTOR Osborne, new (£55)	**£20**
MICRO LINK Osborne, new (£49)	**£15**
dBASE II Osborne, demo (£385)	**£120**
B/STAM Osborne, new	**£50**
DATASTAR Osborne, demo (£195)	**£45**
SUPERSORT Osborne, demo (£125)	**£40**
OSBORNE/EPSON Interface Cable, demo	**£18**
T.I. KSR DATA TERMINAL, new (£1250)	**£800**
PHILIPS DICTATING & TRANSCRIBING EQUIPT *at least*	**-40%**
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SHARP software and accessories in profusion, incl. expansion interfaces, CP/M, F Dos, Assembler, Machine Language, Pascal; mostly below half price.	
SINCLAIR ZX81 COMPUTER new	**£28**
SINCLAIR ZX81 PRINTER, works with Spectrum, new	**£30**
TELEPHONE ANSWERING MACHINES, mostly	**-50%**

Demo items vary from boxed and mint condition downwards. Some may have small items like manuals and attachments missing, but are generally complete enough to use and in working order. Prices listed for demo items are therefore only a guide, but each item is clearly priced. No items listed are second-hand; all are genuine surplus stock. Demo items are guaranteed for 30 days, new items for 90 days or as implemented by the manufacturer. Goods subject to availability, prices subject to change. E & O E. VAT extra at 15%.

SURPLUS ITEMS FOR CALLERS ONLY: NO MAIL ORDER.



MORSE

MORSE COMPUTERS
78 HIGH HOLBORN, LONDON WC1V 6LS. 01-831 0644. TELEX 916509.

equipment at the level suggested by ACT will be fired. And ACT has also refused to supply C/WP with Apricots, saying that its existing dealer base in Victoria is sufficient.

Price maintenance makes for an 'orderly market'. It is justified on the grounds that it enables suppliers to make enough profit to offer proper support.

In fact, it is very dangerous for the industry, which gets fat on higher profits, and vulnerable to overseas competition. If the dealers aren't fighting it out on price (and other) terms, there's little incentive for manufacturers to work into the lower-priced markets.

Dial-up comms software

It isn't quite accurate for Andy Newmark, of Kensington Datacom, to claim that his Remote Control software is the 'first program to integrate word processing and communications. Andrew Margolis's COMM has been doing that for ages.

What it does do is to give somebody with a Tandy 100, on the road, a chance to operate his IBM PC back home, by dialling in.

I'm expecting two or three companies, including US Robotics and MicroStuff, to announce comparable products in the near future, and some of them will be more generally powerful than Remote Control: less restrictive in what hardware you're using, for instance.

The beauty of it is that you have access to your home filing system, and some of your home programs, as long as you leave your home system running with a general purpose modem which will answer the telephone.

Newmark said there was no chance of his software becoming available on the Sirius. His rivals are being a little less bolshy: however, if your Sirius or Apricot has the Micromail modem, just launched, you will have to abandon it. It won't answer the phone. And thanks to that far-seeing authority which regulates our phone system, precious few UK modems will.

One which will, is the Master Systems 21/23 model. That was launched on Kensington (UK) as part of a strange service called One-To-One, but the modem is available for around £250.

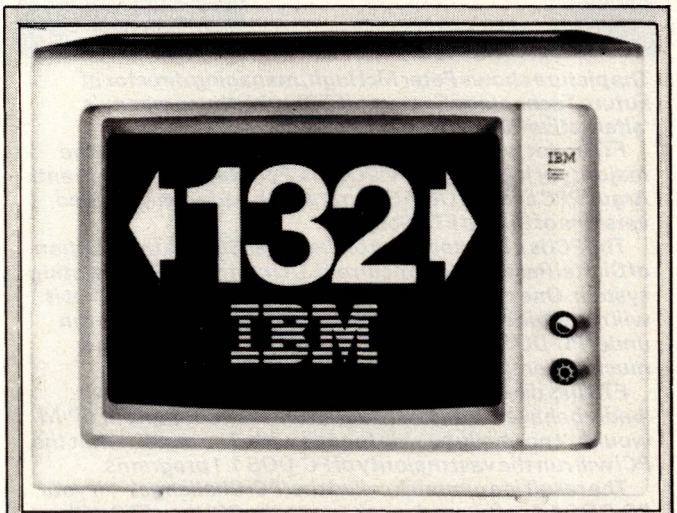
It will perform as a Prestel modem, a link to Telecom Gold, it will answer incoming calls, and it will dial outgoing ones, and will pretend to run at 1200 baud. And all you need is software to drive it.

Master Systems is on Camberley (0276) 685385; Kensington Datacom in New York is on (212) 475 5200 and in London on (01) 730 8911.

Spurious touch

Other people cut prices. When Hewlett Packard cuts the price of its touch screen computer, the HP150, by 14 per cent, it isn't just a price cut.

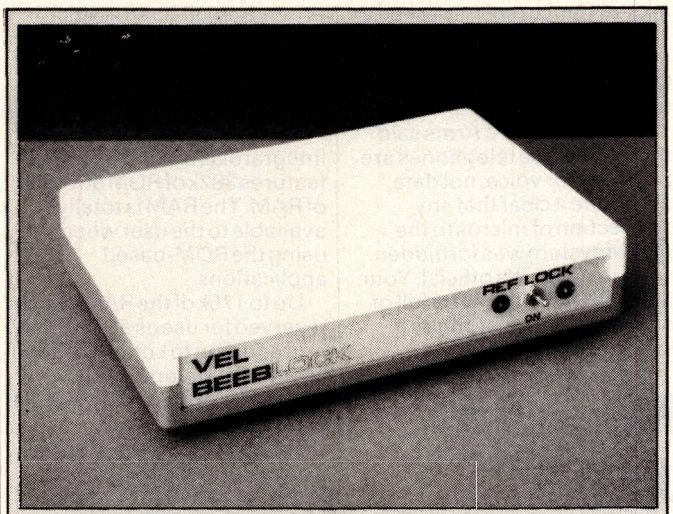
It's 'confirming its commitment to the personal computer market.'



This little number is the subtle method chosen by MBS to announce that it has a video interface board for the IBM PC which provides 132 columns on 44 rows.

With a protocol emulation (every bit as pricey as this) MBS can now offer full IBM 3278 emulation.

Details on Windsor 68171.



Put the output of your micro on TV with this box: it will synchronise the RGB output from a BBC Micro to a standard interlaced 625-line video signal from a camera, studio, video player, and so on.

No, Video Electronics wouldn't say what it cost, so I suppose it can't be cheap.

Details on (0942) 882332.

Basic cost is now £2600 including twin floppies.

Small waves, big ocean

Chilling statistic: Commodore, worldwide, (gaining 'the largest installed base of any computer manufacturer') sold $630 million worth of computers last year.

IBM spent more than twice that on Research and Development.

RAMming those word processors home

Anybody who wants a cheap word processor now must consider a Kaypro seriously. At £1050, including WordStar, Supercalc and a whole lot of other useful software, it's a big improvement on the same machine at £1500 with Perfect This and That, which is what it used to be.

The new £1500 machine is the Kaypro Four, which includes dBase II and also a wonderful program which lets the machine read data off disks from most well-known computers.

This program is wonderful. It doesn't just get data off the IBM (single and double-sided) disks. It will actually reconfigure one of its diskettes (or both) as IBM diskettes, and work quite normally.

Meanwhile, in Milton Keynes, arch rivals Osborne have pulled out one plum, and one sour olive, in their race to keep in business.

The company has taken on the drive C RAM disk which attracted so much enthusiasm from readers of this column when it was first mentioned.

This device formerly just offered 400k of very fast 'disk' which could speed up operations enormously.

It's been enhanced, and Osborne UK, now calling itself Portable Computers, is selling it with printer buffer abilities. The RAM disk will print your last file while you edit the next. It will also queue the files up for you.

And if you buy a hard disk, you can get the RAM disk as part of it, configured as a cache memory, so that most diskette operations work like memory ones. It's *very* fast.

The sour note is the release of double-sided diskettes: this is a UK only upgrade, cost over £400, and unfortunately is not yet known to US software buffs. So it isn't guaranteed to work with clever programs like Media Master, which read and write many different diskettes. (Mine actually won't work, but it's an early version.)

Order in the house

Delighted as I am to note that MPs are getting a '5000 line Merlin DX digital call connect system made by Plessey' — which sounds very technological — I have to report that an MP of my

acquaintance recently asked to have modular jack sockets installed in his House of Commons office — and was turned down.

The Sergeant At Arms said that 'the House telephones are provided for voice, not data,' and made it clear that any connection of micros to the phone system was forbidden.

That means it's official. Your MP's phone line may be full of sound and fury, as long as it signifies nothing.

Not so plain, Jane!

Arktronics, an American company started by two 20-year-old Michigan University students, pipped Apple to the icon by launching a Lisa-like environment for the 64k Apple IIe or II plus.

The product is called Jane, and comprises a mouse, mouse board and three integrated packages, Janewrite, Janecalc and Janelist. Multi-windows give access to all three applications using overlays, but it is not very fast: like the Mac, Jane uses a watch icon to mean — 'be patient while I get on with it.' Retail price in the UK is £314 including VAT: contact your Apple dealer for further information.
Jerry Sanders

Portable HP110 on the way

A slim, 9lb portable computer with MS-DOS, Lotus 1-2-3, a word processor and a terminal emulation package all in ROM has been introduced in the US by Hewlett Packard. It will be launched in the UK in August with shipments in September.

The $2995 portable, called the HP110, is based on the Intel 8086 chip and features an 80-column by 16-line Liquid Crystal Display that can show graphics at a resolution of 480 pixels across by 128 pixels down.

Since the machine uses the MS-DOS operating system and the 8086 microprocessor, Hewlett Packard has devised a way, called HPLink, in which the HP110 can connect up to an IBM or similar computer and gain access to either files created on the IBM (such as a WordStar document) or the hardware facilities of that system such as the IBM disk drive, an attached printer, or its screen. HPLink consists of a printed circuit board, which is installed in the IBM PC, a small disk-based program, and cables to connect the two machines together.

To make up for the lack of an integral disk drive, the HP110 features 382k of ROM and 272k of RAM. The RAM is totally available to the user when using the ROM-based applications.

Up to 176k of the RAM can be reserved for use as a RAM disk.

In addition to Lotus 1-2-3 and MS-DOS Version 2.1, the HP110 ROM contains: a simple word processor called Memomaker; a user-friendly front-end to MS-DOS called PAM (Personal Applications Manager) as used on the HP150 micro; and an asynchronous terminal emulation package. A 300 baud auto answer, auto dial modem is also built into the machine.

Although the HP110 does not feature any disk drives, popular programs such as Multiplan, dBasell and Mail Merge will be made available on 3½in disks. An external double-sided 3½in disk drive powered by batteries and capable of storing up to 710k will be sold by HP so that these programs can be used. The external disk will cost $795 in the US.

Although the HP110 has Lotus 1-2-3, the HP development team had originally designed the machine around Lotus Development's Symphony. Delays with the release of Symphony led to 1-2-3 being provided as a more immediate offering. HP intends to offer an upgrade for users of the portable computer when Symphony is made available.
Robin Webster in the US.

Apple Arabic Basic

A Hammersmith company has caught the attention of Apple Inc with a new product for the Apple II. It's an Arabic/English conversion kit which turns the micro into a bilingual machine.

Science and Information Technology (SIT) showed its DIWAN-Bilingual 14 card at the 3rd Gulf Computer Exhibition in Dubai recently, where it was seen by Apple's Middle East Business Manager. Apple has given the product the thumbs up and is encouraging SIT to get the product to distributors in the Gulf.

The Diwan system comes complete with a set of keycaps etched with both English and Arabic alphabets.

SIT also markets a bilingual word processor (£145) and Diwan Arabic Basic, featuring full bilingual Applesoft programming and translation of English programs to Arabic and vice versa (£90). Details on (01) 741 8011.
Jerry Sanders

Dear DEARS

Dear dears . . . no, not a moan about the latest piece of kit that doesn't work. DEARS is an acronym for Disability, Electronic Aids Reference Service. It's a one-person information gathering and disseminating service run by road-accident victim Helen Townley, which serves users who require an aid to suit a particular disability, and designers of such aids.

The job of recommending an aid for a particular individual is best left to doctors and therapists, so DEARS sets out to match aids to disabilities rather than people. Results are available in the form of lists covering such areas as speech synthesis, input devices and single-digit aids, and there's even a 'not-yet marketed list' to keep you up to date with what's currently being researched. These lists cost £1 each. For more information on DEARS call Helen on (01) 777 7560.
Jerry Sanders

NewBrain rumblings

Brainwave, until now sole distributor of the NewBrain, seems to be losing interest. Clare, a company run by the wife of Brainwave's director is now advertising heavily discounted Brainwave software.

Brainwave has been unhappy about its position since the appointment of a Tradecom representative in the UK, and by non-delivery of hardware for which it has had orders piling up.

Alan Mann director of Brainwave told *PCW* 'I have paid orders for 450 NewBrain



The picture shows Peter McHugh, managing director of Future Technology Systems (FTS), with the company's 'alternative PC' — known as the PCi.

FTS is not well known to the public at large — it sells the majority of its machines via OEMs. For example, the Ferranti Argus PPC and the OEM Orion are both badge-engineered versions of the old FTS Series 86.

The PCi is a development of the series 86 with the addition of Digital Research's Concurrent 3.1 multi-tasking operating system. One of the main features of Concurrent 3.1 is that it will run a wide range of programs originally written to run under PC-DOS version 1.1 On the IBM PC this opens up a much larger spread of programs to FTS customers.

FTS has designed the PCi so that it can even cope with 'badly behaved' PC-DOS programs which Concurrent CP/M wouldn't normally be able to cope with. The result is that the PCi will run the vast majority of PC-DOS 1.1 programs.

The result is a gimmick called the 'PCi Challenge' — if your PC-DOS 1.1 software doesn't run on the PCi then FTS will give you 25 per cent off the list price.

The technical highlights of the PCi are: Intel 8086 running at 8MHz, minimum of 512k of RAM and either 5, 10, or 20Mbyte hard disks. Prices are quoted as being 'comparable' to IBM. More details on (05055) 3637.
Pete Bright

printer cables, but Tradecom says it can produce only 25 per week.'

Brainwave will still deliver to customers who have already ordered but is directing all new business to Tradecom UK. Details on (01) 941 3519.
Jerry Sanders

'C' is for Apple

Apple Computer has finally launched its much rumoured transportable version of the Apple IIe in the form of a 7½lb machine that costs £925 plus VAT. It should run almost all current IIe software.

Called the IIc, the one-piece machine comes as standard with a built-in, half-height 5¼in disk drive, 128k RAM, and an RF modulator to allow the machine to connect up to a television set. It is based on the CMOS version of the 6502 chip, known as the 65C02. A simple, typewriter style, keyboard is

Similarly, if you want to use the IIc with its optional 9in Apple monitor (£140 extra), another button just above the featured but this can be converted from the standard qwerty keyboard layout to the alternative Dvorak keyboard style at the touch of a button.

keyboard allows the user to switch from 40-column to 80-column display mode.

Original Apple II users still upset about past mistakes with the one-touch reset button will be glad to hear that although the IIc's reset button is set to the top left of the keyboard, it must be depressed with two other special keys before it will operate.

A range of I/O connectors identified by icons are built into the back of the IIc. One connector has been provided to allow a mouse—or a joystick—to be attached (many new packages are being developed for the IIc that are mouse compatible and old ones are being enhanced for the same reason).

The IIc mouse will cost £70.

Other connectors include two RS232 serial ports for connecting a modem and/or a printer, an extended video port for attaching the RF modulator or a special colour monitor, a standard video port, and a second disk drive port. The IIc is powered by an external transformer, but it is not too choosy about where the DC power comes from—this means that you could operate it off a car cigarette lighter

socket if you have a battery-powered television. By the end of the year Apple expects to announce a liquid crystal display that clips onto the IIc and which can handle 80 columns by 24 lines in what is being called super or ultra high resolution. This is a far more expensive proposition than a TV since it may cost as much as £600.

Except for what you can add via the I/O connectors, the IIc is not expandable in the conventional sense, and Apple hopes that this all in one approach will appeal to those wanting to buy a computer for use in the home.

Sandwiching it on either side are various Apple IIe system bundles: it will be possible to buy a special IIe starter system for just £795 (CPU, one disk with controller, no display); a professional system for £1095 (two drives and a monitor); and a business system for £2290 (this is a professional system plus a 5Mbyte Profile hard disk.
Robin Webster in the US

Apricot delight

Is your Apricot screen giving you eye-strain? If so how about a 12in monitor?

Emco Electronics expects the idea to appeal and is offering to supply a customised Indesit monitor (green on black) for around £220.

From June new Apricot buyers can specify the 12in screen to dealers on ordering, but if your dealer pleads ignorance, get in touch with Emco's marketing manager, David Bernheim, on (01) 737 3333.
Jerry Sanders

PCW Subscriptions down!

Relentless diatribes from PCW subscribers and the editorial team have finally worn down your publisher. He has agreed in his magnanimity and mortification to cut the subscription cost of the greatest micro magazine from £25 to £15 per year.

If you've already forked out a whole £25 for PCW subscriptions, don't have apoplexy—you are now entitled to a whole extra year of PCWs.

NUMBERS COUNT

Quotients

This month Mike Mudge examines the quotients of Fermat and Wilson.

Notation

We write $A \equiv B \pmod C$, read as A is congruent to B modulo C, if A and B leave the same remainder when divided by C. For example, $16 \equiv 21 \pmod 5$, $64 \equiv 0 \pmod{16}$.

The Fermat Quotient

A famous theorem in classical number theory, Fermat's Little Theorem states that if p is prime and does not divide a, then $a^{p-1} \equiv 1 \pmod p$. The number $F_p = \frac{a^{p-1}-1}{p}$ is Fermat's Quotient.

Computations by Fröberg for a=2 and p less than 5000 have revealed only two solutions, p=1093 and p=3511, to the equation $F_p \equiv 0 \pmod p$. It is still an open question whether any more solutions exist for a=2 with p greater than 5000, and the nature of any solutions for $2 < a \leq 31$; this range being relevant to the proof of Fermat's Last Theorem.

The Wilson Quotient

A well-known theorem by Wilson states that if p is prime, then $(p-1)! = -1 \pmod p$. The number $W_p = \frac{(p-1)!+1}{p}$ is known as Wilson's Quotient.

Computations by Fröberg for $3 \leq p \leq 50000$ have revealed only three solutions, p=5, p=13 and p=563, to the equation $W_p \equiv 0 \pmod p$. It is theoretically probable that there are more solutions to this equation.

Large tables of $W_p \pmod p$ would be useful in empirical number theory. At the present time, only two small tables are known: p less300, and p less than or equal to 211, due to NGWH Berger (1920) and ET Lehmur (1937).

Readers are invited to reproduce the results given above, and to extend them in any natural way. Submissions should include program listings, hardware description, run time and output, and will be judged for accuracy, originality and efficiency (not necessarily in that order). A prize of £10 will be awarded to the 'best' entry received by 1 August 1984. Please address to Mr MR Mudge, 'Square Acre', Stourbridge Road, Penn, Nr Wolverhampton, Staffs WV4 5HF.

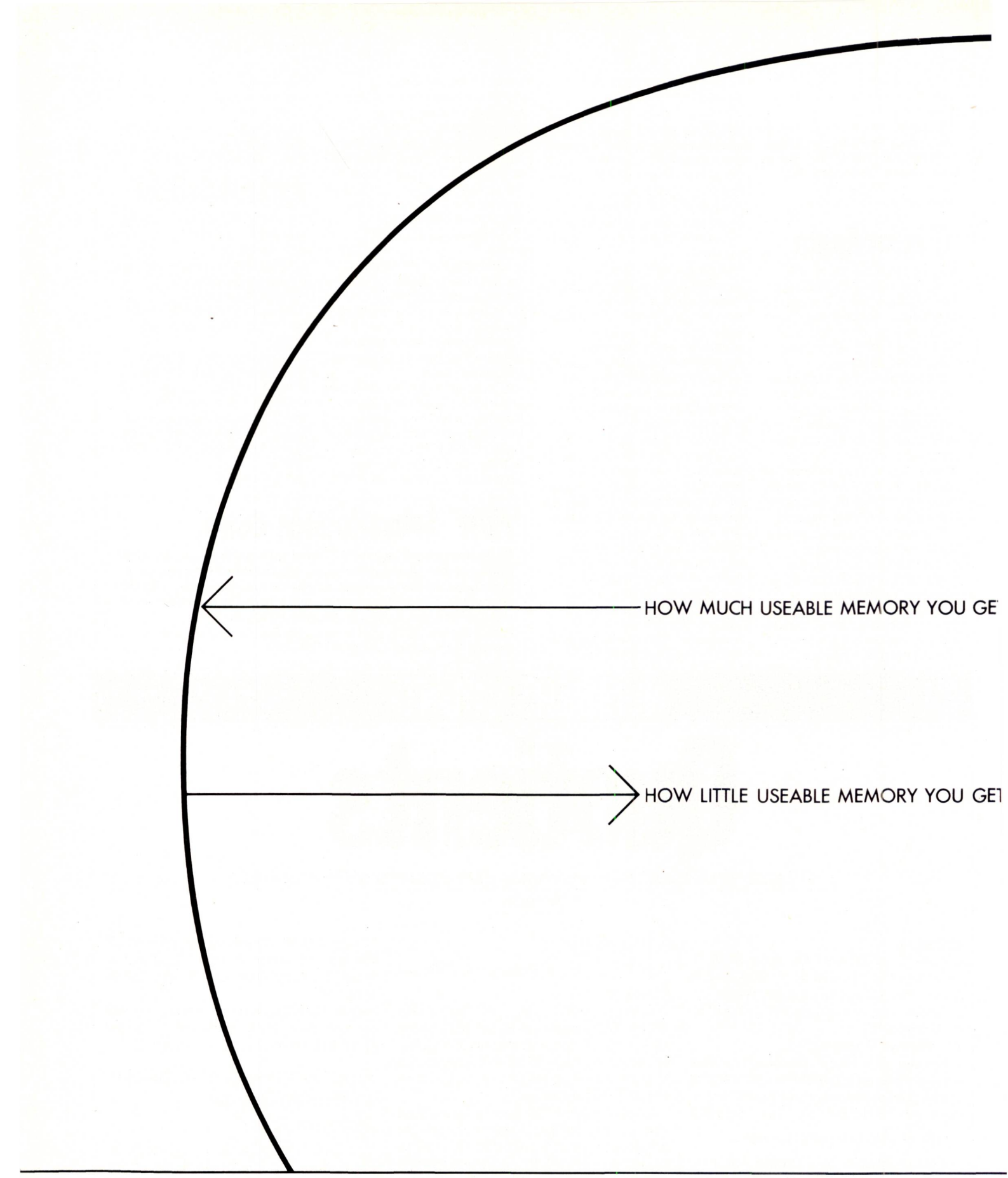
Please note that submissions can only be returned if a suitable stamped addressed envelope is provided.

Fractional Approximation to Primes Review—January 1984

This problem was attacked by a number of readers. A careful analysis of the results shows that a ZX81 with 16k RAM has produced the 'best' result. Mr L Faltin, Wilhelminenstrasse 147/1, A-1160 Wien has compared orders of approximation (. . .5). The use of log/log graph paper may shrink the computing time, apparently!

Decomposition of p=31 to the 5th order may need about four days.

Is this statement true or false? Answers to Mr Faltin or Mike Mudge.



■ If you saw a computer labelled 32K, 48K or 64K you'd assume it had a large memory. Right?

Wrong. These figures bear little relationship to the actual amount of useable memory left once the computer is performing functions like text, colour, sound and even more importantly, high resolution graphics.

The Commodore, for instance, claims an "elephantine" 64K memory, yet uses up 26K producing high resolution graphics.

Under the same conditions, the Dragon 32K leaves 24K of useable memory, the Lynx 48K just 14K.

And the BBC Micro and Acorn Electron leave the operator a miserly 9K to play with.

However, there is one computer specifically designed to cope with these normal working functions as a matter of course.

The new Oric Atmos 48K.

Why, even when you add peripherals like the new micro disc drive unit and colour printer (see technical details overleaf), its useable memory is never less than a healthy 37K.

Which not only caters for all the standard applications you'd expect from any home computer, but also for advanced

WITH THE NEW ORIC ATMOS.

WITH OTHER HOME COMPUTERS.

programming and very sophisticated games.

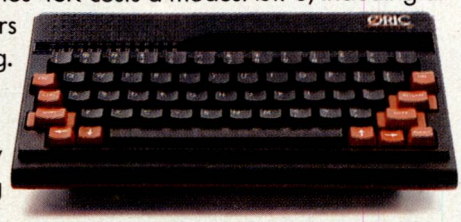
Talking of games, the new Oric Atmos starts off with a major advantage over most new computers, since it takes most of the software already written for the Oric-1.

And like the Oric-1, it has a powerful loudspeaker and amplifier inside its case.

The same unit, in fact, that prompted "Which Micro" (November) to quote... "At full volume this machine can compete with most arcade games. Its sound facilities have more in common with the £400 Beeb, than the rather pathetic beep of the Spectrum..."

Yet the Oric Atmos 48K costs a modest £170, including all the leads and adaptors you need to get it going.

But then what else would you expect from a British Company recognised for offering so much for so little?



The new Oric Atmos 48K. ORIC

Now we've whetted your appetite, here's something to get your teeth into.

Printer Technical Specifications

Printer/ Plotting system	Ball Point Pen, 4 colour
Plotting speed: (horizontal) (vertical)	52 mm/sec (2.05ips) 73 mm/sec (3.08ips)
Printer Speed	12 characters per second
Resolution	0.2 mm/step (0.00787 inch)
Effective plotting range	96 mm (3.804 inch) x axis, divided into 480 steps. (No limit in y direction)
Characters per line	80 or 40 text mode (determined by software in graphics mode)
Characters per line	INT (480/n+1) *6) for 0=n=15
Accuracy (repetition) (movement) (distance)	0.2 mm max 0.3 mm max 0.5% max (x–axis) 1% (y–axis)
Pen life	250 metres (825 feet)
Parallel interface	8–bit parallel Uses STROBE and ACKNOWLEDGE
Temperature range storage	18.3 to 35°C (65 to 96°F) –40 to 71°C (.40 to 160°F)
Humidity range	10% to 80% relative non-condensing
Power supply	Switching power supply input 100–120 VAC 200–240 VAC
Dimensions	10¾" wide 6⅞" deep 2½" high

Atmos Technical Specifications

CPU	6502 A
Memory	Choice of 16K or 48K RAM
Memory (48K Model)	Minimum 48K RAM, max 64: 16K ROM external control signals allow use of full 64K RAM or maybe used externally to increase ROM/RAM
Language	Extended Microsoft basic
Keyboard	Typewriter style and pitch, 57 keys, standard computer layout, additional cursor control keys, autorepeat facility, tactile and acoustic feedback
Display	Output for B&W or colour TV, RGB output for colour monitor.
Text format	40 line x 28 rows
Character set	Similar to Teletext format, standard ASCII double height, flashing, 80 user definable characters
Graphics	240 x 200, 8 colours
Graphic Facilities	Points, lines, circles
Sound	Internal loudspeaker and amplifier. 3-Channel sound synthesiser envelope control, amplitude control 8 octaves, noise channel
Storage	Most cassette recorders via DIN socket 300 or 2400 BAUD. Disc Drive.
Interface	Centronics, expansion port, Hi-fi, RGB Monitor, UHF TV, cassette recorder
Other	Warm reset to regain control without clearing program or data

Micro Disc Technical Specifications

Formatted Capacity	160K bytes per side (double density as standard)
No. of Tracks	40 (80 available as option at a future date)
No. of Sectors	16
Bytes per Sector	256
Transfer Rate	250K Bits/Sec

Supports up to 599 files per side, four drives single or double sided, 40 or 80 track. User definable configuration allows mixing of drive types including 5 ¼" (five and a quarter inch)
Extensive wild card facilities
Copy allows merging of basic and machine code files

Utilities

The Utilities are as follows:

1. Backup	Copy a whole disc
2. Copy	Copy a file to another
3. Del	Delete a file allowing wildcards
4. Dir	Display directory listing
5. Drv	Set the default drive number
6. Format	Format and initialise a disc
7. Load	Load a file (code data or basic)
8. Protect	Change protect status of file
9. Recall	Recall a basic array from a file
10. Ren	Rename a file
11. Save	Save a file (code, data or basic)
12. Store	Store a basic array as a data file
13. Sys	Change system configuration

Prices and data correct at time of going to press.
Specifications on the above models may change without notice.

Available at Allders, Currys, Dixons, Greens, Harrods, Laskys, Rumbelows, Spectrum and Zappo Computer Centres.



YANKEE DOODLES



David Ahl is an eminent figure in microcomputing. In 1974 he founded one of the leading US micro magazines, *Creative Computing*. He has worked for AT&T and Digital Equipment and has written extensively about micros, especially regarding their use in education.

Blame it on the computer

Some years ago, if something went wrong with your bank account, utility bill or credit card account, it was common for people to blame it on 'the computer'. Now that microprocessors are being used in other devices, the practice of blaming it on the computer is spreading.

Recently, *Motor Trend*, a popular automotive magazine in the US, printed a letter from a reader who reported that his local dealer and a Ford factory representative told him that his engine fumbling at a steady cruising speed was the fault of the computer. Funny thing is, his '83 Mercury Cougar didn't even have an engine computer.

Motor Trend got Ford Engineering to look into it. The problem was that dirt had got into the cruise control unit and its control of the speed was less than perfect. The speed variation was being interpreted as 'surge'.

When asked how the service managers and factory representatives could be so far off in their interpretation of the symptoms, the Ford engineers said that since the cruise control is electronically regulated, the service people lumped it in the general 'computer' category.

Motor Trend didn't feel that was a very good answer, nor do I. As computers are so little understood by the general public, they have become convenient whipping boys for the service industry. The general philosophy seems to be: 'If we can't figure out what's wrong, blame it on the computer.'

Unfortunately, as microprocessors become more widely used, we see this 'blame it on the computer' trend spreading to other industries.

Random rumours

Microcraft Corp has introduced the Dimension computer, a 32-bit machine said to be able to handle Apple, IBM PC, CP/M, TRS-80, and several other types of software.... The Japanese manufacturers, who have so far held off introducing any MSX machines in the US, are planning to do so in the last half of 1984.... Two programs introduced to convert files from one format to another: UniForm from Micro Solutions can translate between CP/M and 38 other formats; and Xeno-Copy from Vertex Systems translates between the IBM PC and 47 other formats.

More Adam troubles

Coleco reported that troubles with its Adam home computer led to a 1983 fourth quarter loss of $35 million. Moreover, losses are expected to continue through the first quarter of 1984.

The company had anticipated selling 500,000 Adam computer systems in 1983, but disclosed in January that it had shipped only 95,000 units. Signalling revised expectations for 1984 sales was the recent cut in half of its order for printers from Spiralux in England.

More recently, Coleco has raised the Adam's wholesale price from $525 to $650, a move that pushed retail prices close to $800 for a system originally intended to sell for $600.

Exacerbating Coleco's problems is the fact that the company is unfamiliar with computer marketing. It sells through mass merchandisers whose salespeople are more comfortable with Cabbage Patch dolls than Adam computers; and the company has shunned advertising in influential personal computing magazines in favour of TV advertising. Coleco has discontinued its user newsletter after just a few issues; and it hasn't made any review systems available to the press. With marketing like this, perhaps Coleco ought to stick to Big Wheels and Cabbage Patch dolls?

Adam Osborne strikes again

In his first public appearance in several months, Adam Osborne told a packed auditorium at the West Coast Computer Faire of his plans for a new approach to software distribution.

While the software industry was young, a single successful software package could support an entire company; this is no longer true. Furthermore, retail stores cannot justify training salespeople to sell every software package that they stock.

Thus, Adam Osborne has modelled the approach of his new company, Software Seed Capital Corp, on an agricultural cooperative.

He plans to sign up software authors (farmers) and package, distribute, advertise and market their products.

Tentative packaging is in the form of a book with a disk attached to it. He is also shooting for low prices and widespread distribution.

This approach is being tried by other companies as well. But none of them has the flamboyancy of Osborne; whether he can translate this into profits remains to be seen.

No more backaches?

Low cholesterol diets. Jogging. No-tar cigarettes. Back chairs. Yes, these days everyone's interested in health. Thus, one of the hottest new items in the world of computers is a posture chair in which you poise, half kneeling, half sitting, in a position that is said to keep your back as upright as possible.

In scientific terms, the back chair maintains a torso-to-thigh angle of 135 degrees, which is considered by ergonomists to be optimal for working at a desk or terminal. Normal office seating does not allow a person to sit with this posture for any extended period of time. A recent study indicates that the average office worker loses about 10 per cent efficiency as a result of poor seating.

Back chairs are made in wood and metal, with or without casters. Some rock and some are stationary. Having used a stationary one for several months, I can attest to the benefits of such a chair. However, I would recommend one that either rocks or has casters, and also one that is covered with a fabric that does not produce static electricity. Mine produces a nasty static charge which occasionally caused disastrous results.

Personal computer backlash

Reflecting the maturing of the personal computer industry was a session at the West Coast Computer Faire titled 'Personal Computing Backlash'. Seven papers were delivered in this session, 10 per cent of the 70 papers given at the Faire.

The authors of one paper deplored the effect computers have on the English language. Of course, we Americans have already made mincemeat of the language, but computers are making it worse. One common offence is adding *'ize'* to a noun to make it into a verb. Thus we now microcomputerize, windowize, and digitize.

Moreover, to show how clever they are, many computer people seem compelled to replace perfectly good words with acronyms. The first five sentences of a recent press release assaulted the reader with CMOS, EPROM, MIL-SPEC, ROM, RAM, ANSI, PIA, DIP, EBCDIC, RGB, CRT, VAC, VAX, OEM, CP/M, and DOS.

Two authors talked about the 'morning after' effect. This is what happens when you wake up a few days after unpacking that wonderful new computer and wonder: 'What am I doing with this thing in my home?' Although many computers are gathering dust in closets because of poor manuals, even more are there because people felt compelled to buy a computer but had no clear idea what they wanted to do with it. They thought that just having it would provide the answers but, instead, found that it provided far more questions than answers. END

'THE COMPANY COMPUTER' VS THE PERSONAL COMPUTER



Businessman Smith wants a microcomputer system for his smallish but buoyant company.
He buys a typical Personal Computer to start things off. It costs him about £3,000.

Businessman Brown, with a similar problem and a prudent eye on the future, opts for the Sage. It costs him £6,500, but it does have 4 times the capacity and can handle up to 6 users.

In no time, Smith's staff have taken to computing and want a second machine – another £3,000.

Brown too organises a 2nd work-station – he only pays £595 for an additional screen and keyboard.

Both bosses are asked to supply printers. Smith has to buy two for his PC's, Brown only needs one because his Sage was designed for sharing.

Business is good for both companies, but whilst Brown's bill for a 6 user system is £11,000, poor Mr. Smith has forked out just over £21,000.

And his troubles aren't over yet...

Because his staff need to share the company's information, it's going to cost him at least an extra £4,500 to network his system together. What's more, his dealer has recommended he does it with a Sage!



Vital statistics

32-bit MC 68000
2 million operations per second
256K – 1MB memory
Up to 72MB storage
6 users plus printer
Total information sharing
Wide range of applications
SAGE monitor speed up to 19200 baud.
SAGE II from £3130.
SAGE IV from £5850.
SAGE monitor/keyboard from £595.

Please send me the Sage brochure giving details and prices/call me to arrange a demonstration. PCW3

Name _____

Company/organisation _____

Address _____

_____

Telephone _____

To TDI Limited, Stork House, 288-292 Hotwell Road, Bristol BS8 4NJ. Telephone (0272) 276447

TDI SAGE
THE COMPANY COMPUTER

COMMUNICATIONS



PCW welcomes correspondence from its readers but we must warn that it tends to be one way! Please be as brief as possible and add 'not for publication' if your letter is to be kept private. Please note that we are unable to give advice about the purchase of computers or other hardware/software — these questions must be addressed to Peter Bright (see 'Computer Answers' page). Address letters to 'Communications,' Personal Computer World, 62 Oxford Street, London W1A 2HG.

Reactionary practices

With reference to the 'Software Piracy' letter and its reply in Communications, *PCW* April.

As far as I can see, the cost of a program bears no relationship to the amount of cash or effort invested in it, only to that of the initial cost of the micro it's written for — that is, the higher the price of the micro, the higher the cost of software.

If the cost of programs was low enough (to make it uneconomic in terms of time and effort), then few people would bother to 'borrow' or 'swap' in the first place. Acornsoft's reply ('. . . only way that we can charge a low price . . .') hits the nail on the head, so can it explain why 'Planetoids' still costs the same after two years on the market? Long after any cash invested has been recovered? How long has it been company policy to replace *free* faulty tapes and to replace tapes with disk (albeit at a vastly inflated cost)?

The company (and other software houses) will no doubt reply: 'It has always been our policy.' In which case, wouldn't it be better to inform customers (and staff!)? Acornsoft is rapidly killing the goose that lays the golden egg with its shoddy treatment of customers.

I realise (and fully support the principle) that adequate remuneration must be paid to authors and software companies, but I and many others object to the highly inflated prices asked for programs we cannot take back-up copies of. We will not be ripped-off forever, and when seemingly solid companies have sunk into oblivion, they will only have themselves to blame for their basically reactionary practices.

Here are two suggestions:
1 Why not set up a library scheme? I don't see all that many book publishers/authors on the dole. I know it's been tried before and it failed, but why? Because the major software sellers thought that their massive profit margins were going down the drain, so they closed ranks and stamped on such enterprises.
2 Set up a system whereby one pays a higher price for a guarantee of a refund if the program is returned within a short period.

The second suggestion has the added benefit that, if the program isn't popular, it will soon be withdrawn as a result of too many 'returns'. The software purveyors should remember the proverb: 'Half a loaf is better than no loaf at all'.

HC Leivers, Beddau, Nr Pontypridd

PCW program listings

I would like to complain about the standard of programs listed in *PCW*.

Several BBC programs that have been published recently have not been checked. The source program has probably been tested, but the published program definitely has not.

To give two examples: the program 'BBC Omniopoly' in the January issue was never keyed into a machine. If it had been, it would not have worked.

In the March issue you published a BBC Disk Menu program, which again was never tested by being keyed into a machine. I have found the following faults so far:

1 The programmer has used non-printing control characters for highlighting the selected program (line 1980 — I think).

2 The command OSCIL is used, but is only available on a very small number of BBC machines.

3 The program calls an ASCII file an EXECable file, and *vice versa.*

Could you please make sure that programs are tested by keying them into a properly initialised standard machine?

I hope you will take some action on this as it spoils a good magazine.

J McLachlan, Hertford

(All program cassettes are tested by one of a panel of referees, and are then printed out for reproduction in the magazine. Problems can arise if an author uses non-printing control characters, but we simply do not have the resources to type in all the listings again. See May Programs for a correction of 'BBC Disk Menu' — Ed)

Post-hypnotic suggestion

The letter from WF Harrison (*PCW* March, page 361) on hypnosis has greatly intrigued me. Although the letter was of a humorous nature it had a ring of truth about it. Was there, perhaps, a PHS (post-hypnotic suggestion) contained within the letter to which I have responded?

I too have watched several hypnotist's shows at Blackpool and was so amazed by them that I have since delved into various techniques for inducing trances. The approach of CAH (computer aided hypnosis) adopted by Mr Harrison is most interesting as it's known that television is an ideal medium for hypnosis (*Hypnosis: Fact & Fiction* by FL Marcuse, Publ Pelican), since the focus of attention is often completely captured and the normal censor mechanism can then be sidestepped. Indeed, if this were not so, ITV would soon collapse as its revenue from advertising (based on 'suggestion', which has close links with hypnosis) would dwindle quickly.

Obviously, as Mr Harrison has already discovered, two people are required when modifying CAH programs: the operator in front of the console and an observer behind it watching for the glassy stare to appear in the eyes of the operator, often heralded by the eyelids dropping fractionally.

If Mr Harrison & Co really do have a computer tape available which they believe will induce a simple trance state, I would be very interested to see it.

Dr RA Evans, Lytham St Annes, Lancs

(So would we! — Ed)

Helpful suggestions

With reference to Mr Harrison's hypnotic problems (Communications, *PCW* April).

Being a fully qualified psychoanalyst, I make the following suggestions to improve his team's situation:
1 Throw the micro in the bin.
2 Go on a long holiday, spaghetti harvesting in Italy perhaps, to help clear the mind.

Mr Douglas Maclean Msc, Rickmansworth, Herts

Sharp practice

I was searching for a new printer and really wanted an Epson, as I knew they were reliable. I could in no way afford an FX80, so I had to consider the RX80. Looking at the ads led me to believe that the RX lacked a lot of the features of the FX, mainly the underlining, sub and superscript, italics, and the CRT graphics. The dealers I visited backed this up. I found myself looking at Epson-compatible printers which offered the features that the RX lacked. Eventually, I found a dealer

who knew the RX and surprisingly, I found that it had all the features I've just mentioned. It still lacked some FX features, such as proportional spacing and downloadable characters, but I wasn't over-interested in these.

Are the dealers who place the ads genuinely unaware of the features of their goods, or is this an example of a sharp practice in which the expensive model is enhanced in the buyer's eyes by implying (and in some cases stating) that it has more advantages over the cheaper model than it actually has?
Pete Gaunt, London NW10

(You can't trust anyone these days! There's no substitute for putting yourself in the know — Ed)

Satellite odyssey

Menno Aartsen, in his article '24-Carat Gold' (*PCW* April), suggests that the idea of ordinary citizens using satellites as communications devices was never envisioned even by Arthur C Clarke.

I quote from the final paragraph of his latest book, *2010-Odyssey Two*: 'This book was written on an Archives III microcomputer with WordStar software and sent from Colombo to New York on one 5in diskette. Last minute corrections were transmitted through the Padukka Earth Station and the Indian Ocean Intelsat V.'

Oops!
Peter O'Neill, Exeter, Devon

(It's good to see Arthur keeping up with the times — Ed)

End user copyright interests

In the discussion of software copyright and protection, too much attention is given to the interests of suppliers and manufacturers, and too little to the interests of end users.

I note with some amazement the assertion in your April issue that some suppliers of compilers claim an interest in the sale of software produced using those compilers. The logical conclusion to this argument would be a situation in which the designers of (for instance) the Z80 would expect to receive royalties on every profit made with the assistance of a Z80. This is plainly ridiculous.

On a slightly different tack, I am as concerned as most about the difficulty buyers of multiple machines have in complying with the 'single-use' limitation imposed by software licenses. However, I do not see the remedy lying in attempts to rigidly enforce single user licensing in these situations, but rather in the issue of suitably worded licenses for multiple use of the software, accompanied by a suitably higher charge. The present situation makes criminals of us all.

May I bring to your attention an astonishing clause in the standard DEC software warranty which, while disclaiming all responsibility for 'loss of data and profits' (the sort of effect which reliance on faulty software might very well have), idemnifies the user massively against 'direct damage to property caused by defects in the software'. How on earth can faulty software *directly* damage property? I don't wish to imply any shortcomings in DEC products, but is it surprising if people find it hard to take such inequitable contracts seriously?
Martin C Taylor, Wantage, Oxon

(Maybe DEC's worried about its kit being used for missile guidance! — Ed)

Keyboard impressions

I'd like to correct two 'wrong impressions' in Conall Boyle's 'History of the Keyboard' (*PCW* April, page 224).

The French government and the French telecom company PTT *have* been stepping up the installation of free online directories (Minitels) and it's the subscribers who scorn them!

Your writer shows a startling ignorance of keyboard instrument procedures when he remarks: 'On the piano, notes are usually struck together in the form of chords.' *Most* piano music is separate notes with mandatory fast action:

'Michael H Adler (*The Writing Machine*, Allen & Unwin, 1973) argues persuasively for a new standard keyboard that puts the 10 most common letters — ETAOINRSHD — on a single row, curved in such a way that each of the 10 fingers (thumbs included) rests comfortably on one of the keys . . . Adler delegates the space bar, the shift key and carriage return to the feet . . . This somewhat piano-like arrangement should result in much faster typing. As Adler points out: "After all . . . a pianist can comfortably handle over 1500 to 2000 keystrokes a minute (the equivalent of 300 to 400 words per minute) on a much less compact keyboard than the one described, and without trying to break world speed records either."'

This is from Phil Lemmons's *Short History of the Keyboard* (*Byte* November 1982, page 386). Incidentally, someone came up with a keyboard concept involving both relabelling of the keys (as in the Dvorak layout) and remodelling of the typewriter (as in the Norden or Adler concepts), and all that in the late 1970s! It was called, I think, the Maltron, and had a slightly curved squarish keyboard with ancillary functions (shift, C/R, space bar, and so on) on large contoured keys to the right and left of the main letter cluster. Unfortunately, it appeared a bit too early, before micros and daisy wheels, at a time when flat-top keyboards (Olivetti) were fashionable. Apparently, it sank without trace.
Bernard Sigaud, Reading

(The keyboard's days seem to be numbered, don't they? — Ed)

Imperceptible QL

The quantum is the smallest unit of energy. It is so small that human vision cannot perceive it. Can this be why we cannot see the Sinclair QL? Perhaps it has already been delivered unnoticed to thousands of homes!
RI Harcourt, Orpington

(You guessed!— Ed)

Acorn Teletext adaptor

Regarding the report in the April issue of *PCW* on the Acorn Teletext adaptor. When I purchased one recently I did not experience any of the troubles you did, perhaps because I read the user guide carefully. Tuning is stable and downloading reliable, week after week.

This method of program acquisition is one of the most exciting developments in home computing; no more sore fingers and strained eyes.

Education, utilities, games and information — its all there now, and more to come.

You are quite correct, however, about the quality of the software. It makes very good use of the advanced features of the BBC Micro.
HM Hoffman, London E9

Alternate title

Shame on you! Fancy carrying an article on David Karlin of Sinclair Research (April issue) and not titling it 'The Man from Uncle'.
Malcolm Ray, London NW6

A question of efficiency

In the recent Basic v Pascal controversy (*PCW* September, November 1983 and January; *The Guardian* 8 March) a couple of crucial points have been missed by both sides.

Firstly, I doubt whether the bit-twiddling instructions that RG Silson's program uses can be considered as proper Basic. I know of several respectable Basics, such as Sharp Basic SB-5510, which do not have them. The ill-defined nature of Basic makes any sensible discussion of it very difficult, so maybe Mr Silson should restrict his claims to Microsoft Basic, or whatever he uses.

Secondly, Mr Silson makes the common mistake of confusing a programming language with its implementation. Questions of efficiency only apply to implementations and not to the language as a whole. He is complaining that his Pascal compiler doesn't optimise his program as much as he would like, so he should again restrict his claims to the particular implementation he uses. The fact that there is probably no Pascal implementation in existence that would satisfy him is of no relevance, as the definition of Pascal does not exclude the possibility of one being constructed.

Given this, Mr Silson's insistence on being shown an

efficient Pascal version of his program seems rather silly. Any Pascal program can be as efficient or as inefficient as he likes; it's only when the implementation is chosen that the efficiency becomes fixed.
T. Brelstaff, Guisborough, Cleveland

(Perhaps he should try APL — Ed)

Coming soon...

Over a year ago I ordered two of Softek's Sofsys utilities — Sofsom and Sofsem. After a month or so I wrote a letter, asking where my software was. In reply I received the Sofmon disassembler together with another utility, but not the Sofsem assembler. Softek was sorry for the delay, and said I would get my Sofsem as soon as it was ready (the programmer was busy with his school exams).

Time went by and nothing happened, so I tried to contact the company again. This took some time, as it had moved to a new address. But still it wasn't ready, it would be just a matter of weeks. Well, I've waited this long so what's another week, I thought.

More time went by and still nothing happened, but my patience had run out and I called again. I was told it would be a few weeks more, but I wanted my money back.

This should be the end, but now I'm waiting for my money. How long will it take? Has the company really cancelled my order? What will I get first, my money or the Sofsem?

This is not something Softek should be proud of.
JR Strømsnes, Norway

Using your head

Your review of Brainstorm (*PCW* January) begins: 'The most effective aid to creative thought since the pencil and paper.' So says Caxton Software . . .

That may be the company's opinion, but for approximately one fiftieth of the cost one can buy a book that is a rather more cost effective aid to thought than Brainstorm. The book is entitled *Use Your Head* by Tony Buzan, published by the BBC. Has D Tebbutt Esq heard of this book?

I use the Pattern Diagram method put forward in the book for marshalling my thoughts for letters, reports and programming. When used for constructing programs, this *Use Your Head* method bears some resemblance to Warnier-Orr and it may be easier for hobbyists to get to grips with.

Caxton, please rethink: until you start selling Brainstorm for £6 a copy for every machine on the market, it is *not* the most cost effective aid to creative thought. What is? The pencil and paper plus some knowledge of pattern diagrams, this knowledge being gained by buying the book, going to the local library or watching the TV series if the BBC repeats it. Another point for pattern diagrams is that they can be made anywhere. What would happen if all the members of the Conservative Party or TUC conferences wanted to marshall their thoughts using Brainstorm? Can small companies afford computers or terminals for every member of the board?

I suggest that Sir Clive has a chat with Tony Buzan and then shows Caxton that £1 profit on half a million copies of a thought processor is better than £200 on one thousand copies.
William R Walker, Manama, Bahrain

(You choose your tool according to your task. If you just want an aid to thinking the book will suffice. Brainstorm develops the technique to build and merge much more complex models, but we do think it rather pricey! — Ed)

Inflated *PCW* subscriptions

I have been a subscriber to *PCW* since the first issues, but my subscription days end here.
1983 Subscription: £10
1984 Subscription: £24
Some inflation!

I shall continue to receive *PCW*, but via my newsagent.

Don't you feel that your pricing policy is a little shortsighted?
DR Hilton, Preston

(See Newsprint, page 140 — Ed)

The spirit of discovery

Thank you for Surya's preview of Atari research on QLogo (*PCW* March). From those pages I sense an attitude toward computing that is intellectual, practical, and realistic as well as open and completely undefeated by short-term markets. That is refreshing!

I have used [TLC] Logo in University of California Extension courses since June 1983. I believe it has somewhat anticipated others and combines Logo and Smalltalk ideas to offer users a sophisticated, interactive environment. Versions of [TLC] Logo, as it has been implemented on a succession of micros, bring it ever closer to achievement of a notation giving freedom to work with any type of object in a general way. Lists, vectors, and strings are all possible. Turtle is not a special case, and I can hatch as many turtles, or as few, as I wish, and send each my message. Each may swirl and dance in either unique or orchestrated ways. A descriptive approach keeps attention drawn to the application in particular situations — the actual functions and relations are kept to mind and not lost in the bureaucracy of prescriptions and procedures. Thinking is close to notation, and Logo work becomes alive and even beautiful!

It's important to remember that the idea of Logo is to present environments in educational settings appropriate for mathematics and science, not only in the area of concepts, but also of notation. It is very much that we educators want to bring the spirit of Soho, James Watts and discovery into its rightful place in the mathematics, science and computing curriculum alongside directed and prescriptive methods.

TLC Logo is a product of The Lisp Company, PO Box 487, Redwood Estates, CA 95044, USA. Attn: John R Allen
Grace Mason, Palo Alto, California

Survival of the fittest?

With reference to the *PCW* May issue, page 128, 'Nature or Nurture?':

'Girls, it is widely regretted, seem less interested in computers than boys.'

Not regretted by us boys out here it isn't!
W Prescott, Bath, Avon

(Cowards — Ed)

Winchester storage system for TV

In Computer Answers, *PCW* May, RA Holt asks if it would be possible to hold colour slides on a winchester disc in such a way as to be played back as a television signal.

In his reply, Tony Hetherington states that such a system does not exist. I agree so far as the domestic market is concerned — it would be beyond the pocket of any home computer user. But in the field of broadcast television, the 'Slidefile' made by Rank stores up to 80 pictures on a winchester disc for instant recall.

In addition, one only has to look at programmes such as 60 Minutes and The Money Programme to see still pictures that have been stored on disc being used with computer graphics.

The problem is not the storage, but having enough memory.
DS Buckley, Harrow

DIY disassembler routines

After typing in the Disassembler for the BBC Micro featured in the *PCW* April issue (page 311), I discovered that the 'prhex' and 'esctest' routines used by the program are not at the same location on a computer with Basic II and OS 1.2.

No doubt the routines can be found elsewhere in the new ROMS, but instead I have written my own routines to do the same job. Simply add the following lines:

```
10110 .prhex PHP:CLC:STA
  &8F:AND £&F0:ROR A:ROR
  A:ROR A:ROR A:JSR hex
10120 LDA &8F:AND
  £&0F:JSR hex:PLP:RTS
10130 .hex CLC:ADC
  £&30:CMP £&3A:BMI
  out:ADC £06:.out JSR
  &FFEE:RTS
10150 .esctest TYA:CMP
  £&1B:BEQ esc:RTS
10160 .esc BRK:EQUB
  &FF:EQUS "Disassembler
  ended":EQUB 0
```

Then delete lines 200 and 600, and swap round lines 3500 and 3600.
A Tennant-Smith, Heywood, Lancs

END

COMPUTER ANSWERS

Send your queries to Tony Hetherington, PCW, 62 Oxford Street, London W1. Note that Tony cannot answer questions on an individual basis, so please don't send an SAE with your query.

Expensive technology

During the last year I have been bombarded with invitations to join the technological revolution via the Micronet system. Research has uncovered that I will require a modem for my Spectrum costing about £100, and on top of that there's a subscription fee plus the cost of the phone bills.

Is there a cheaper way, or do I pay £200 just to allow a micro to run up my phone bill (a job performed admirably by my family)?
C Freeman, Nottingham

Prism Microproducts offers a scheme which costs £11 a month and will provide you with all you need. Included in the package is the rental of the VTX 5000 modem, installation of the telephone jack socket and a year's subscription to Micronet and Prestel. Although this won't be cheaper in the long run, it will certainly spread the initial cost. Prism can be contacted on (01) 253 2277.
Tony Hetherington

Foul play

In August last year my son entered a football league table program in a competition run by another micro magazine, the results of which were printed in its November issue.

My suspicions were aroused when the following advertisement appeared in the 10 December issue of *Match*, a weekly soccer magazine:

'ZX81 (+ 16k) Owners League Master by Sportz (soft)ware'

There then followed a description of my son's program.

I naturally suspect that they have copied his program and if so, what can I do about it?
G Moon, London W9

I sent £4.75 for the League Master program and was appalled with what I got in return.

The program is recorded on poorly disguised EMI C15 cassette and accompanied by an instruction sheet—a photocopy of a ZX printout with the League Master title coloured with green felt pen. However, the program was even worse than the packaging.

They have not copied your son's program; if they had, it would have been a better program. I compared the two listings and discovered that they had taken three times as much code to do less. Take the method used in each program to change the number of points for a win, for example. This is important in this type of program, as while the Football League allocates three points for a win, most boys clubs still adhere to the old system of two points.

Your son's program quite correctly asks the simple question: 'How many points for a win?' and assigns a variable accordingly.

The recommended League Master method is to break into the program, assign the correct value to the variable and restart the program.
Tony Hetherington

Dragon terminals

I would like to use my Dragon 32 as a terminal to telephone networks (such as that operated by *PCW*'s Peter Toothill) and I have some queries.

Firstly, the Dragon doesn't have an RS232 port as standard although, on the face of it, this isn't a problem as a large number of add-ons are available. The trouble is, some of these are apparently unsuitable for use with modems. The ads don't specify one way or the other, so which should I buy?

Terminal software, on the other hand, is very hard to come by. The only supplier I know of is Rainbow Software, as reported in December's Networks. Do you know of any other suppliers I can contact?

Finally, can you offer any advice on which modem/acoustic couplers are best suited for use with the Dragon and what costs, if any, am I likely to incur from British Telecom for the privilege of *not* using Prestel?

Incidentally, my real worry at the moment is that I might grow old staring helplessly at the Networks pages of your excellent magazine, wondering what on earth I must be missing.
EA Parr, Sheffield

There are, as you say, a number of add-on RS232 interfaces available for the Dragon 32. With the Dragon 64, the problem doesn't arise as this has a built-in RS232 interface.

I don't know why you say that some of these are unsuitable for use with a modem; provided that the interface does conform to the RS232 standard, connecting it to a modem should simply be a matter of working out the pin connections.

If possible, buy both the modem and the interface from the same dealer and let him connect the two. Otherwise, choose a modem and ask the supplier to advise a suitable interface. When you actually place your order, specify in writing that you are buying the modem for use with the recommended interface. Then, if you do run into compatibility problems, you have a legitimate cause for complaint, having made clear at the time of purchase your reasons for ordering the modem.

There is a lack of decent communications programs for most machines, but a large number of comms packages are likely to become available for most popular machines over the next few months. *PCW* will be publishing communications programs for a number of machines in the near future, including one for the Dragon. Meanwhile, watch 'Networks' for details of commercial packages.

Choosing a modem is largely a matter of what you want to use it for and how much you are prepared to pay. If you simply require a 300-baud modem for accessing bulletin boards, you need pay no more than £50-60. If you want Prestel standards as well, the price rises to £100-150+ (see last month's Computer Answers for more details of the different baud rates).

Most bulletin boards are free of charge—apart from the cost of the telephone calls, of course. There are no increased rental or other charges made by British Telecom unless you have an old telephone plug, in which case there is a small charge for changing it to a modern jack and socket.

I can't recommend any single modem as there are so many available, but you'll find details of plenty in *PCW*.
Surya

Which computer for specific applications?

Some months ago, my wife expressed an interest in word processing. She paid for 12 hours of individual tuition on an ACT Sirius, using WordStar.

During this time, and due to her enthusiasm, I too became interested in computers and since then have read a number of books dealing with the subject in general and WordStar in particular, and bought the March and April issues of your excellent magazine. I now find that I cannot sort the wheat from the chaff, at least as far as machine expense is concerned.

I would like to buy a micro which will a) do word processing; b) catalogue my rather large collection of music and books; c) enable me to have some relaxation with a few games; d) allow my interest to develop into programming if the desire siezes me; and e) allow the addition of a Teletext add-on at a later date.

The BBC Micro, with all its add-ons, will be too expensive for what I wish to do. Will an alternative—Wordcraft 40, or Easy Script, or Vizawrite 64 on a Commodore 64 with a single floppy disk, colour TV/monitor, plus printer—be just as good?

Incidentally, the literature I received from Commodore in Slough mentions under the heading of Planned Products: 'Z80 Card CP/M (Version 2.2). Gives access to over 100 existing software programs.' Does this mean that I could run WordStar on this machine when the card is available (or is it already available)? And what about the new 264, 'likely to cost less than £300, available in the late Spring in the US and here a little bit later'?

The QL seems to be a very tempting package at £399 and I shall, of course, see what it can do. But this machine appears only to allow me to work on it — no recreation facilities, at least so far.

And what of the Japanese machines coming onto the market later this year? I am in no hurry to buy, but will the MSX system be any good to me? Other articles about Japanese models say: 'Word processors, spreadsheets and utilities are also appearing at great speed.'

WordStar is no so important that I *must* use it, but are the alternatives a good comparison or have I been spoiled with my knowledge of it?
Derek Cook, Lightwater, Surrey

WordStar will only run on machines that have a Z80 chip and run under CP/M. CP/M is available for the Commodore 64 although it still seems to have some problems, the main one being a lack of applications software. This will no doubt be rectified in the future, but at what price? The same is true of the CP/M versions of the MSX machines.

A point often forgotten is that while CP/M may open the door to thousands of software packages, each one must be converted for use on your machine. For example, WordStar would have to be supplied on a Commodore format disk before it would work on a 64.

There are many other word processors available on home micros, including the ones you have mentioned. Easy Script is currently supplied free with the Commodore 64 disk drive; the QL will be supplied with Quill, its own free word processor (this inclusion of a free word processor is an encouraging trend and may be continued through the launch of the Commodore 264 and the Enterprise).

However, your specific applications will also require a database program to store a music and book collection index. Again, these are widely available, but check that the package actually fits your needs.

The final decision is, of course, yours. However, look carefully at the following micros which will probably fit your needs:
Commodore 64
Dragon 64
Spectravideo/Yamaha (MSX machines)
Sinclair QL
Amstrad
Enterprise

As you have an interest in music, you may find the performance of the Commodore and MSX machines pleasantly surprising.
Tony Hetherington

Sinclair QL for education?

I am considering purchasing either the Sinclair QL or the BBC Micro and would appreciate your advice on the following:
1 Is there a likelihood of the QL being (a) awarded the BBC contract, or (b) being adopted in schools?
2 Will my two children, aged 10½ and 7, be able to adjust from a QL at home to a BBC at school?
3 Is the QL equally as suitable as the BBC for use by children?
4 Will the QL have a plentiful supply of games and software within the next 12 months?
5 Will programs on Microdrive cartridges be more expensive than Acornsoft cassettes? Are games cartridges likely to be cheaper and/or more suitable?
Name and address withheld

When the QL finally arrives, it will be aimed at the business/professional market and therefore I doubt whether it will compete for the BBC contract. I think it's unlikely that the BBC will move away from the present Micro because of the investment already made in it. Consequently, the QL is probably unsuitable for educational use, the Spectrum or Electron being a better choice.

Incidentally, don't be too concerned about your children adapting to other micros as they'll find it quite easy. It may even help them to broaden their computer horizons beyond the boundaries of BBC Basic.

I envisage that the QL will have a plentiful supply of games on both Microdrive cartridge and ROM pack. Initially, prices will be high until the larger software houses realise the QL's games-playing potential, but prices should stabilise at around £10.
Tony Hetherington

Bugbyte Software

Last November my son sent a program he had written on cassette to Bugbyte Software in Liverpool at an address obtained from an advertisement in your magazine. The cassette, plus letter, was sent by Recorded Delivery.

There was no reponse so I sent a reminder letter in February, again by Recorded Delivery, but have had no reply.

'Bugbyte' does not currently advertise in your magazine. My son would like to know what the company thinks of his program, but it will not respond.

Do Bugbyte Software still exist?
EM Goss, Barnet

Your son's program is just one of the hundreds of submissions a company like Bugbyte receives each day; there are bound to be delays.

However, over 90 per cent of these programs are apparently unsuitable, being poor copies of arcade games usually written in Basic.

I would therefore suggest that your son looks at his program again to see whether it is indeed comparable to, if not better than, current marketed games. If it is, then he should send it to other software houses but whatever happens, he musn't give up. Remember — Monopoly was turned down by several games companies before becoming a world bestseller.
Tony Hetherington

Arcadia's Pasta Blasta

In the Games Special supplement supplied with the January issue of *PCW*, there was an advertisement for Arcadia Software of Swansea offering the game 'Pasta Blasta' for the 48k Oric at £5.50.

I ordered one on 12 December 1983 enclosing my cheque. This cheque duly went through my bank account on 20 December but I have not received anything. I wrote in January enquiring when I would receive it but had no reply.

I have since written again, sending my letter Recorded Delivery, but have still had no reply.

Is the firm still trading under this name and what action can I take to obtain Pasta Blasta?
TBV Worthing, Rugby

According to Arcadia, its had some problems with tape duplication which accounts for the delay, but assure me that your copy is on its way.

This raises an important point: due to copy deadlines, companies often place advertisements before the product is ready. It's a good idea, wherever possible, to phone a company before placing an order to check for availability.

Such a call would also ensure that the company is still trading.
Tony Hetherington

Sharp MZ-700 software

I own a Sharp MZ-700 computer — it seemed a better machine to buy after having a VIC-20. However, I find the manual is too advanced for me as I'm 13 years old. I've looked in the shops but there are no books on the Sharp computer, and I can't get any software for it either.

Can you help me?
Lesley Martin, Fife

I don't know of any books on the Sharp MZ-700; it's probably a little early to expect anything as the machine has not been available for very long.

The same is true of software, though Lightening Software has recently launched at least one program for the machine. Lightening can be contacted at 48 Westbourne Road, Penarth, South Glamorgan, Wales CF6 2HF.
Surya

Spectrum machine code

I am attempting to learn machine code as Basic is too slow for my purposes. Unfortunately, the book I am using only gives the CLEAR commands for the 16k Spectrum, and as I have a 48k model I was wondering what I should use.
K Whelan, Manchester

The CLEAR command is used to reserve space above the top of memory to store machine code safely, in order that it is not deleted by the NEW command.

The same CLEAR command can be used on both 16k and 48k Spectrums and I suggest that you follow your book's example programs. However, when you come to write your own machine code programs you should only reserve sufficient space to store the program. For example, CLEAR 65350 will be sufficient for a 150-byte program.
Tony Hetherington END



Epson PX-8

A truly capable lap-held computer must incorporate all the specifications of a standard desktop machine. The Epson PX-8 runs on the CP/M 2.2 operating system and has unlimited access to a huge CP/M software base. Does it fit the bill? Dick Pountain reports.

What sits on your lap, has three processors, uses ROM, RAM and cassette as disk drives, and runs CP/M 2.22? The only answer as far as I know is Epson's new PX-8 Portable Computer.

Epson started the 'lap-held' market with its HX-20, and the signs are that this sector is going to become the hottest area of competition over the next year. The market is driven largely by workaholic business practices in the US, where we are led to believe that young execs like to keep up with their spreadsheets even in the toilets of transcontinental airliners. Whatever the reason, suddenly everyone is making lap-held computers, and some of them (like the Sharp 5000 I reviewed last month) are sporting most of the features of desktop machines, including 16-bit processors. Only display

technology now holds off the fully capable (which should include an 80 × 24 screen) portable computer that has been the dream of portable 'nuts' for several years; the rumours are that the last hurdle will be passed later this year by a new, fully IBM PC-compatible Tandy.

Meanwhile, Epson has brought out a replacement for the HX-20, whose small 20 × 4 display places it in a previous generation compared to the Tandy and NEC lap-helds.

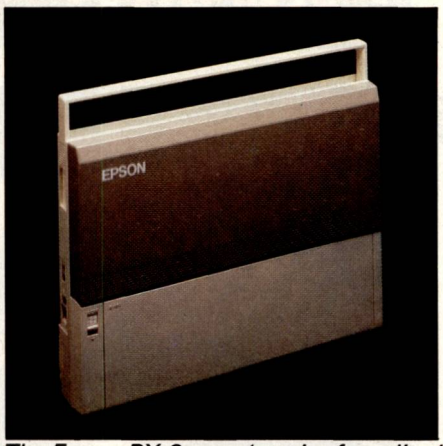
The PX-8 was originally called the 'Maple', an attractive name which has been sadly dropped in favour of the inevitable hi-tech number (software writers could have gone to town with programs called 'Walnut' and 'Syrup'). It has an 80 × 8 display, and also has the powerful advantages of a built-in microcassette drive and a grown-up operating system, CP/M 2.2. Rather than chasing after the still-confused 16-bit market, Epson has wisely decided to go for the established winners, and is offering a selection of proven CP/M software (including WordStar) bundled with the machine.

Hardware

I can still remember the impression the HX-20 made on me when I first saw it—I wanted one. The PX-8 has a similar effect but even more pronounced. There is an air of quality about the mouldings, keyboards and various neat design touches of both machines that no-one else seems to be able to match.

The PX-8 is almost exactly the same external size as an HX-20 (A4 magazine size), the immediately obvious differences being a removable cover over the keyboard and a fold-away display, so that when packed for travelling it forms a fully-covered box. Joy of joys! — it also has a sliding carrying handle which fits flush and unnoticeable around the front edge of the keyboard. When this is extended, the machine feels very much like a small portable radio. The case is moulded in cream high-impact plastic to a very high standard; numerous legends labelling the various controls and ports are moulded in sharp relief. Two little fold-out feet at the rear of the case allow it to sit on a desk slightly tilted forward for better typing — good thinking, Epson.

The keyboard cover slips off by pulling it forwards, after which a catch can be released to allow the display to fold up out of its recess behind the keyboard. In doing so, it reveals the microcassette deck and a small audio speaker. The display can be set to various angles up to 180° (flat) in 15° increments, using a ratchet mechanism that is built into the concealed hinges. The display is the now-familiar eight-line LCD but, like the Sharp, has a full 80 characters per line. The contrast is rather better than that on the Sharp, but it still requires strong frontal illumination for comfortable reading. Until some form of flat self-luminous display becomes cheap enough, I'm afraid this is as good as we'll get. The character set is chunky and readable though it lacks descenders. Contrast is controlled by a slider which is sensibly placed below the display.



The Epson PX-8 case: 'an air of quality.'

The keyboard is very good indeed, with flattish keys with 'sculptured' tops and a superb positive action. The SHIFT and RETURN keys are properly placed and double-sized. Four cursor keys are picked out in orange and live above the RETURN key. TAB, CAPS LOCK and two CTRL keys are provided, the second CTRL key placed at the end of the space bar for touch typists. Like the HX-20, the PX-8 has two extra shift keys to access the graphics character set and to turn part of the QWERTY pad into a numeric keypad (CAPS and NUM locks have red LED warning lights to show they're engaged). Above the main key block is a row of smaller keys which include STOP, ESC, PAUSE, HELP, and five programmable function keys. The HELP key is not supported at the CP/M command level, only in suitably written applications (including Portable WordStar).

The only thing I didn't like about the keyboard was the type-ahead buffer but this is a personal phobia — some people consider it indispensable. I'm the sort of impatient dolt who pounds away at the RETURN key when something takes too long to happen. My reward is half a minute of frantic scrolling as the slow LCD tries to display twenty machine-gun CRs.

The PX-8 contains alternative character sets for nine different countries which can be switched either by an internal DIP switch or under software control. UK users will be glad to know that there is a £ sign prominently displayed on the keyboard next to the $. There is also provision for 32 user-defined characters, using ASCII codes 224 to 255 accessible from the keyboard via the GRAPH key.

The PX-8 is powered by a rechargable NiCad cell pack which lives under a trapdoor in the bottom of the case. It's good for up to 15 hours of use (without power-hungry external devices) and takes eight hours to charge fully from the supplied AC adaptor. This, unlike the HX-20's, is smart enough not to overcharge however long it's left on, and the machine can be used with it connected. After a 'Low Battery' alert, the battery can be charged up to operating level in about 15 seconds, allowing you to put the house in order before setting it to charge fully.

Another trapdoor under the case contains two ROM sockets and the master reset switch. The 32k ROMs are treated by Epson's special CP/M as disk drives and are the principal medium for distributing software. Before you start to panic — no, you don't have to insert bare ROM chips, legs and all. The chips are mounted on a simple plastic carrier with their legs wrapped around which plug into a low insertion force socket, gripping it by finger grips at each end. It's no more hassle than inserting the bulky edge-connector cartridges favoured by other manufacturers and is much more compact. ROMs can be changed at any time, with only a warm



The 'sculptured' keyboard has a superb positive action

start required afterwards.

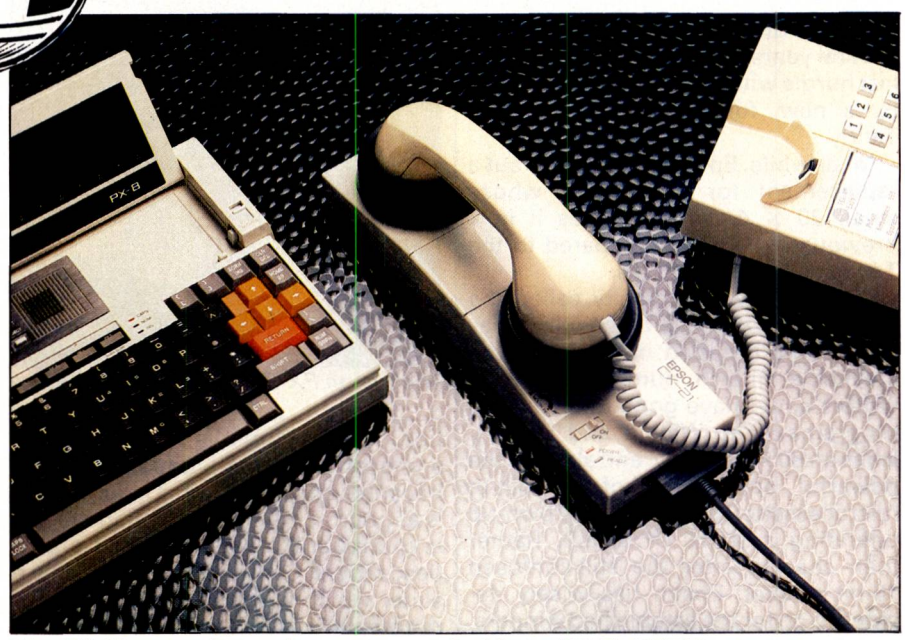
At the back of the case are six I/O sockets. One is the power socket for the AC adaptor followed by the high speed serial port (for printers and disk drives), the RS232C port, and three jack sockets for Bar Code Reader, Analogue Input, and External Loudspeaker. There is no support for external cassette recorders. The main Power On/Off switch and speaker volume control are at the right-hand side of the case, and the Reset is one of those holes you poke a Biro into at the left (there are three different levels of Reset). Between the sockets is a removable panel which conceals the 50-pin system expansion bus.

Dismantling the PX-8 is gratifyingly easy: remove seven screws and the case bottom lifts off to reveal a single board computer of exquisite simplicity and uncluttered execution. There are only 36 ICs on the whole board and of those, three are ROMs, eight are 64k RAMs and three are processors. The main processor is a Z84 by Toshiba (presumably a CMOS Z80) and it's this which is the host for CP/M. Epson doesn't say, but the timings suggest it runs at 2MHz. Under its control are a Slave Processor 6301 (as used in the HX-20) which looks after all the I/O devices, with its own 6k of RAM to use as video memory. The third processor is a 7508 which controls the keyboard and the 6-bit resolution A/D convertor.

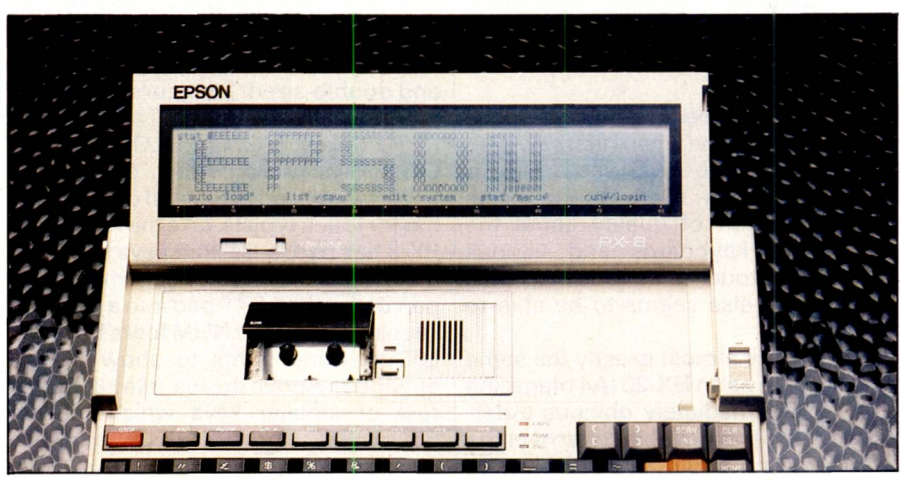
The RAM is battery-supported, and the clock-calendar chip has its own separate back-up battery which can also support the main memory for a short time in case of a low main battery. Power is automatically shut off to conserve the batteries after a period of disuse which can be set in software. A variety of automatic power on modes are also provided.

The Z80-style processor addresses the full 64k of internal RAM and also a 32k ROM called the IPL (Initial Program Loader), from which CP/M is booted into RAM. Up to 24k of the internal RAM can be configured as a RAM disk so that the machine can be used as a self-contained unit without any other mass storage. For many purposes 24k of RAM disk will not be enough, so Epson has provided two models of optional 'Intelligent RAM Disk' extension, one of 60k and the other of 120k (the UK market may only get the latter). These are thin wedge-shaped boxes which bolt onto the underside of the case and increase its thickness but not its 'footprint'. They connect by a printed flexible ribbon cable to the system expansion bus and have their own battery back-up (Epson does not guarantee that they can be used to transfer data from one PX-8 to another).

When an external RAM disk is in use an internal one can't be assigned, so the full 64k is available to CP/M as TPA.



The CX-21 acoustic coupler can be used with the PX-8's TERM program



A ratchet mechanism allows the display to be set to various angles

The microcassette deck is based on a standard Olympus mechanism and features a software tape counter as on the HX-20. Unlike the HX-20 however, the tape is configured as a CP/M device (drive H:) and its operation is normally completely transparent to the user, though a manual control mode does exist. As the tapes are set up as (sequential) CP/M media with a directory, there are complications when removing a tape from the drive (the directory is not automatically updated after writing so removing the tape could corrupt it). Tapes must only be changed with the MOUNT and REMOVE commands which guarantee that the directory is up-to-date. The tape system is not very fast (in fact, it seems slower than that on the HX-20) but it works OK as a second line of security for the RAM disk contents when you are writing lots of text on a tropical beach (some hope). Copying a 1000-word WordStar file to tape takes approximately three minutes, but PIP is appreciably faster. The cassette deck plays Olympus Pearlcorder format audio tapes through the built-in speaker or through headphones, so the machine can be used for audio typing. That's smart thinking for you.

Operating system

It's a fact of life that you can get used to anything given time. I can remember numerous occasions when I and other writers slagged off CP/M in these pages as a dreadfully unfriendly operating system, unfit for personal computer users.

Time and the computer industry marches on, and I find myself more and more in favour of the spartan simplicity of CP/M compared to some of the grisly edifices that have been erected since! The software base for this operating system is now huge and most of it is genuinely portable, give or take a few evenings cursing and spitting escape sequences.

By comparison, the 16-bit scene has turned out to be a step backwards, with IBM ROM-BIOS compatibility (or more usually incompatibility) re-

placing portability. PIP and STAT now seem like old friends.

One thing that's certain is that when Gary Kildall created his little monster, he had no notion of ROM drives, RAM drives and microcassettes. Epson (or its contractors) have had a lot of work to do to get CP/M to accept these alien devices, and they've done it very well. PX-8 CP/M actually behaves more like proper CP/M than a good few desktop 'versions' I could name. In addition to the standard CP/M formula of BDOS (Basic disk operating system) and BIOS (Basic I/O system), Epson has added a complete cassette operating system (consisting of the corresponding MTOS and MIOS), plus a stack of BIOS extensions to handle the plethora of clever hardware features such as automatic power on, alarm clock/scheduler, high-res graphics, bar code reader and A/D convertor. There is even a BIOS entry point to talk to the slave processor which can be brought under the control of Z80 programs.

A very powerful innovation is the User BIOS. This is an area of RAM (the size is allocated during system configuration) which can hold new routines and then effectively become part of the CP/M BIOS. The User BIOS has its own table of entry points and a function to reload them; it provides a clean way of adding new device drivers to the ROM-based operating system.

The display driver supports four different display modes. The first, Mode 0, is the normal 80 × 8 display, though it's actually a window onto a virtual screen. To be exact, it's a window onto one of two virtual screens, the sum of whose lines must be 48; at power up they are both set to 80 × 24. It's possible to switch from one screen to the other and to scroll both up and down using CTRL and the cursor keys. This applies even at the CP/M command level, so you can scroll back up a long directory listing. Mode 1 splits the screen in two vertically, with a line down the middle. The 39-column wide text wraps around to the top of the right-hand half giving, effectively, 16 lines; the two halves scroll together. Mode 2 again splits the screen, but the two halves are two separate virtual screens and can be scrolled independently. The split can be moved by the user so that one part is, for example, 20 columns and the other 59 (the sum must be 79). In all these modes the character size remains the same. Mode 3 is graphics mode in which the screen becomes a 480 × 64 dot bit map (in this case there is no virtual screen — what you see is what you get).

Much has been done to the user end of CP/M. When you boot up the PX-8, a menu of files is presented instead of the normal bare A>. Programs can be run from this menu merely by moving the cursor to the right name and pressing RETURN. Given the small display (one third of a normal CP/M screen) and the presence of at least four drives (RAM disk, two ROM disks and cassette, maybe two floppies), it's clear that you can't get eveything on this menu. A system configuration program is built in which can be accessed at any time (even inside an application program) by pressing CTRL HELP. One option is to choose which drives are shown on the Menu and the types of files to show (it comes set up to show .COM files only but you can have up to four different extensions).

Pressing ESC gets you out of the Menu and into the A> prompt, where the CP/M built-in and transient utilities work as usual. You can't PIP into a ROM (they behave exactly like write-protected disks) though you can PIP out. The supplied utility ROM contains PIP, STAT, SUBMIT, XSUB, TERM, FILINK and CONFIG (another configuration program used to set RAM disk size, function keys and RS232 parameters).

One thing missing is a way to find out how much RAM is free (STAT could have been extended to do this). It doesn't usually matter in CP/M, but when you have a variable user BIOS and RAM disk, it does. The only hard fact I have is that 24k is free to Basic with no RAM disk or UBIOS, which suggests that the CP/M is larger than normal.

Initially, the RAM disk is A:, the ROMs are B: and C: and the cassette is H: with optional floppies at D: and E:, but this order can be changed from the system configuration screen if you want to have a floppy as A: (only the cassette is fixed as H:).

Other clever things you can do with the system configuration program include setting a password to prevent unauthorised use of the machine, getting the machine to switch itself on at a preset time, setting up an alarm clock message which will be displayed at a given time (interrupting any applications which are running — ESC lets them continue) and altering the RAM disk size.

The ALARM/WAKE function uses the battery-backed clock/calendar in the PX, which also displays the time and date (including day of the week) continuously when you're in the file menu. WAKE sets the PX-8 to switch itself on at a specified time and date, and can also take a string which is executed as if it had been typed at the CP/M command line. You can therefore get the PX-8 to switch itself on next Christmas and run a program (perhaps YonderStar™). By cleverly allowing wild cards in the specification of the WAKE time, the machine can perform this robot operation at regular intervals too. For instance, **/12 **:15 would cause it to WAKE on the 12th of every month, every 15 minutes throughout the day. AUTO START takes a string similar to that in WAKE but executes it automatically when you switch the machine on manually. In both cases the file menu must be switched off, otherwise the program lying under the cursor will be run instead with your string as a parameter! I know because I now have a WordStar file called DIR.

The RAM disk has to be formatted just like a real disk (though it only takes a second) and if it's corrupted you get a BDOS ERROR: BAD SECTOR just like the good old days.

Resetting the PX-8 is a rather baroque affair because of the number of independent little minds in there. Many hung programs will be tamed by the STOP key on the keyboard; if not, CTRL STOP should warm start CP/M. If that fails, the Reset switch on the side of the case performs a warm boot and resets most of the system parameters to their default values (it usually doesn't destroy programs or data). The ultimate deterrent is to press SHIFT NUM/GRAPH and Reset at the same time (borrow a friend's octopus), which blows away everything including the RAM disk and requires you to re-enter the date and time. This should only be necessary if the battery has been removed, or something equally drastic.

One final point about the operating environment is of very special importance. You can switch off the power to the PX-8 in the middle of an application

Technical specifications

CPUs	Main Z80-compatible CMOS Slave 6301 Sub 7508
Memory for Z80	64k RAM 32k ROM containing CP/M Variable RAM and ROM disk size
Memory for 6301	128 bytes on-chip RAM 4k on-chip ROM 6k video RAM
Display	80 × 8 character LCD
Keyboard	ASCII type with US, UK, Fr, Ger, Swed, Dan, Nor language character sets
Interfaces	RS 232C, serial (38,400 baud), bar code reader, analogue/digital
Power supply	Rechargable NiCad pack, AC adaptor
Dimensions/weight	297mm × 216mm × 48mm/2.3kg

program and have it restart at exactly the same point when you switch it on. To do this, you must hold down CTRL as you switch off, otherwise it will boot up into the file menu next time you switch on. This feature has a beneficial effect on WordStar, not the quickest program in the world to start up from scratch. Now you can forget it — just switch off and start again where you left off. This feature is automatically applied when the machine switches itself off to save batteries.

Software

The PX-8 comes with a full set of 'bundled' applications. By 'full set' I mean a word processor (Portable WordStar), spreadsheet (Portable Calc), data management program (Cardbox Plus), diary/scheduler (Portable Scheduler) and Basic. In addition, two communications programs are included among the ROM utilities: TERM is a simple asynch terminal emulation; FILINK is a file transfer program which uses a rather complex protocol of Epson's own devising. These programs will be supplied in ROM but not all were ready at the time of this review (I only saw Cardbox on tape and disk).

Portable WordStar

This alone will sell the PX to many people. If you've been using WordStar as your main editor for some time (and around a million people have) then it's very difficult to cope with a different editor on your portable. How does it compare with the desktop version? Apart from the smaller screen there is little difference. Being in ROM it boots up a lot faster than any floppy disk version, and saving to RAM disk is almost instant. On the other hand, the slow updating of the LCD display makes scrolling through a document rather agonising. It's not possible to have H: (the cassette drive) as the logged drive in WordStar as it's far too slow for virtual memory access.

Because the screen is so small (the Help menus fill the whole screen), the automatic Help facility of WordStar has been suppressed and the menus are raised manually by hitting the HELP key. The SpellStar-related commands are missing from the main menu, but in their place are new commands — T for Transmit and C for Receive — to transfer files to another computer via the RS232 port.

The biggest handicap is memory space. With a 24k RAM disk (the maximum allowed internally) I could only produce a document of around five single-spaced pages; any more and a 'Drive Full' error occurs when you try to return to the first line. The file is only 13k in size but WordStar has to reserve the same again for its back-up file, hence the error; given the non-volatile memory I think I could live without. BAK files. For any serious writing, the external RAM disk (or the portable disk drive when it arrives) will be essential.

Cardbox Plus

I used a floppy disk version of this program and found that it works very well even on the small screen. A cardfile record may be created which spreads over more than one screen, and flipping between these separate 'pages' is done with the function keys. The machine's block graphics allow well-formatted boxes and various symbols to be used in records to highlight different fields on the cramped screen. The Cardbox Help menu is again suppressed until you need it, when the HELP key toggles it on and off. In this application more than most, a large RAM disk is necessary to store useful amounts of data.

Portable Calc

I wasn't supplied with a Calc ROM but played with it briefly on another machine. It's written by Micropro and seems like a perfectly useful spreadsheet with all the facilities of a desktop version. Surprisingly, the small screen does not make it at all difficult to use, probably because we are already used to scrolling a window onto a larger spreadsheet.

Portable Scheduler

The scheduling program allows you to choose a screen which represents a diary page (the date is displayed at the top). The page is split into morning and afternoon, each divided into half-hour intervals. On each line you may type a short reminder of what you are to do at that time. Any of these reminders can be automated using the ALARM/WAKE function, and each one so selected is marked on the page by a musical note beside it. At the appointed hour, the Scheduler will interrupt what you're doing, bleep, and print the reminder. This interrupting can happen even though the Scheduler (which is just a data entry program) is not loaded, because it has stored the appointment times into the User BIOS and passes them in sequence to ALARM.

TERM and FILINK

TERM provides terminal emulation using the built-in RS232C port at a range of baud rates up to 19,200, which can be set in software. Unfortunately, it's necessary to leave TERM and go into the configuration program to alter the communication parameters. TERM allows transmission and reception of files as well as direct keyboard interaction, but without any protocol. It worked well when connected to my CP/M system, and transferred files successfully in both directions at up to 2400 baud.

For reliable transfer at higher rates the more specialised FILINK should be used. Unfortunately, the protocol it uses is not XON/XOFF or ACK/NACK so you'll either have to write a special program or communicate only with Epson machines. It transfers the file name in ASCII followed by 128-byte blocks with their XOR as a check byte, and uses no less than 13 different characters as handshake signals — that is, to establish connection it sends R (ready), receives S (set), then sends G (go)).

'Rather than chasing after the still-confused 16-bit market, Epson has wisely decided to go for the established winners, and is offering a selection of proven CP/M software (including WordStar) bundled with the machine.'

Basic

The Basic supplied with the PX-8 is an extended version of Microsoft's Basic-80, but is not extended to the level of GW-Basic, the version used on the IBM PC and rapidly becoming the new standard. In particular, Epson's Basic does not have the sound and graphics 'sub languages' of GW-Basic, having just a SOUND command with pitch and duration, and only point and line plot commands for graphics instead.

More surprisingly, given the rich hardware environment, it doesn't have the new software interrupt structures such as ON COMM . . . GOSUB and ON TIMER . . . GOSUB, though it does have full support for the RS232 port and the alarm timer. The latter can be programmed through the ALARM command which uses the same clever wild card formats as are available in CP/M. The W option gives WAKE instead of ALARM, which means that a Basic program can be set to run itself at programmed intervals — useful for data-logging or control activities. AUTO START and the automatic power off feature can also be used from Basic. However, the Bar Code Reader and Analogue interfaces are not directly supported and will need a machine code routine to be linked in to read them.

As on the HX-20, the program area is partitioned into five, so that up to five different Basic programs can coexist in memory. Each can be given a name, and a menu of the contents is shown on

entering Basic. Swapping to a new program is done by the LOGIN command.

Decimal, hex and octal constants can be used and double-precision (16-digit) constants are allowed. Integer-, single- and double-precision variables can be optionally declared with DEFINT, DEFSNG and DEFDBL, and type conversion is automatic.

Sequential and random files are permitted for both disks and microcassettes, though random files on the latter can either be read or written but not both (they must be closed and reopened). File I/O is performed in the same way for all external devices, files being referred to by a descriptor which includes the device name they're intended for. Up to 15 files may be open simultaneously, and memory use can be optimised by specifying the number you will be using as an option when loading Basic. For example, BASIC/F:3 will only create buffers for three files.

The Benchmark timings show that the PX-8 sacrifices little in speed to its CMOS processor. They are exactly the timings you would expect for the older desktop CP/M machine with a 2MHz processor.

PX-8 Basic has a full trapping of CP/M BDOS errors, and about time too. If you try to save to a write-protected disk, or to one with a bad sector, you'll get a Basic error message and the chance to retry, rather than being dropped into CP/M and losing all your data as of yore. All things considered, this is a thoroughly professional Basic, with a bias more toward business programs than amusement.

The system disk which came with the floppy drives contained a PROM-burning program, which I assume will be made available to third party software vendors to allow them to put their software into ROM capsules. The fact that no fancy cartridge is used should enable costs to be kept down (if the chip shortage allows them to get any ROMs at all!).

Expansion & potential use

Like the Sharp 5000, the PX-8 is a fully-fledged general purpose business computer and can be used to 'take the office with you' to places where mains power is not available. The 15-hour battery life is adequate for the longest journeys and for any sort of day trip in the field. If no printer or other external devices are employed then this could extend to several days of average use.

Potential users include those people currently using portable computers, from business executives, through salesmen to scientists and engineers. The latter should find the combination of the sophisticated timing facilities, with the ability to run other languages like Fortran, Forth and C, particularly attractive.

For users who require large data volumes, such as a writer or a sales rep logging his contacts and orders, then one of the external RAM disks would be a good purchase. Epson also has plans to release a portable, battery-powered 3¼in disk drive to accompany the PX but no dates are available yet.

Another alternative is to send the data back home by telephone link, rather than store it on the spot. I tried the battery-operated acoustic coupler (CX-21) which can be used with the PX running its TERM program. This is a 300-baud, full/half duplex, answer/originate device, compact and well constructed. One of the rubber cups is on a swivel to accommodate different shapes of telephone handset.

Epson has launched two PX-8-compatible battery portable printers. The P-40 is a 40-column thermal printer and the P-80 is an 80-column thermal transfer (ribbons and plain paper) job. Neither was available for this test but they are both very keenly priced, the P-40 being under £100.

The floppy disk drives (TF-20) that I used for this review are not specially designed for the PX-8 but will work with the HX-20 and the QX-10 desktop too. The twin slimline drives hold 280k per drive, and the unit is 'intelligent' in that it has a processor and boots the operating system into its own RAM (it's possible to boot the drives without a computer connected at all). This allows QX-10 disks to boot the PX-8 and *vice versa*. The drives (connected by serial link) are comparatively slow in transfer rate, and make the most extraordinary clicking noise which had me constantly worried that they were trying to read a bad sector, which they weren't.

'. . . the PX-8 is a fully-fledged general purpose business computer and can be used to "take the office with you" to places where mains power is not available.'

Benchmarks

BM1	3.0
BM2	8.0
BM3	19.5
BM4	19.0
BM5	22.5
BM6	40.0
BM7	62.5
BM8	89.0

All timings in seconds. For a full listing of the Benchmark programs see 'Direct Access'.

Documentation

Only two manuals were sent with the test machine, the User Manual and the Basic Manual; the application manuals are not ready yet. They are chunky spiral-bound soft cover books (no nasty ring bindings to drop pages all over the floor) of over 300 pages each, and they are very good indeed. Both start off ominously by saying that they are not intended as tutorials (some tutorial books on CP/M and Basic are recommended) which is often an excuse for skimpy, hastily-produced stuff written by the programmers. Not so in this case. It's an excuse for clear, concise, no-nonsense, non-patronising information, on a par with that supplied by Apple and Hewlett-Packard. Just about everything you need to know is there and it's fully indexed (20 pages of index in each). The workings of all the utility programs are explained, including TERM and FILINK. The RS232 port is fully documented, including the signals and pin-outs of every alternative cable. The user manual has all those tricky little things like the console escape sequences, lack of which can often hinder you in installing new applications, and even fully documents the special BIOS routines to control the clock. For the professional software writer there is a separate Operating System Manual.

Prices

PX-8	£798
120k RAM Disk	Unconfirmed
Acoustic Coupler	£160
TF-20 Disk Drives	£498
P-40 Thermal Printer	£95
P-80 Thermal Transfer Printer	£160

Conclusion

The PX-8 is without doubt the most capable lap-held computer to be introduced so far. Apart from the fact that it has virtually all the capabilities of a desktop CP/M machine, it also has immediate access to the huge CP/M software base which its 16-bit competitors will find difficult and costly to match. None of the existing lap-helds have attracted an adequate third party software base, largely because of the restrictive hardware limitations and a certain lack of faith in this market sector on the part of the software houses. The PX-8 should change that at a stroke.

Its price, at around twice that of the NEC and Tandy machines, puts it firmly in the professional user market, but it's still at the bottom of the price range for CP/M machines. It's extremely well made and its design makes it a pleasure to use. The variable angle display is a big improvement for word processing when compared to the flat, fixed displays of its cheaper competitors. And for many users, the inclusion of WordStar will alone be enough to tip the balance. **END**



BANKS' STATEMENT

Rip-off, ahoy!

Illegal tape copying is a controversial subject; the moral and practical issues are tinged with both resignation and outrage. Imposing a levy on blank tapes may be one effective deterrent. Martin Banks gives his verdict.

Ahoy, shipmates! Welcome aboard the good ship Rip-off. We're all bound for a little bit of pirating on the high 'C's, Basics, Pascals and Fortrans of this world, relieving rich, over-stuffed, Ferrari-laden superstar programmers of just a few of their ill-gotten gains.

What do you mean — 'But please sir, I'm not a pirate?' If you own a micro, be it for home or business use, the chances are that you have either directly ripped off a program, 'bought' one cheap from a friend, or 'borrowed' a copy for a 'long' time. You only need have done it once to be a naughty person, you know, and though it may seem a trivial offence to you, when you put them all together the potential is there for a rip-off against the software industry in general of gargantuan proportions.

What actually brought the subject of software piracy to the front of my lobotomy was a dinky little brochure that popped through my letter box the other week. It was from the Tape Manufacturers Group (TMG), a lobby group formed to protect the interests of the leading manufacturers of audio and video tapes; companies such as Agfa, BASF, 3M, Memorex, Maxell, Sony and TDK. They are up in arms about the recent proposals to impose a levy on blank tapes that would compensate the 'software' industry (the film makers and the music producers in particular) from being ripped off by home copying for fun, pleasure, and perhaps the occasional profit.

Their complaints are centred mainly around the proposals coming from the film and music industries, but the impacts and issues are also very closely tied to the home computer business with its dependence on the audio tape as the main vehicle of software storage.

In essence, the proposals are based on the idea that each blank tape should carry a levy on the price to recompense, in advance, the film and music business for the products that are going to be copied by Joe Public. The TMG says this should not be allowed to happen, for the perfectly justifiable reason (in its eyes) that it will hit its business.

There is both a moral and a practical question involved here and, unfortunately for the TMG, neither seems to revolve around the economic viability of its business. The moral question has a good measure of sadness and resignation in it. It is sad that the human race, when faced with the straight choice between paying someone the sum negotiated for an item and the chance to rip it off without much risk of getting caught, will invariably opt for the latter course. This tendency is something we must resign ourselves to and legislate for accordingly, which is why we have criminal courts and penal codes.

It becomes difficult, if not impossible, to police this human tendency effectively, where there is some common element to the crimes readily accessible to the law. Seeking retribution via that common element seems sensible. As the crime in this case is the deprivation of a full financial return to an author for his intellectual efforts — by simply copying those efforts onto another tape and not paying for them — then claiming payment 'in advance' by way of a levy seems to have a certain natural justice about it.

And as for those who cry that this unfairly penalises the honest, I would instantly say that this is true. I am, however, also reminded of a quote about they that are without sin being the ones to cast the first stones.

It seems strange that much of the moral argument hinges around the idea that because it cannot be effectively proven that the vast majority of the population is either innocent or guilty of copying, nobody should have to pay for what gets ripped off because it's always done by 'someone else'. The ones that suffer, as usual, are a minority group: in this case the software producers.

The second aspect of levying blank tapes is practical: how would it be administered? In its simplest form this might be the funding of training schemes for programmers and the like, though I see no reason in theory why the people who write the programs shouldn't get the money. If they didn't write the programs, music or films there would be precious little left to copy.

There has been much written and done in the area of software 'dongles' of one type or another (*PCW* is currently funding research in the area together with Acornsoft), but I can't help feeling this is only half a cure. After all, anything one human mind can devise to stop piracy can almost certainly be undone by another human mind of equal or greater ingenuity. A dongle is a challenge. A levy is admitting reality.

The brochure produced by the TMG contains some strange reasons for not putting levies on blank tapes. It draws a clear distinction between home taping by individuals and organised piracy, admitting that piracy is naughty. The effect on the software producer is exactly the same in both cases. One must assume that the pirates get their supplies of tapes from somewhere, and that somewhere ought to be leviable.

The TMG also states that the figures for piracy and illegal copying of tapes quoted by the British Phonographic Industry (specifically concerned with music tapes) cannot be proved, and should be ignored. It couples this with the bland statement that home taping goes on, 'but not to the extent claimed by the record industry,' without offering any proof of its own.

One little gem is the statement that a levy would prompt everyone to say: 'We've paid for it, so let's copy everything in sight.' Strange; wouldn't that be to the TMG's advantage? But then, of course, the money from the levy would go to writers and performers from abroad, creating a drain on sterling. The TMG seems to forget that it's made up of companies like Agfa, BASF, 3M, Maxell, Memorex, Sony and TDK; all good, indigenous British companies?

It also includes the classics: 1) home copiers do not do it for commercial gain; and 2) when referring specifically to film makers (but with comments that apply equally well to computer software), it says they sell broadcasting rights knowing their work will be copied, so it's up to them to obtain adequate compensation in the first place. Otherwise, they should not allow their work to appear.

Right, all you programmers, get your artistic tantrums ready. It's art for art's sake, but money for God's sake. END



Illustration by Willie Ryan

SLASHED

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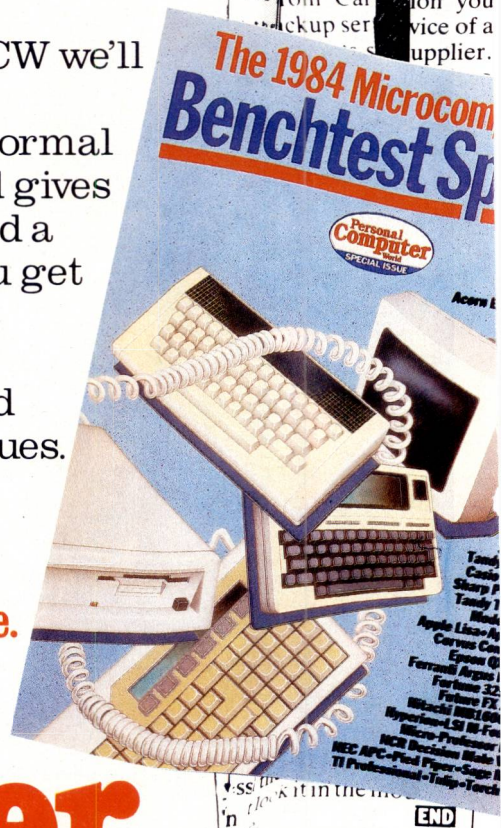
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SOFTWARE

Open Access

Open Access is being pitched directly against Lotus Corporation's integrated business system, Symphony. Implemented on the IBM PC, Peter Bright finds out how well it lives up to its name.

Open Access from Software Products International is one of the first of the new breed of fully integrated business software packages. It incorporates database, word processor, spreadsheet, graphics, communications and a time manager. All the modules can exchange data and each presents a common user interface. The idea is that instead of buying several different packages to do different tasks, you just buy one product that will do everything for you.

Open Access is being pitched directly against Lotus Corporation's integrated system Symphony. Symphony is not yet available in the UK whereas Open Access is available now.

In order to use the product you need: an IBM PC or XT, 192k of RAM, at least two 320k drives — but preferably a hard disk and a graphics board (if you want to draw pretty pictures). The package can work in black and white, but is much more effective in colour.

The product is very well presented. It comes packaged in a very large cream box which opens up to reveal three manuals, a folder containing four floppy disks and various bits and bobs. The first manual gets you started, the second is a more advanced tutorial and the third is a full reference manual. The first two manuals have associated data disks, so you can put the programs in drive A and the relevant data disk in drive B and just follow the examples through.

In use

To start up Open Access simply boot the system using the system disk (IBM really is misguided not to allow software to be shipped with DOS tracks). Next insert the Open Access boot disk and off you go.

The major problem, as far as disk access is concerned, is that Open Access programs take up two disks. This is unavoidable since together they make nearly 650k of code. But it does mean that you have to swap disks around occasionally which can be a nuisance. (On the plus side the system makes this very easy to do.) The only way around it is to use a hard disk. However, I tested Open Access on a twin floppy system.

User Interface

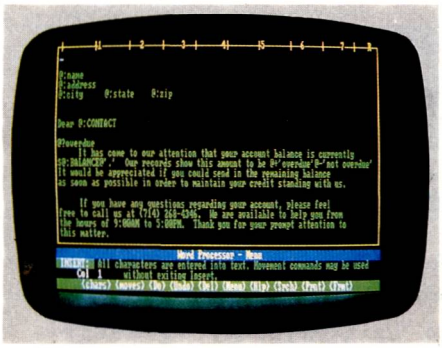
First I'll deal with the common attributes of all the modules.

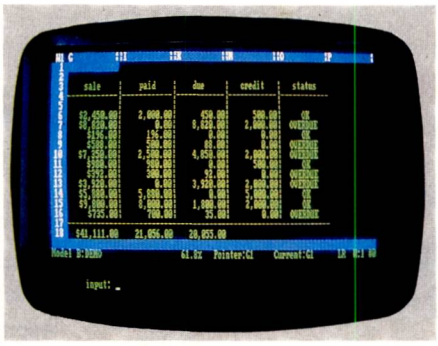
Open Access is controlled by sequences of single keystrokes. Many of the keys control specific functions, so a function key overlay is supplied to indicate which functions have been assigned to the keys. This is a good idea but the problem is that function keys 5, 7 and 9 aren't labelled because their function changes according to the module being used. It took me quite a while to remember which key to use.

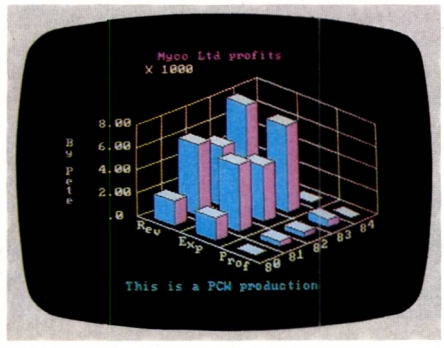
An added problem is that several system functions are controlled by other keys which aren't marked. The manual has a list of key functions, but it's annoying to have to refer to it repeatedly.

Open Access makes widespread use of windows as user aids. If you hit the HELP key (F1), a window is opened to display the available options.

A nice point about the HELP screens is that they are context-sensitive and only display the information required for the job in hand. However, I didn't find them particularly helpful! Generally the explanations are short and meaningless. To choose a module, you move the cursor up and down a window containing a list of available options. When you get to the one needed, hit the







DO key and the module will be selected.

Another more useful application of windows is the SEARCH facility. If you can't remember the name of the file you want to load, hit the SEARCH button. This will open a window showing all the files on the data disk. Again, this facility is context-sensitive, so if you're in the database, you'll only be shown valid database files.

The two other most commonly used keys are the DO and the UNDO keys. The DO key is used in much the same way as the RETURN key in most other applications. I spent my first few hours with Open Access hitting the return button instead of DO. The UNDO key is used to terminate commands.

Data Transfer

A major advantage of an integrated system is that data can be transferred between different modules. Some packages such as Apple Lisa allow data to be passed very easily, others such as this one take a more complicated route.

Data can be sent to and from all Open Access modules, but it is one of the more complex operations. It is not always relevant: for example, you wouldn't want to send data from the Time Manager to the spreadsheet. Others, such as Information Manager to word processor, have up to three different ways of transferring data.

Three main channels of communication are used within Open Access. The first method is the Context command. This allows you to move directly out of one module and into another taking the data with you. It is the neatest and most direct method, but it is not applicable to all modules. The manual contains a warning about it occasionally doing nasty things to your data: for example, if you want to transfer data from the database to the word processor it will truncate all fields longer than 11 characters!

For those of you who value their data, the second method will be more suitable. The Standard Interface Format (SIF) DOS disk file is arranged in a pre-defined format. SIF files are usually an alternative to Context interchange, except when data is being transferred from the word processor when Context transfer is not available. The last method is to use an ASCII print file.

There are other methods of transferring data: for example Open Access can read dBasell files. In fact a whole booklet is made up of data transfer details.

Once familiar with operating the system, you'll probably find that you keep pressing the same sequence of keys repeatedly, Open Access has a facility that allows you to store a sequence of keystrokes which can be called at a later date. This can be helpful if used carefully. The problem is that it remembers keystrokes so the program must be in exactly the same state every time the procedure is called. If this is not the case then the system will happily reproduce keystrokes which could produce the wrong effect.

Information Manager

The first module on the list is Information Manager. This is a very complex module. I'll just look at the highlights here as Kathy Lang (*PCW* database reviewer) will be taking a closer look at this in a future issue.

Information Manager is described in the literature as a 'relational' database. 'Relational' means different things to different people — in this case it means that you can join together up to five files to form a 'virtual file', which is capable of being interrogated in the normal way.

The upkeep of multiple files is aided by the use of the MUST MATCH structure. This allows you to design the input so that a field in one file must match a corresponding field in an associated file.

Information Manager uses a subset of IBM Structured Query Language (SQL) to interrogate the database. This allows you to enter queries in an 'English-like' way. The Query Language uses a number of 'clauses'. Three of the main ones are 'From', 'Where' and 'Select'. The From clause tells the system which file you wish to interrogate but you can interrogate more than one file by joining them with the Where clause.

The input and output of data is achieved by the use of masks. To enter data onto the system, you design the way you want the screen to look and save it in a mask file. When you want to input data to the database you just specify the correct mask. Printed reports can also be formatted in much the same way.

Spreadsheet

Words fail me on new things to say about spreadsheets. This one is fairly standard — it looks very pretty on the colour screen. The two major points worth noting are its capacity and its goal-seeking abilities.

The maximum model size is 3000 rows by 216 columns. This should be enough for most applications.

The goal-seeking ability is a very useful facility not common on spreadsheets. It allows you to set goals and then let the machine work backwards to find the values needed to reach the goal. For example, say you were to tell the model that profits=sales−costs and that costs are a constant £5000 per year. All spreadsheets will allow you to enter different values for sales and will calculate profits. However, only goal-seeking spreadsheets will allow you to enter a figure for profits and work back to the sales needed to reach your target.

The Open Access spreadsheet also has a number of very helpful built-in formulae and two different depreciation formulae: future value calculation and internal rate of return; and modified internal rate of return calculation.

Graphics

The graphics abilities of Open Access are certainly very impressive. To use them you need an IBM-compatible graphics board.

As well as being able to draw the usual line charts, bar graphs and pie charts, Open Access can handle three-dimensional bar charts. These look good but I'm not sure that they're particularly useful.

Most of the major graphics functions are handled from one main menu. This allows you to choose between bar graphs, line charts and pie charts. It also allows you to choose between windowed, overlaid, 3-D and simple 2-D. Some combinations won't work: for example, I had hopes of looking at a 3-D pie chart, but the system just ignored me!

One nice little feature is that you can set up a computer equivalent of a slide show and let the system display a series of graphs. The system can also divide the screen into windows and display multiple graphs on one screen.

The display colours can only be altered in a restricted way. You have a choice of two different palettes: the first is magenta, cyan and grey; and the second is red, green and brown. You can also control the screen colour







INTEGRATED BUSINESS PACKAGES

separately, so you end up with four different colours on the screen.

Word processor

The word processor seems to be very powerful. My lasting memory is that when I tried to delete some text, I (naturally) hit the delete button: no text was deleted. It turns out that the backspace key deletes text. Other Open Access modules use the delete key to erase text, so it is confusing that the word processor doesn't. However, apart from this inconsistency, Open Access generally is very good at providing a consistent user interface.

Although entering text is easy enough, printing documents is rather daunting. In WordStar, when you want to print a document you just hit the 'P' key. In the Open Access word processor you are greeted with a whole print menu. This lets you set the paper width, length, spacing, margins, and so on. If you hit the print key again this selects all the defaults. I'm sure that as soon as you get used to it, the system is very flexible.

Open Access uses a system of printer drivers to make sure that it can be used with a wide range of different printers. Again this is very flexible, and it means that if you change your printer you just change the driver and off you go.

Communications

Until a few months ago, communications was very much a secondary feature of the micro scene. However, a great many packages have appeared recently to link micros. Open Access follows this trend by providing a very comprehensive comms facility.

The first thing I noticed about the comms module was its flexibility. Like the printer interface, the comms module uses a system of drivers. This makes it very easy to change modem. The review copy of Open Access came with two printer drivers: one for a 1200 baud Hayes Smartmodem; and one for the 300 baud Smartmodem.

When I tried this module out, I couldn't get it to work. This may be my problem rather than the package's. The drivers were designed for mega-intelligent auto-dial/auto-answer modems, but the *PCW* budget can only stretch to a no-frills 300 baud acoustic coupler. The result was that I couldn't persuade the package that all I wanted was a simple 300 baud dumb terminal. Perhaps if I'd spent more time on it I could have persuaded it to work.

Time Manager

Time Manager is a sort of electronic cross between a diary and a Sasco year planner.

Each month is displayed as a grid with a box for each day. You can enter all your appointments, and then see at a glance what you are doing at any time on any date. The system can print out lists of appointments and can automatically schedule regular appointments.

Conclusion

Integrated business systems seem to be the current trend and I can only be impressed with this package.

When I started this review, I thought that the whole system would probably be good, but that each individual module would not stand up on its own. This is not the case. All the modules are very impressive, and when the system is viewed as a whole it's outstanding.

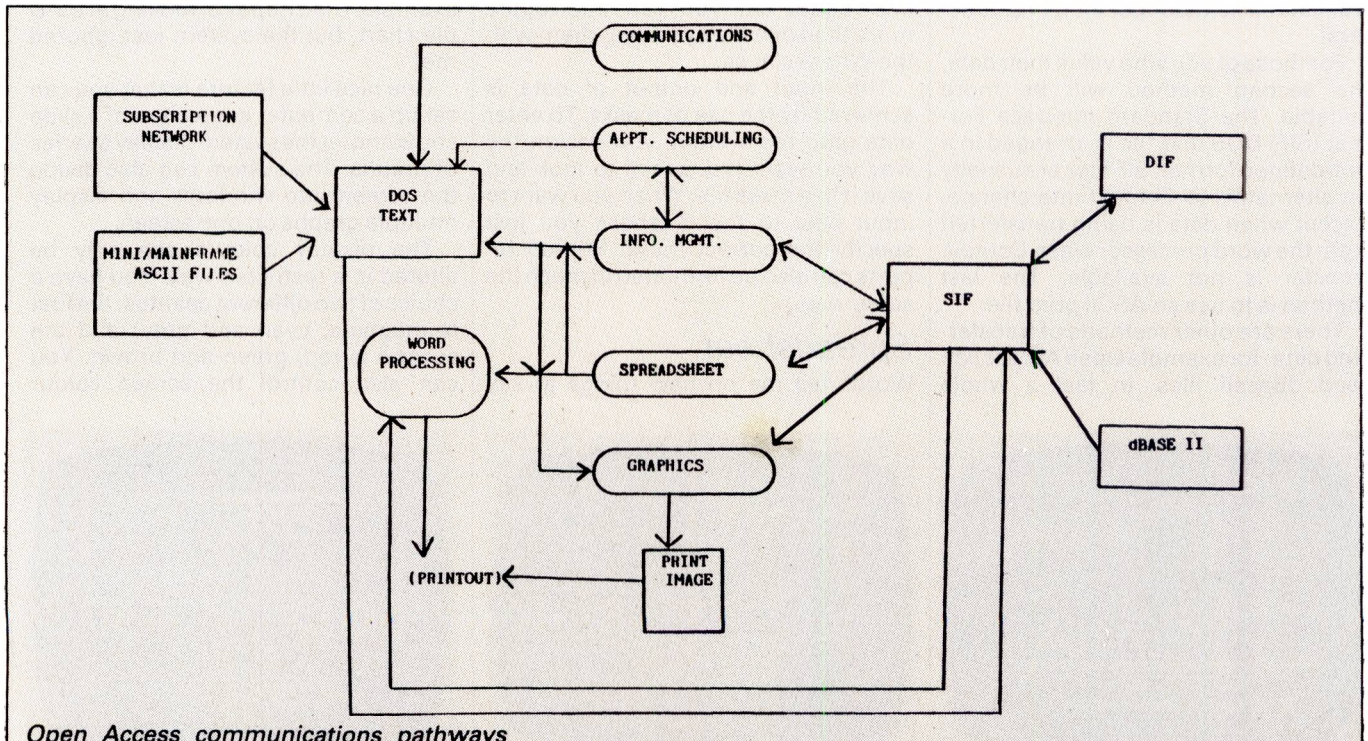
Generally the system was easy to use; I especially found windows and the context-sensitive SEARCH facility very useful. The only moans I have are that the control keys are sometimes obscure — it's annoying having to reach repeatedly for the reference book to find which key to use.

My other criticism of Open Access is that it can be complicated to move data from one module to another. The transfer is not difficult, it's just that the user is sometimes faced with up to three alternative ways of doing the same thing — each method is subtly different and it's not always obvious which one to use. A better bet would be to tell the system you want the data moved and let it worry about how to do it.

Overall, I found Open Access very impressive. It's a pity that it is only available on the IBM PC, but this is what happens when one manufacturer dominates the market. As a final point of consideration it will be interesting to see how it compares with Lotus Development Corporation's Symphony when the latter is released in this country.

END

Open Access costs £450 and is distributed in the UK by Softsel. Tel: (01) 844 2040



Open Access communications pathways

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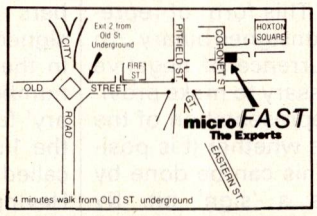
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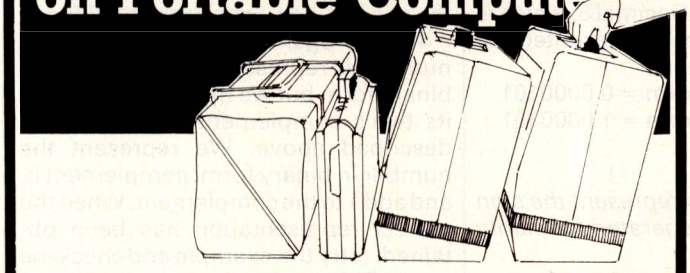
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TEACH YOURSELF ASSEMBLER

Paul Overaa continues his series on assembly language programming with a general discussion of arithmetic operations.

This is part five of PCW's Teach Yourself Assembler series. It's unique in using Basic as its point of reference, and avoiding the 'drop you in it' approach often used on this subject. Three processors, the Z80, 6502 and 8080 are covered in detail, but enough information is provided to enable users of other processors to follow the course. Copies of earlier articles in the series, which started in February 1984, may be obtained from our Back Issues dept (see page 286).

The 8-bit processors, such as the Z80, 8080 and 6502, have instructions to perform only elementary addition and subtraction. To provide anything more sophisticated requires us to program the more complex procedures in terms of these simple operations. This month we look at some general ideas, then next month we'll relate this to assembly language routines.

We 'take for granted' the facilities offered by high level languages for adding, subtracting, multiplying and dividing, and an appreciation of how languages, such as Basic, actually perform the 'arithmetic' is useful for gaining insight into the problems involved when providing such facilities. Our first job is to look, in a general sense, at the way we represent numbers inside a computer.

Integers

With the eight bits of a single byte we can represent numbers from 00000000 Binary to 11111111 Binary — that is, from 0 to 255 decimal. To represent larger numbers we must use 'more bits'. By using two bytes for the representation we can deal with integer numbers up to the value 65536 (1111 1111 1111 1111 Binary). The magnitude of a number that can be represented in this way is therefore limited by the number of bytes we choose to assign to its representation. This form of representation is called 'unsigned binary'. To allow for the occurrence of negative numbers it is necessary to make provisions within the representation of the number to indicate whether it is positive or negative. This can be done by using one bit as a 'sign' bit. By convention, we use the most significant bit, the left-hand bit. It is set to zero to represent a positive number and to 1 to indicate a negative number. An 8-bit 'signed binary' number will therefore have only seven bits for the numerical value. For example, Decimal 5, which is 101 Binary, can be represented as follows:

+5 Signed binary form = 0 0000101
−5 Signed binary form = 1 0000101
^
|

(Leading bit used to represent the sign of the number — separated for clarity only.)

By using a suitable number of bytes, and using one bit as a sign bit, we can represent both positive and negative numbers of any magnitude. Are our problems of representation over? If we just wanted to represent the numbers, then yes. The problem is that we want to manipulate them (add, subtract, and so on). We'll first add two positive numbers, 4 and 5, as an example:

+4 is 00000100
+5 is 00000101
Result 00001001 represents 9 (which is correct).

Now we try adding the two numbers −4 and +5:

−4 is 10000100
+5 is 00000101
Result 10001001 represents −9 (which is incorrect).

The correct result is +1, so clearly a problem exists with the representation, or the way we are using it. The solution lies in using 'two's complement' representation. In this form, positive numbers are represented in the usual signed binary form. The difference lies in the representation of the negative numbers. We take the 'unsigned binary' form and complement it: turn all the 1's into 0's and 0's into 1's (often called the 'one's complement' form). Having done this, we add 1 to the result to obtain the final 'two's complement' representation. It can be shown that by using this representation, the results of arithmetic operations, including the sign, come out correctly.

Here are some examples to outline the general idea. Let's try the addition of −4 to +5 again. +5, being a positive number, is represented in usual signed binary form but we must convert −4 to its two's complement in the manner described above. We represent the number in binary form, complement it, and add 1 to the complement. When the correct representation has been obtained, retry the example and check the result. The details are shown in Fig 1.

One of the 'rules' of two's complement arithmetic is that the setting of the carry flag can safely be ignored.

If the magnitude of a result is too large to be expressed within the bits allotted for the representation of the numerical part of the number, it's possible for the sign bit to be changed accidentally. This is called 'overflow' and the effect is an incorrect result.

The most obvious cause of such an error is an 'internal carry' from bit6 to bit7, as the following example will show:

0 0111111 two's comp form of +63
0 1000001 two's comp form of +65
1 0000000
↑
(The 'sign' bit has been changed due to a carry from bit 6 to bit 7.)

Overflow can also occur when we add two negative numbers. In general, it occurs when the result cannot be

expressed in the seven bits available. It is obviously useful to be able to detect such a condition and most processors, including the Z80 and 6502, have an 'overflow' flag for this purpose (the 8080 does not possess an overflow flag).

Multiple-byte integers

The magnitude of the largest integer we can represent is governed by the number of bytes used. We can show this by looking at how Microsoft's Basic stores the 'integer variables'. When you write the Basic statement LET X% = 10, the per cent sign indicates that an integer variable, x%, is being assigned the value 10. Can we write a program to look at the internal representation of such a number ? Yes, easily.

The function VARPTR(X%) is used to obtain the address of the variable X%. This byte, and the contents of the following byte, are examined using the PEEK() function (after prior translation to hexadecimal form by use of the HEX$() function). For hex numbers less than 16, the HEX$)) function returns only one character (for example, F rather than 0F), so we add the '0' to such numbers from within the program. The program in Fig 2 asks for an integer value and prints the hex form of the internal representation.

(Note: The function VARPTR(), an abbreviation of 'variable pointer', is normally used to pass addresses of variables from a Basic program to an assembly language routine.)

If this program is run with the number 15, 000F will be obtained, which corresponds to the binary number 0000 0000 0000 1111. With −66, you will get FFBE — Fig 3 shows the reason why.

Conversion to the two's complement form

00000100 is binary 4
11111011 One's complement form of −4
11111100 Two's complement form of −4

Addition of the two's complement forms

```
    11111100  −4  (two's complement form)
    00000101  +5  (two's complement form)
(1) 00000001  Result +1 (which is correct)
 ^
 |
Carry flag is set
in this example
```

Fig 1 Addition using two's complement arithmetic

```
4 REM
5 REM
6 REM
10 INPUT Please enter integer value; X%        Input an integer value
20 MSB$=HEX$(PEEK(VARPTR(X%)+1))'              Most significant byte
30 IF LEN(MSB$)=1 THEN MSB$=0+MSB$
40 LSB$=HEX$(PEEK(VARPTR(X%)))'                Least significant byte
50 IF LEN(LSB$)=1 THEN LSB$=0+LSB$
60 PRINT MSB$+LSB$'                            Shows how X% is stored
70 END
80 REM
```

Fig 2 Print hex representation of integer X%

	< MSB >		< LSB >	
66 =	0000	0000	0100	0010 Binary
Complement	1111	1111	1011	1101
Add 1				1
Two's complement form	1111	1111	1011	1110
Equivalent Hex form	F	F	B	E

Fig 3 Explanatory details for −66

Floating point representation

The representation of wide ranges of decimal numbers has its own special problems. The usual way of coping with wide variations in magnitude is to use scientific notation. For example, 26063.15 can be represented as 2.606315×10^4, or -0.000003415 can be written -3.415×10^{-6}. This gives a clue to providing a similar computer representation. We need to reserve bits for the mantissa, and further bits for the exponent. We also need to indicate the signs of each part of the number. In scientific notation, we 'normalise' the number by moving the decimal point to a position where the mantissa takes a value between 1 and 9.999. It transpires that for floating point representation, it's better to move the 'binary point' to the far left of the number:

111.1101 is represented as $.1111101 \times 2^3$

.0000111 is represented as $.111 \times 2^{-4}$

The general floating point format is based on a schematic form, m and n varying according to the number of bits chosen. Fig 4 illustrates the essential idea.

1 bit	n bits	1 bit	m bits
Sign	Exponent	Sign	Mantissa

Fig 4 Schematic form

Binary coded decimal

For some applications, it is necessary to have complete numerical accuracy. An often quoted example is the use of computers in accountancy. For these applications, an alternative representation called 'binary coded decimal', or 'BCD', is sometimes used.

The principle is to code each digit separately, using as many bits as necessary. Each digit requires four bits with some combinations being unused:

BCD	Number
0000	0
0001	1
0010	2
0011	3
0100	4
0101	5
0110	6
0111	7
1000	8
1001	9
1010 – 1111	Unused codes

Two digits are packed into each byte, thus the amount of space a number will require is dependent on how many characters are present.

The advantage of representing numbers in this way is that complete accuracy is obtained. The disadvantages are firstly, that more memory is required to store the numbers and secondly, that arithmetic operations are slower. END

Next month: Having briefly described some of the more common ways of representing numbers within a computer, we turn our attention to simple routines that use some of the forms we have discussed. In the meantime, try this experiment: take a number and multiply it by 2, 4 and 8. Express the number and all the products in their binary form. What do you notice about the bit patterns?

The story behind MSX

Tom Sato uncovers the success story behind ASCII's development of MSX — a badly needed computer standard.

In the centre of the MSX operation is one revolutionary company called ASCII. ASCII has set standards which a large number of manufacturers now follow. The Japanese computer industry badly needed an industrial standard. There were a huge number of micros with limited software and this deterred many would-be computer buyers.

Origins

ASCII started off as a small publishing company back in 1977, the year when the PET 2001, APPLE II and TRS-80 came onto the market. That July ASCII started publishing its computer magazine of the same name — in terms of history, and circulation, it's the Japanese equivalent of *PCW*.

The following year, having realised that US software was far superior to Japan's, vice president Nishi flew to the US and signed a deal with Microsoft to set up a company called ASCII Microsoft. ASCII footed the bill to set up the new company, so ASCII Microsoft is a 100 per cent Japanese company with ASCII holding all its shares.

At that time the Japanese electronics giants, NEC and Sharp, were developing their own micros after seeing Apples and PETs being sold like hot cakes. ASCII's first deal was to supply NEC with a modified version of Microsoft Basic for the NEC PC8001. This was the turning point for ASCII and ASCII Microsoft. The success of the PC8001 brought in more business and as the number of personal computer manufacturers increased, so did ASCII's business. At the time of writing, ASCII Microsoft's Basic dominated 80 per cent of Japanese personal computers including Hitachi, Fujitsu, NEC, National Panasonic.

ASCII Microsoft's task is to adapt the language to individual machines and 'Japanise' it so most computers with Microsoft Basic can handle Japanese characters.

Earlier this year I went to ASCII in Tokyo and met Hiroshi Watanabe, one of the vice managers of ASCII.

He told me: 'The MSX machine is designed to be easy to adapt. We gave the prototype MSX computer to all interested so all they had to do was modify it, which wasn't difficult. By November last year 11 manufacturers announced their products to our amazement.'

MSX machines use old technology. But the way the Japanese have adapted the ageing Z80 and TMS 9918 chips and executed the whole operation is an eye opener.

The philosophy behind MSX is standard hardware which any manufacturer can build with identical software. The chips used in MSX are produced by many second source manufacturers. The Z80 is made by NEC, Sharp and a number of others. The same goes for the graphics chip and the sound generator, so there should be no chip shortage problems. The sheer number of MSX makers means that no one semiconductor manufacturer can cope with the demand. Also the Z80 and TMS 9918A are tried and tested and no one has to learn new technology.

In terms of cost the Z80 and TMS are now very cheap compared with some exotic VLSIs. In the UK, computer manufacturers reduce the cost of computers by using the latest technology: Ferranti ULAs for the Sinclair Spectrum and BBC Micro are examples.

ASCII sold prototype MSX machines to software houses well before the launch of MSX computers, so by the second month after the launch of the machines there were about 100 software titles independently produced. Arcade video game producers were also encouraged to move into the home computer software market. Namco, which created Pacman, is now converting most of the coin-operated arcade games to the original specification for MSX computers.

MSX is made as expansible as possible; it can handle up to 16 I/O ports so you can plug in anything from a disk interface to expansion RAM. This expandibility meant that the MSX makers were quick to include various firmware and peripherals for their machines. The choice of graphics chip (TMS 9918A) means that user memory is not eaten up by using high resolution graphics; it has its own 16k video RAM. Also this chip can handle sprites as well as 16 colours in high resolution.

On the negotiation side, ASCII has been able to reap the harvest of past efforts in selling Microsoft Basic. But what is ASCII's plan for the future of the MSX system?

'Well', said Wantanabe, 'the blueprint of a second generation MSX is already drawn up. I think MSX will be around for a long time. The reason why Apple was so popular for such a long time was because of the huge amount of software and peripherals. MSX has a similar quality and MSX will expand around the same basic system for quite a while.

'The MSX-DOS for floppy disk drives is now in working order at our laboratory and manufacturers will be releasing disk drives in May. The disks are not standardised but MSX-DOS is the same for all disks. It is possible to have 3.5in and 5in floppy disks at the same time and transfer data between them. The popularity of floppy disks among home computer users has recently increased dramatically.

'As for software, we have converted Microsoft's Multiplan to MSX. Also various languages which run under MS-DOS including Fortran, Cobol, Logo and Pascal will be converted to MSX.'

Watanabe continued, 'We have about 100 games software titles now, increasing rapidly. Before the launch of MSX we sold prototypes to various software houses to enable them to get started early. Quite frequently a software house would send in a prototype of its MSX software and ask us to test it. We have all the MSX computers in our laboratory to do this. We also support smaller software houses which have limited finance. ROMs have to be made in a large quantity to be cost-effective, so we do that for them.'

'What of future MSX hardware?' I asked.

'A number of VLSI manufacturers are now working on customised chips for MSX,' said Watanabe. Thirty or so chips will be reduced to about five but with total hard/software compatibility. The MSX chips will cost less thus enabling reduction in the overall price of MSX computers. This opens a wide horizon for MSX as there is a possibility of MSX ICs being used outside computers: for example, they can be used for controlling videos and TVs.'

Will MSX computers be sold in the US and UK?

'The US market is entirely different from Japan's,' said Watanabe. 'There is the tremendous power of companies like IBM and most of the home computer manufacturers are involved in a bitter price war. Some Japanese manufacturers have expressed doubts over exporting due to volatile foreign markets, but there is no doubt that the machines will be sold abroad,' he concluded.

Conclusions

What ASCII has created is the Japan Computer Industry Inc, with almost all the electronics giants participating. It has considerable strength combined with an ability to market consumer electronics. The company has an impeccable record for quality control.

It is almost inevitable that MSX will be exported, as with hi-fi and videos. Whether British manufacturers will be able to withstand the tidal wave of MSXs has yet to be discovered.

END

Kuma

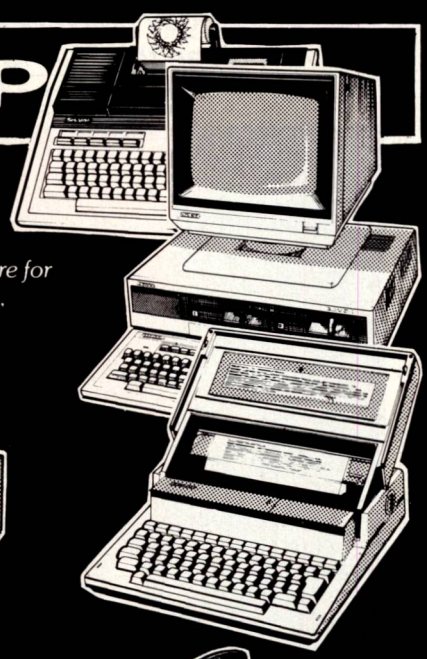
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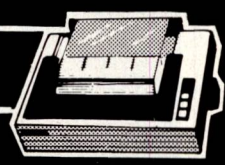
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Sinclair QL

The launch of the QL represents Sinclair's logical progression into the business computing sector. However, the company's failure to honour its 28-day delivery promise has brought widespread criticism but, ironically, given the QL a lot of 'free' publicity. Is it worth the wait? David Tebbutt got hold of the first working model and reports exclusively for PCW.



Was I the only person in the world who wondered what all the fuss was about when the QL was launched? People kept on about the Motorola 68000 processor and the 128k of memory, not to mention a souped-up version of Basic. Multi-tasking and windows were thrown at me in a generous attempt to win me round but everything failed. No matter how I tried, I could not get enthusiastic about the QL.

The responses warmed up a little when I read the descriptions of Psion's four programs — Archive, Easel, Quill and Abacus, which compared on paper very favourably with many commercially available packages. But I was still left with doubts; after all, how can anyone do anything serious with a Microdrive?

It wasn't until I had been using the QL for many hours that I twigged what it was all about. Like the lap-helds and the Macintosh, the QL has been designed for serious personal use. The supplied applications are just what the professional user needs to get started. Of course, the built-in SuperBasic will appeal to the enthusiast, too, but I suspect the bulk of QL sales will be to people who would like a business computer but cannot afford the cost normally associated with such a purchase.

The QL costs £399 including VAT but you'll need a printer which will cost from around £250. If you use your existing television, you are ready to go for £650. I would strongly advise buying a monitor if you plan to use the QL for hours at a time. This might cost you another £250, so you still get away with a computing facility for less than £1000.

The main psychological difference between the QL and the other machines mentioned earlier is that the QL is only available by mail order at present. With the lap-helds and the Macintosh you can go into your local dealer and beat him round the head if anything goes wrong. Not so with the QL. There is a thing called the QLUB which, for £35 per annum, entitles you to a newsletter and software enhancements. (Common bugs are fixed for nothing according to Sinclair.) You may also send written queries about the software and these will be answered in writing (in due course, no doubt). All of which means that you're on your own if things go wrong, or if you simply can't get the hang of something.

At the time I carried out the review (mid-April) there was still no sign of any QL shipments, although Sinclair was saying — with a degree of conviction — that the machines would start trickling out at the end of April. If this is the case, then I think they will be going out with a few known holes in the firmware and with some sort of voucher scheme which will entitle buyers to an upgrade when Sinclair finalises the system.

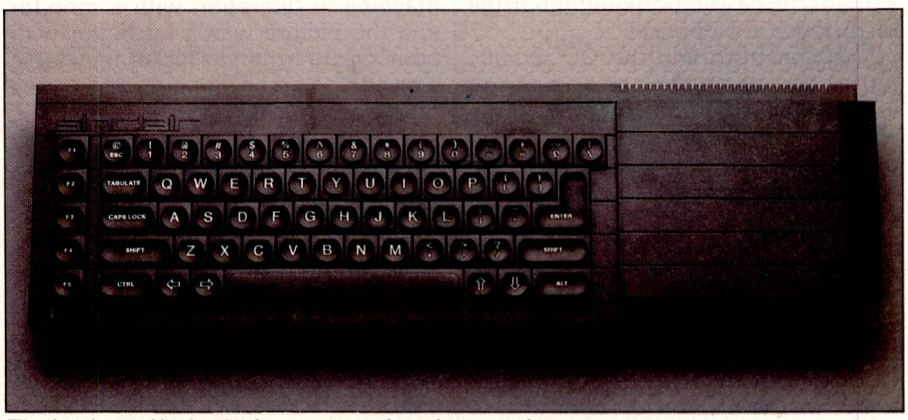
At the moment the firmware is held in three 16k EPROMs which means that one of them must occupy the ROM slot at the back of the machine. You will not be able to run early QLs without this expansion ROM pack. Once the operating system is tucked away on real ROMs, I am told that it will fit inside the QL (on one 32k and one 16k ROM) and the ROM pack slot will be freed. Quite how the upgrade will take place, I have no idea. I suppose some sort of call-in system will be necessary as I can't see the average QL user taking the machine to bits to replace ROMs. I also find it hard to visualise people who have become dependent on the QL giving it up while the problem is sorted out. I suppose this latter group will stick with the expansion ROM until they find they need the slot for something else.

While the QL is only available by mail order, I would expect only those already familiar with computers to buy one. Of course this is a pretty hefty market these days so I don't think Sinclair will be short of customers. Once QLs get into the shops and stores, then I think that computer naive people will be taking a serious look too.

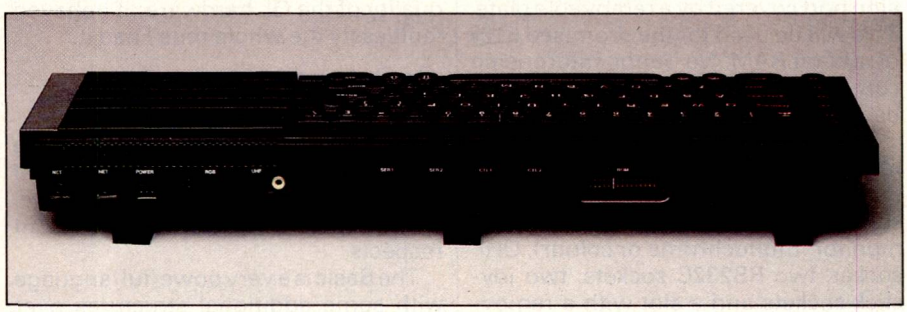
Hardware

A working QL comprises a keyboard with two integral Microdrives, a power supply, a television or monitor and its associated lead. Early versions will also need a ROM pack plugged in at the back. An RS232C cable and a network cable are also supplied with the machine. If you do a lot of typing, you might find the keyboard lies a bit flat. To overcome this, Sinclair has supplied three funny little plastic feet which are supposed to fit into rubber pads under the keyboard. I found that these fell out regularly and in the end I dispensed with them and got used to a new typing position. To compensate for this I found that the printer cable worked first time with my Epson MX 80F/T. The network driver still hadn't been implemented in my version of the operating system, so attempts to talk to my son's Spectrum were doomed to failure.

Just in case you were wondering about the QL's portability, Sinclair boasts that it weighs around three pounds. What it doesn't boast about is that the separate power supply weighs over two pounds! Also, you still need the television and, at eighteen or so inches wide, the QL cannot be slipped into a briefcase like its ZX predecessor.



The keyboard is the 65-key conventional qwerty layout



L to r: sockets for networks, power, 8-pin DIN, UHF, RS232C, joysticks and ROM

Keyboard

The QL has the sort of style the public has come to expect from Sinclair. The potential monotony of an all black rectangular casing is relieved by a textured surface and some ribbing at the right-hand side. The 65-key conventional qwerty keyboard looks very neat, not at all unlike the NCR DMV. Despite the inevitable membrane mechanism underneath, the keyboard feels good and positive in operation. The Microdrives are hidden under the flat area to the right of the keyboard.

The keyboard highlights the fact that we are not really looking at a traditional Sinclair machine. With its ESC key, five function keys, CTRL and ALT, it would seem to represent a quantum leap by this company into the arms of convention. I must say I'm relieved. I felt immediately at home with the QL and found I could get on with the important business of using it for productive work. The '3' key has the hash sign

above it but, don't despair, a pound sign is provided in the top right-hand corner next to a back-slash key, apparently vital when programming in C.

A yellow light at the front of the keyboard tells you when the machine is on and a red light in front of each Microdrive tells you when it's in use. A row of slots under the Microdrives provide a degree of ventilation and also conceal a piezo-electric speaker. A covered expansion port on the right allows up to six Microdrives to be added. Incidentally, they are not the same as the ZX Microdrive although the blank tapes are identical.

The Spectrum and the QL actually format their tapes differently so, if you want to exchange information, you'll need to use the network. The Microdrive cartridges have a capacity of at least 100k. In theory they can take up to 255 sectors, each of 512 bytes on a 200 inch tape loop. A reset key next to the Microdrive expansion port is an improvement on the ZX range which requires you to pull out the power supply lead to obtain the same effect. Like the ZX range, there is no on/off switch on the QL. The left-hand side of the keyboard has an enormous expansion port covered by a removable plate. This will be used for the promised 512k of add-on RAM. No doubt enterprising companies will invent all sorts of devices to plug in here.

Turning to the back of the keyboard, reading from left to right, there are two network sockets, a miniature power socket, an 8-pin DIN socket for the monitor (monochrome or colour), UHF socket, two RS232C sockets, two joystick sockets and a slot with a removable cover for the ROM pack. This pack can hold up to 32k. The RS232C and the joystick sockets are like those newfangled telephone jack sockets. If one RS232C socket doesn't do what you want, you can try the other which has its signalling pins reversed.

Removal of the 10 screws which hold the QL together reveal a very tidy interior. The main PCB is very crowded but neatly laid out. The large Motorola 68008 can be seen on the left, 16 chips make up the 128k RAM, two EPROMs contain the operating system and SuperBasic and an extra 8049 processor controls the keyboard among other things. Four Sinclair-designed ICs control the display, memory, RS232C, network and Microdrives. Over on the right are the Microdrives which look just like the innards of the ZX Microdrives. Behind them is an enormous heat sink which nicely warms the flat panel to the right of the keyboard.

The keyboard is covered by an aluminium plate which when removed reveals the mechanism. The key presses down on a sort of moulded soft plastic dome. The dome has a spike moulded on its inside which in turn presses down on a sheet of plastic printed with metallised tracks. This presses in turn on another similar sheet thus completing an electrical connection between two tracks — one on each sheet. It sounds nasty but it actually works very well. Once you appreciate how the keyboard works, you can feel it in use but I doubt that most people would notice.

I used the QL with a domestic television; and I must admit that it got a bit tiring after a while. I have seen the machine in operation with a monitor and the picture was a lot better with none of the irritating flicker inevitable with UHF. The computer display wraps off the corners of the television screen, another reason why a monitor may be preferable.

On the other hand, it is possible to select from a variety of character sizes and display resolutions so that you can reduce the problems somewhat. Psion gives users a choice of 80,64 and 40-column displays for its programs. The 64-column display works very well: I found myself using that mode all the time.

Overall, I was very pleased with the quality of the QL hardware; it behaved faultlessly the whole time I had it.

Software

SuperBasic

As I mentioned earlier, the operating system and the Basic were not finished on the machine I tested. They were, however, complete in most important respects.

The Basic is a very powerful language with some additional structures over and above the earlier ZX Basics. Particularly impressive is the ability to define extensions to the language using the procedure definition facilities. One current limitation in SuperBasic restricts overall program size to 32k. This is to do with the internal error checking. Sinclair tells me that this restriction will be lifted in due course.

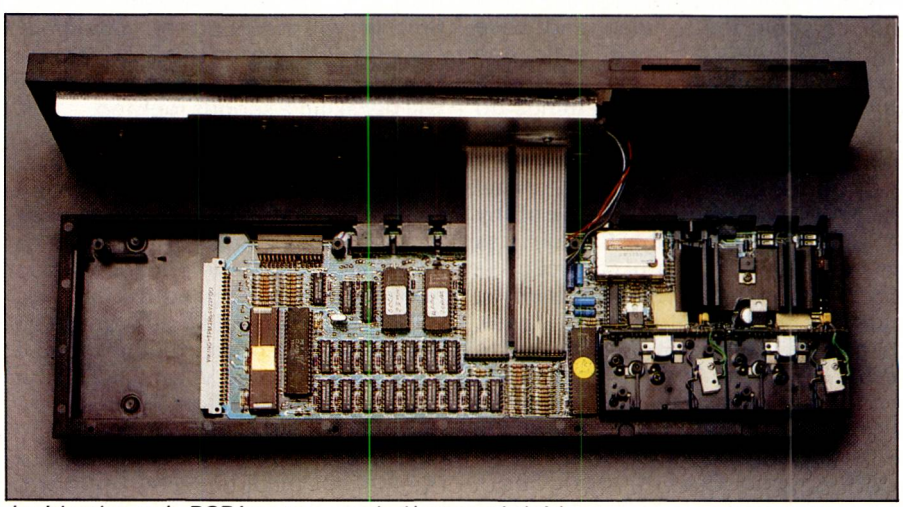
The other major omission in the review machine's Basic was the full screen editor promised at launch. At the time of writing, the only way to edit a line of Basic is to re-enter it.

That's all the bad news; now let's look at what's actually in the Basic and perhaps see why it has been christened SuperBasic.

The Basic follows a similar pattern to all Basics. I had few problems writing little routines. I know I shouldn't admit this but I must confess to having introduced a couple of GOTOs in my programs. SuperBasic doesn't mind; it just makes them a bit unnecessary. Anyway the point of this confession is that you cannot say IF . . . THEN and a line number, you must say IF . . . THEN GOTO. Basic commands must be typed in full — there is no keyword entry system, although I suppose you could create your own using the procedure definition facilities.

An AUTO line numbering system was missing on my copy but I have been assured that it will be included in the released version. This, coupled with a RENUMBER command, will lead to tidier programs. BAUD sets the baud rate of the two RS232C ports — yes, both of them must be set to the same speed which can be one of eight between 75 and 19200 baud. 19200 is reserved for transmission only. BEEP makes sounds through the grotty speaker. Pitch and duration can be varied, as well as things like second pitch and bounce, which 'bounces' the sound between the two pitches. A fuzzy option adds a random number to the pitch on each cycle causing an appropriate distortion. Fine for fun but not of massive practical benefit. I hear that an external sound generator is under development which should help.

The Basic contains an impressive range of graphics facilities as you might expect. Windows, borders and blocks of colour can all be created on the 512 × 256 resolution screen. Up to four



Inside: the main PCB is very crowded but neatly laid out

colours are available in this high resolution mode and the lower resolution (256 × 256) gives eight colours plus flashing.

The MODE command lets you switch between 256 and 512 screen widths. When you define the ink and paper colours, you can also define a stipple pattern but, unless you like shimmering, don't use it on the domestic TV . Character sizes can vary in width in four stages from 6 to 16 bits wide and, in height, either 10 or 20 bits high. This would be useful in headings or in applications for young children or partially sighted people, for example. A PAN command allows you to slide the contents of a window sideways. Once you have lost stuff from the window you can't get it back without regenerating it.

Windows are handled by allocating each one a spare channel then you simply address your Basic commands to the chosen channel. It really is a doddle.

Now for the various control structures available in SuperBasic. Firstly there's DEF FN which is probably already familiar to you. It allows you to define a function which returns some sort of value to the line using it. It also allows you to use local variables through the LOCAL statement. These may have the same name as variables outside the function definition but they will not become confused during execution of the program. DEF FN is terminated with END DEF. Similarly DEFine PROCedure is terminated with END DEF and it, too, allows local variables. When defining the procedure, any parameters needed are placed in brackets: for example, DEF PROC F (LIMIT), but when the procedure is used the brackets are not needed: for example, F 23. You can do some super things with this facility and, of course, it does away with GOSUBs and the complications of parameter passing.

And that's not all. The old familiar FOR . . . NEXT has a new twist. It allows you to slip some commands after the NEXT but before the END. REPeat gives you a repeating loop which you escape via an EXIT command embedded somewhere in the structure. Perhaps you need to wait until an input satisfies a test before moving on. Once again this is an attempt by Sinclair to encourage GOTO-less programming.

The final neat structure I'd like to mention is SELect. Used with ON this gives a similar effect to ON . . . GOTO but you can embed all the actions inside the procedure itself. For example, SELect ON a can be followed by ON A=1 and then all the things you want to happen if A=1. The next ON will stimulate a new set of actions for a second value of A. This command ends with END SELect. Very neat.

SuperBasic has an interesting feature which Sinclair calls 'coercion'. This allows you to mix your variables when performing calculations. For example, it will let you add '2' to '2' and still get '4'.



Archive (the database) is one of four excellent business cartridge programs supplied free with the QL

Finally, the Benchmark timings. They put the QL in the top third or so of all machines tested by *PCW*. Frankly, the comparative speed of machines is insignificant; it's far more important to take the broader view and decide how the facilities offered compare.

QDOS

The QL operating system, QDOS, is busily working in the background whenever the QL is in use. It makes its presence known, for example, when you need to run jobs in different windows and when you are transferring data to and from the Microdrives.

When the QL is first switched on, the screen is divided into three separate windows. The bottom few lines of the screen is a command entry and message display area where all the direct interactions with QDOS and SuperBasic take place. The top of the screen is then divided vertically with the upper left being used for displaying the developing Basic program and the upper right displaying the user view of the program when you run it. The bottom of the screen is attached to channel 0, the listing area to channel 2 and the program execution area to channel 1. It is a simple matter to direct commands to the appropriate channel.

QDOS handles multi-tasking by dividing processing time between the various jobs being executed, and according to their built-in priorities. As I said earlier I couldn't set up an adequate test system to see how this performed. What I do know is that at the launch it was less than impressive. The fact is that the QL can do several things at once. The performance depends more on the quality of the programs running than on the inherent capability of the operating system.

As you may have guessed from the channel numbers, all I/O is device-independent. You simply choose your channel, attach your device to it by saying something arcane like OPEN £5; CON_200×200a50×50_and you have created a 200×200 bit window starting at location 50×50 and with a keyboard buffer of 32 characters. Easy isn't it?

The really annoying thing about QDOS for me was that I had to put an underline at the end of my Microdrive commands. For example 'DIR MDVI' does not give a directory of Microdrive 1 whereas 'DIR MDV1_' does.

Benchmarks

BM1	2.1
BM2	6.4
BM3	10.7
BM4	10.3
BM5	13.2
BM6	26.1
BM7	61.8
BM8	25.8

All timings in seconds. For a full listing of the Benchmark programs see 'Direct Access'.

Applications software

Without doubt, the Psion programs tip the scales heavily in the QL's favour when comparing the system against others.

Four packages are provided: word processor, database system, spreadsheet program and business graphics. I used all four programs to a limited extent. Then I chose to plunge into the database program in detail.

I'll start with the others and then take a closer look at Archive, the database.

Easel was the largest and most complicated to program, yet it appears to the user as the most trivial and the easiest to use. It's great for bringing numbers to life. At the simplest level you can literally load the program and start keying in numbers and immediately a histogram appears on the screen. If you go off the scale it automatically rescales itself and lets you carry on. If you want to enter another set of figures, simply choose a new name and start keying the new ones.

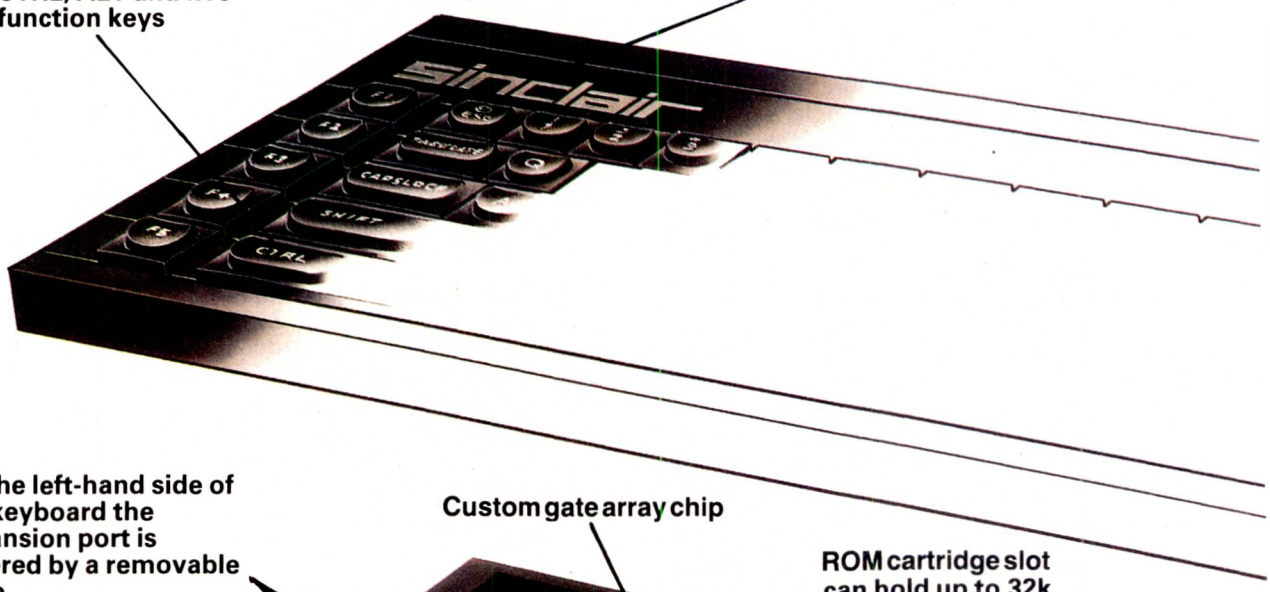
Let's say the first lot were called 'TURNOVER' and the second lot 'COSTS'. You could easily create a third set by saying 'MARGIN=TURNOVER-COSTS'. These can then be displayed individually as histograms, line graphs or pie charts or they can be superimposed on each other to show the relationships between differing sets of figures. Text can be added to the charts, and moved around, and everything can be printed — provided your printer is capable of graphics.

You can read in files which have been prepared either by Abacus, the spreadsheet or by Archive, the database. Such data will be displayed according to the currently selected format. Data can be transmitted from this program to others in the form of tables of numbers.

Deeper inside the package there are

65-key conventional qwerty keyboard — good and positive feel

The keyboard shows Sinclair's move into conventionality: ESC, CTRL, ALT and five function keys



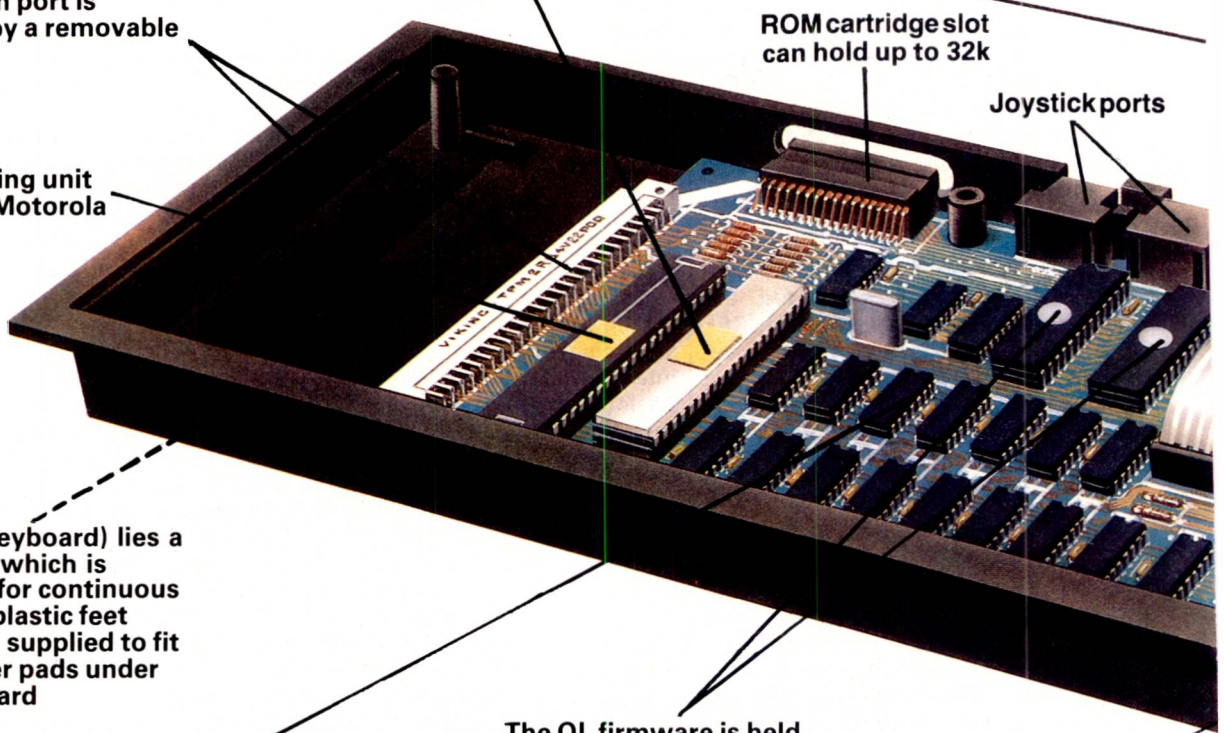
On the left-hand side of the keyboard the expansion port is covered by a removable plate

Custom gate array chip

ROM cartridge slot can hold up to 32k

Joystick ports

Central processing unit (CPU): 7.5MHz Motorola 68008

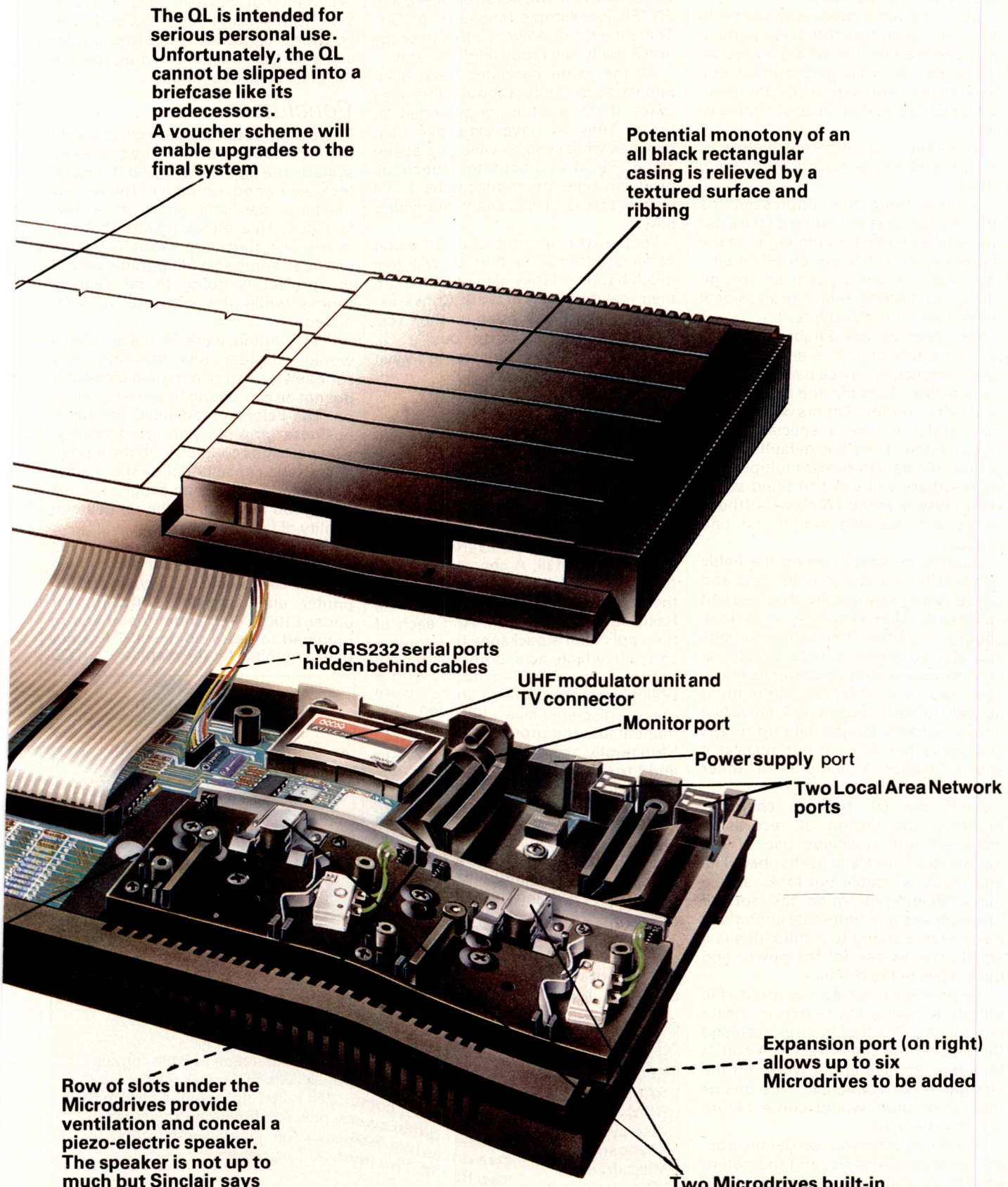


The QL (keyboard) lies a bit flat — which is annoying for continuous use — so plastic feet have been supplied to fit into rubber pads under the keyboard

16 chips make up 128k RAM: of which 32k is used by the display

The QL firmware is held in three 16K EPROMs (only two of which are visible: the other occupies the ROM slot at the rear of the machine). They contain the operating system (QDOS) and SuperBasic However, the final version will have one x 16k and one x 32k leaving the ROM slot free for expansion

An 8049 processor controls the keyboard


The QL is intended for serious personal use. Unfortunately, the QL cannot be slipped into a briefcase like its predecessors.
A voucher scheme will enable upgrades to the final system
Potential monotony of an all black rectangular casing is relieved by a textured surface and ribbing
Two RS232 serial ports hidden behind cables
UHF modulator unit and TV connector
Monitor port
Power supply port
Two Local Area Network ports
Expansion port (on right) allows up to six Microdrives to be added
Row of slots under the Microdrives provide ventilation and conceal a piezo-electric speaker. The speaker is not up to much but Sinclair says 'an external sound generator is being developed'
Two Microdrives built-in, 100k per cartridge. Microdrives aren't the fastest things in the world; apparently moves are afoot to hot them up.

facilities to manipulate text, open windows, vary column widths and transfer data.

Quill, the word processor seems to have very grown-up facilities. I particularly like the fact that what you see on the screen is what gets printed out. Superscripts and subscripts are handled by Quill's built-in special character set.

Underline is an inherent feature of the QL and this is also used to good effect.

Another thing that impressed me was the fact that the current character position is shown by a highlight on the margin ruler at the top of the screen. Quill keeps a word count as you go along, something many professional writers will find invaluable.

Now Archive, the database. I spent hours on this one. It is an extremely deep product. A novice user can use it literally like a card file and be none the wiser after months. Others will find that they prefer to use a special screen layout rather than the default. Some people will want to access multiple files while others will want to build some sort of system around Archive. All these things are possible within the one product.

I started by simply listing the fields into which I wanted to enter data and then creating a simple file of names and addresses. That was easy — it took about 10 minutes. Then I got ambitious and started entering data which exceeded the available space for its entry. The data was accepted although it actually ruined the display. Archive will accept variable length data up to 255 characters per field. In this respect it shows similar limitations to other popular databases.

Since the QL has no character graphics, the design of records is achieved with judicious use of the exclamation mark and the hyphen. The end result is usable but looks a little tacky. Bearing in mind the sort of program size and timescale limitations Psion was working to, I think this is a small price to pay for the power and usefulness of the product.

It is possible to locate records in a file quickly by using the search or locate commands. The first ignores case and the second matches exactly. A sort is built into Archive and it works on the straight ASCII sequence. This means that 'Computer' would come before 'all', for example.

Like SuperBasic you can define procedures within Archive, and the potential for developing applications and new commands is mind-blowing. Suddenly the entire product becomes soft and you can redefine it to suit your needs exactly. For example, do you always open the same files, display them in the same form and then access a particular record. Fine. There's no reason why that shouldn't all be done with two keystrokes — G and ENTER, for example. I chose 'G' for 'Go'. There's a lot of power in this package and it really will repay diligent study.

All the Psion packages have plain English commands, although this does make them a little long-winded at times. They all have extensive help facilities which can be called up at any stage. Psion is about to launch its products onto other machines and I reckon this is an excellent marketing ploy.

People who become used to using Psion programs on the QL will feel much happier if they also use them on their real machines at work. Conversely, people who use Psion on their real machines may want to buy a QL because they've already learned what Psion's products can do.

Documentation

I was provided with preliminary documentation which was adequate. There was no beginners' guide, although I understand that this will be available in the final version.

A Basic keyword summary is provided which explains every Basic instruction in detail. A concepts section runs through all the concepts regarding the QL which is beyond the scope of the Basic keywords section. And each of the applications packages has a guide to itself which acts both as tutorial reference material. Inevitably, with a preliminary document there were many discrepancies between the manual and the products I was using. Structurally, the documentation is fine and I trust the errors will be put right before the final version is issued.

Prices

The price of the QL is £399 including VAT. To this you will need to add the cost of a three-pin plug and a monitor plug if you are using this rather than a television.

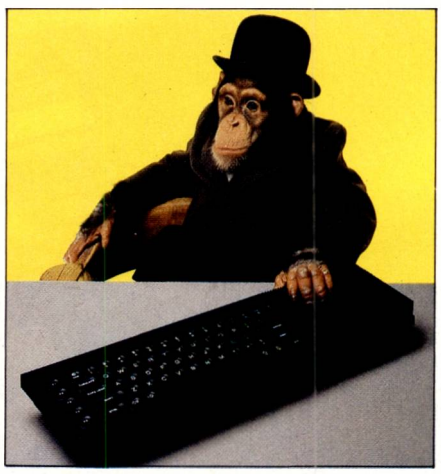
At press time Sinclair claimed that deliveries of the machine would start at the end of April. The fact is that in mid-April I had an almost-working machine and set of software. If the machines do go out soon, then I think it is certain that they will have an extension ROM sticking out of the back with software upgrades promised under some sort of voucher scheme. Not the happiest state of affairs.

Conclusion

There's no doubt that the QL is a well made piece of hardware. The operating system, the applications and the Basic look very good, on paper. The review machine was still short of a few facilities. This either means that deliveries will start soon and early buyers will need some sort of upgrade, or that the project is going to be delayed further while the software is completed.

If everything were in place, then I would consider this machine very seriously as a truly personal computer but not as something to run a business on. The Psion spreadsheet, database, business graphics and word processing packages coupled with the limited Microdrive capacity define the market very clearly. The Psion programs look very good in terms of the ranges and quality of facilities offered.

The bottom line is that the QL gives you the potential to own a complete serious computing facility, including printer and essential software, for under £1000. Well under that if you're prepared to use a domestic TV rather than a monitor for the display. END



Technical specifications

CPU	7.5MHz Motorola 68008 plus Intel 8049
RAM	128k (32k used by display). Expansion to 640k coming
ROM	48k QDOS and SuperBasic. 32k ROM pack (see review)
Display	512 × 256 four colour. 256 × 256 eight colour. UHF or RGB
Keyboard	65-key, normal qwerty plus five functions and cursor
Microdrives	Two drives min 100k each. Can expand with further six
I/O	Two RS232. Two joystick. Two network
Languages	SuperBasic
Applications	Quill — Word processor Abacus — Spreadsheet Easel — Business graphics Archive — Database

M.D.R.

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Oric POKE bug

In the Oric V1.0 ROM there is an obscure bug in the POKE command. It occurs when you try to POKE X, #85, where X is any memory location (even ROM).

The effect is a crash which produces three and a half error messages and a few lines of multi-coloured, flashing garbage. Subsequent instructions are usually followed by '?FORMULA TOO COMPLEX ERROR.'. However, if a program is running these do not appear, and the effect is simply that X is not POKEd with #85, making it look like a programming error. The crash also occurs when a set of statements like V#85 or V VAL("#"+"85") followed by POKE X,V is encountered.

It does not occur, however, when a pair of statements like READ V...POKE X,V (where V is given the value #85) are interpreted. The easiest way to overcome the bug is to use the decimal equivalent of #85, which is 133. Alternatively, you may change the variable V in the above examples to V%.

There is no need to include all these '#' characters in hex data lists; the Oric can add them afterwards.

To do this, change any routines which would normally be:

```
DATA #A6,#F5,... etc
..
..
FOR I=1 TO N:READ
 DTA:POKE X+I,DTA:NEXT I
```

to a routine which looks like this:

```
DATA A6,F5,...etc
..
..
FOR I=1 TO N:READ
 DTA$:DTA=VAL
("#"—DTA$):
POKE X+I,DTA:NEXT I
```

This technique can be used in your own programs and those from magazines. All you have to do is change the equivalent of READ DTA to READ DTA$: DTA=VAL ("#"—DTA$), in order to save typing a quarter of the characters in the data list. Incidentally, neither of these routines are afflicted by the aforementioned bug as the variable is assigned by a READ statement.

Andrew J Edgington

NewBrain quirk

The bug—that's what I thought it was—in this program was concealed by the nature of the program and could cause endless difficulty to the unwary (and anyone who uses the NewBrain in the financial area).

AV Thomas

```
10 REM ********************************
20 REM
30 REM  Some problems with
40 REM  using DEF FN() on the
50 REM  NewBrain .......
60 REM
70 REM ********************************
100 INPUT("INPUT NUMBER UP TO 4 >> ")N
130 IF N=1 THEN DEF FNZ(A)=A*101
150 IF N=2 THEN DEF FNZ(A)=A*102
170 IF N=3 THEN DEF FNZ(A)=A*103
190 IF N=4 THEN DEF FNZ(A)=A*104
200 IF N<1 OR N>4 THEN100
210 INPUT("INPUT ANOTHER NUMBER >> ")B

250 Q=FNZ(B):PRINT"Q=";Q
1000 END

If I input 4, FNZ(A) should multiply by
104.   Input a 5 as the 2nd input, when
the answer should be 5*104 = 520.

run
INPUT NUMBER UP TO 4 >> 4
INPUT ANOTHER NUMBER >> 5

ERROR 83 AT 250:1

Error 83 states 'No DEF statement for
user Function.'  The computer did not
see the DEF statements !!

Perhaps it doesnt 'see' DEFs past the
'THEN'. Let's try a different way.

70 REM ********************************
100 INPUT("INPUT NUMBER UP TO 4 >> ")N
110 IF N<1 OR N>4 THEN100
120 ON N GOSUB 1130,1150,1170,1190
210 INPUT("INPUT ANOTHER NUMBER >> ")B
250 Q=FNZ(B):PRINT"Q=";Q
1000 END
1010
1020 REM %%%%%%%%%%%%%%%% subroutines %%%
1130 DEF FNZ(A)=A*101:RETURN
1150 DEF FNZ(A)=A*102:RETURN
1170 DEF FNZ(A)=A*103:RETURN
1190 DEF FNZ(A)=A*104:RETURN
1200 REM %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

There should be no problem here, each
statement isolated and reachable by only
one route. The answer should be Q=520.
run
INPUT NUMBER UP TO 4 >> 4
INPUT ANOTHER NUMBER >> 5
Q= 505

No crash, but it's WRONG! The machine
read the FIRST 'def fn' at 1130 on the
way to line 1190. Lets change 1130.

1130 DEF FNZ(A)=A*111:RETURN

run
INPUT NUMBER UP TO 4 >> 4
INPUT ANOTHER NUMBER >> 5
Q= 555

Proof positive! There appears no way
around this inability to vary a FN under
programme control. Difficult to believe
in a micro of this standard. Any ideas ?
In the meanwhile, have a care!
```



Commodore 64 tip

In the November issue of *PCW* (page 199), Mr Adams was looking for a way to suppress the '?' prompt in an INPUT statement.

Instead of the line 10 INPUT, he should try 10 POKE198,4: POKE631,157: POKE632,157: POKE633,32: POKE634,ASC("£"): INPUT A.

If the computer has come to an INPUT statement, the contents of the keyboard buffer are then printed on the screen and executed. The first POKE tells the computer that the buffer contains four characters. The next two POKEs move the cursor two places to the left, and the fourth POKE prints a space. The last POKE prints the '£' sign.

Terje Saether

Spectrum Forth

Here are three short routines written for the Spectrum using the Sinclair/Artic Forth program.

The first routine, DRAWTO, is a Forth version of the Basic program by Christopher Timson (*PCW*, Nov 82) which calculates the offsets required to plot to a point denoted by a pair of x,y coordinates. DRAWTO 'PEEKS' a pair of system variables, held at 23677 and 23678, and then draws a line to the correct point on the screen using the Forth command 'DRAW'. To use DRAWTO, type x y DRAWTO, where x and y are the coordinates you wish to draw to. The variables x and y must be in the range 0<=x<=255 and 0<=y<=175: DRAWTO does not check for this in order to save memory.

The second and third routines, REVERSE and NORMAL, are used to change the screen colours. REVERSE gives white letters on a black background and NORMAL gives black letters on a white background.

```
:DRAWTO DECIMAL
23678 C@    (peek last x coord)
—SWAP       (calculate offset)
23677 C@    (peek last y coord)
—SWAP       (calculate offset)
DRAW;       (draw line)
:REVERSE
7 0 0
PAPER BORDER INK
PERM
CLS;
:NORMAL
0 7 7
PAPER BORDER INK
PERM
CLS;
```

Dave Cliff

BBC garbage collection

A peculiarity of the BBC Basic interpreter is that it does not perform any 'garbage collection', or, support the FRE(X$) function found in many Basics. This means that programs which perform extensive manipulation of strings can gradually consume the free variable space, resulting ultimately in an ominous 'No room' catastrophic error message.

This proved to be the problem with a mailing list program where alphabetical order sorts are carried out on various fields of the data. The data is organised using a separate string array for each field (title, surname, house number, road, town) with an array element per record, and the problem arises because elements in each array are exchanged in the course of the sort.

The solution is to avoid moving the string array elements when sorting the arrays. This is done by exchanging the pointers to the string array elements instead. A simple way is needed to find the location of the string pointers in memory, and use is made of a CALL statement which builds a parameter block at 0600H before executing a machine code subroutine.

The example shows the relevant portions of the program:

Lines 60-69 assemble a machine code subroutine (PBMOV) which transfers the parameter block placed at 0600H by the CALL statement to a safe location, because 0600H is also used by other parts of Basic. 0C00H was chosen as it is reserved for customised character fonts and is rarely used.

Line 64 sets the number of bytes of the parameter block to be transferred. This should be at least 3*(number of arrays)+2.

Lines 1400-1470 comprise a Basic subroutine which the sort program calls (using GOSUB) in order to exchange two elements in all arrays. The two elements are specified by T and rec.

Line 1400 calls the machine code subroutine and specifies the string arrays we wish to locate.

Lines 1420, 1460 set up a FOR–NEXT loop which will handle one array on each pass.

Line 1430 reads the pointer information in the parameter block and finds the location (N) of the 4-byte pointer block for array element (0).

Line 1440 calculates the locations (Y and Z) of the pointer blocks for the two array elements to be exchanged.

Line 1450 then exchanges these pointer blocks.

The technique used is general and may be useful in other applications with little or no modification.

Martin Cope

```
LIST
   50 REM
   51 REM PBMOV - PARAMETER BLOCK MOVE ROUTINE
   52 REM
   60 DIM A% 20
   61 FOR C=0 TO 2 STEP 2
   62 P%=A%
   63 [OPT C
   64 .PBMOV LDY #20
   65 .LOOP DEY:BEQ EXIT
   66 LDA &600,Y:STA &C00,Y
   67 JMP LOOP
   68 .EXIT RTS
   69 ]NEXT
   70 REM
   71 REM
 1300 REM
 1310 REM ARRAY ELEMENT INTERCHANGE SUBROUTINE
 1320 REM
 1400 CALL PBMOV,sur$(0),title$(0),ho$(0),road$(0),town$(0)
 1410 M=&C00
 1420 FOR X=1 TO 13 STEP 3
 1430 N=(M?X)+256*(M?(X+1))
 1440 Y=N+4*T:Z=N+4*rec
 1450 W=!Y:!Y=!Z:!Z=W
 1460 NEXT
 1470 RETURN
 1500 REM
 1510 REM
>
```

64 screen dump

Here is a short listing for a routine which produces an exact printed copy of the Commodore 64 screen.

It will reproduce all characters and block graphics in upper or lower case and normal or reverse video.

It's a fairly easy task to convert for the VIC-20. Alterations in lines 60040 (checking for upper/lower case), 60100 (screen memory locations), and 60105 (screen width) are necessary.

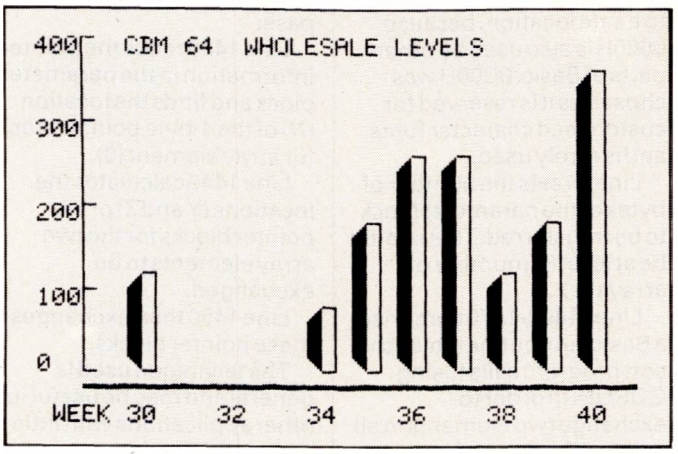
The program runs by examining the screen one line at a time, and building up a string of CHR$ values to be printed. It is very useful as a subroutine in a main program.

D K Twinberrow

```
60000 REM********SCREEN DUMP********
60001 REM*****                 *****
60002 REM*****BY D.K.TWINBERROW*****
60010 AT$="":AS$=""
60020 F=0:DIMAS$(80)
60030 OPEN4,4:PRINT#4
60040 CK=PEEK(53272):IFCK=21THENCASE=145
60050 IFCK=23THENCASE=17
60100 FORX=1024TO2023STEP40
60105 FORS=0TO39
60110 CH=PEEK(X+S)
60120 IFCH>=0 AND CH<=31 THEN AS$(S)=AS$(S)+CHR$(CH+64)
60130 IFCH>=32 AND CH<=63 THEN AS$(S)=AS$(S)+CHR$(CH)
60140 IFCH>=64 AND CH<=95 THEN AS$(S)=AS$(S)+CHR$(CH+32)
60150 IFCH>=96 AND CH<=127 THEN AS$(S)=AS$(S)+CHR$(CH+64)
```

```
60160 IFCH>=128 THEN CH=CH-128:AS$(S)=AS$(S)+CHR$(18):F=1:GOTO60120
60170 IFF=1 THEN AS$(S)=AS$(S)+CHR$(146):F=0
60190 AT$=AT$+AS$(S):AS$(S)=""
60200 NEXTS
60210 PRINT#4,CHR$(15)CHR$(CASE)AT$CHR$(8)
60220 AT$="":NEXTX
60230 CLOSE4:RETURN

READY.
```



BBC menu

This menu program for a disk system has one or two interesting features, not least parameters passed by reference instead of value. It runs on a 32k Model B BBC Micro with OS 1.2, but should also run on a 16k machine with OS 1.0.

The menu program reserves space for a string at line 110, which is passed by reference—bypassing the starting address—to PROCgetcommand. PROCgetcommand draws up a normal menu, and allows selection of any option by use of the cursor up and down keys and the copy key. When an option has been selected, the command required is put into $S% and PROCdumpstring is called. This dumps the string into the keyboard buffer using OSBYTE 138, having set up X%, Y% and A% beforehand. Note that multi-line commands can be used.

L Giles

```
  10 REM menu program for disc system
  20MODE7
  30PROCgetcommand(S%)
  40PROCdumpstring($S%)
  50END
 110DIM S% 100
 120MODE7
 130PROCgetcommand(S%)
 140PROCdumpstring($S%)
 150END
1000DEF PROCgetcommand(S%)
1010LOCAL count,position,maxname,input
1020VDU 23,1,0;0;0;0;
1030*FX 4,1
1040FOR count=0TO24:PRINTTAB(1,count);CHR$((count MOD 6)+129);:NEXT
1050count=0:READ name$,command$:REPEAT PRINTTAB(2,count);name$:READ name$,comma
nd$:count=count+1:UNTIL name$="###" OR count=25:maxname=count-1
1060position=0
1070REPEAT
1080PRINTTAB(0,position);CHR$157;
1090REPEAT input=GET:UNTIL input=138 OR input=139 OR input=135
1100PRINTTAB(0,position);" ";
1110IFinput=138THENposition=position+1:IF position=maxname+1THENposition=0
1120IFinput=139THENposition=position-1:IF position=-1THENposition=maxname
1130 UNTIL input=135
1140RESTORE 1500:FOR count=0TOposition:READ name$,command$:NEXT
1150$S%=command$
1160*fx 4,0
1170VDU 23,1,1,0,0;0;0;
1200ENDPROC
1500 DATA GALAXIANS,*ARCADE|M,BIORYTHMS,CH."BIOS"|M,CHESS,CH."CHESS"|M,DONKEY K
ONG,CH."DONKEY"|M,SWOOP,CH."GALAXY"|M,KING,CH."KING"|M,SPACE LORDS,PAGE=&1200|MC
H."LORDS2"|M,ASTEROIDS,CH."METEOR"|M,DEFENDER,CH."PLANET"|M
 1510 DATA SCRAMBLE,CH."RAID"|M,PACMAN,CHAIN"SNAPPER"|M,STARFIRE,CHAIN"STARF"|M,
QUIT.*DRIVE0|M,###,###
2000DEF PROCdumpstring(S$)
2010LOCAL count,control,A%,X%,Y%
2015CLS
2020A%=138:X%=0
2030FOR count=1 TO LEN(S$%)
2040IF control THEN Y%=ASC(MID$(S$,count,1)) AND &1F:control=FALSE:ELSE Y%=ASC(
MID$(S$,count,1))
2050IF Y%<>ASC"|" THEN CALL&FFF4:ELSE control=TRUE
2060NEXT
2070ENDPROC
```

Tandy tips

The following Tandy routines may be useful.

1) Places a comma after every third digit from the right in a number. Number input in X, output as A$. Uses A,B,C, internally.

```
500 A$=MID$(STR$(X),2):
  A=LEN(A$):C=A
510 A=A-1:B=C-A:
  IF A=0 THEN RETURN
  ELSE IF B/3=INT(B/3)
  THEN A$=LEFT$(A$,A)+
  ","+MID$(A$,A+1):
  GOTO510 ELSE 510
```

2) Given a line of text, this routine stops the words being split by the edge of the screen. Text input in A$. Line length in LL. Uses A2 internally. For ? read print.

```
600 IF LEN(A$)<LL
  THEN ?A$:RETURN ELSE
  A2=LL
610 IF MID$(A$,A2,1)=""
  THEN 620 ELSE
  A2=A2-1:IF A2-0 THEN ?
  A$:RETURN ELSE 610
620 ?LEFT$(A$,A2-1):
  A$=MID$(A$,A2+1):
  GOTO600
```

3) This routine justifies a row of numbers into 0.00 form which is ideal for use in money printing routines. INPUT P where P is the sum of money in pence. Output in S. Uses A,B internally.

```
100 S$=MID$(STR$(P),2):
  B=VAL(S$):IF B<1
  THEN S$="0"+S$
110 A=LEN(S$):B=A
120 IF MID$(S$,B,1)="."
  THEN 130 ELSE B=B-1:IF
  B=0 THEN B=A+1:
  GOTO130 ELSE 120
130 S$=S$+RIGHT$
  (".00",2-(A-B)):
  RETURN
```

These routines have been running on my Tandy Color Computer since they were developed (I don't have Extended Basic or PRINT USING). They should be easy to convert to computers that don't have ELSE or multi-statement lines.

Peter Griffiths

Atom sight and sound

The cassette port (the 8522) can be used to detect loud pulses from the recorder. It's possible to produce graphic patterns on the screen to the bass notes of a song.

Usually, when you PEEK #B002 it is found to be alternating between 215 and 199. When music is played into it, various other numbers emerge. On my Atom they are 103, 119 and 71 (most frequent). These numbers can be used to set off different pattern routines. The graphics blocks are used in my program to make the listing shorter and to simplify it. However, Mode 4 graphics can be used if you are prepared to spend hours typing in the locations!

When the program RUNs, it is assembled twice (forward jump locations are specified) and the machine code is LINKed. The screen should be filled with grey blocks; if not, BREAK and RUN it again and it should work second time round.

Music should then be played through the tape recorder with the DIN lead in as you would when LOADING, but at approximately half the volume. Fine adjustments can be made to the volume—the lower the volume, the more it responds to the bass notes. A strong bass line or a song with a lot of quiet pauses works best.

The pattern can be changed by altering the number at lines 160, 190 and 230, and the pattern direction by changing DEY instructions for INY and *vice versa.*

To stop the program, BREAK must be pressed as there is no keyboard scan involved.

How it works:

```
 10 DIMENSIONS LABELS
    FOR JUMPS
 20 SETS LOCATION FOR
    MACHINE CODE TO
    ASSEMBLED TO
 21 FOR...NEXT (TWO
    PASSES)
 40 LOADS ACCUMULATOR
    WITH #B002 ("SCANS"
    CASSETTE PORT)
 50 IS IT 199?
 60 YES? GOTO }
    LINE 40    }
 70 IS IT 215  }DON'T ACT
 80 YES?—GOTO LINE 40
 90 IS IT 71?
100 YES?—GOTO LINE 160
110 IS IT 103?
120 YES?—GOTO LINE 190
130 IS IT 119?
140 YES?—GOTO LINE 230
150 GOTO 40
160 LOAD ACCUMULATOR
```

Little Brothers should be seen but not heard.

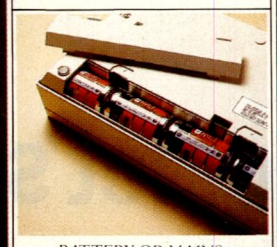




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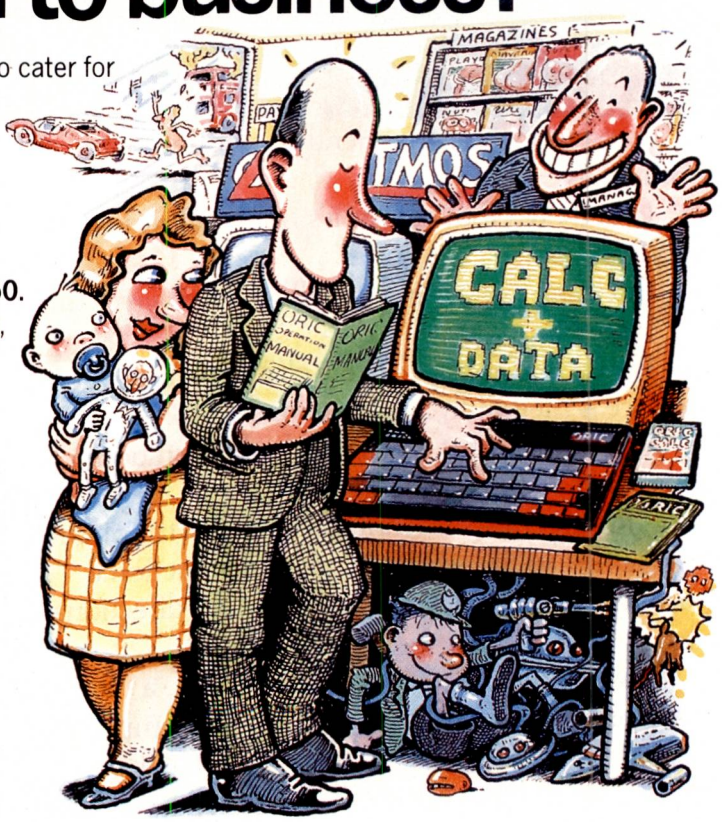
Tansoft produce a wealth of business and utility software to cater for every interest. The 'not so' games-minded people may be coming to grips with:–

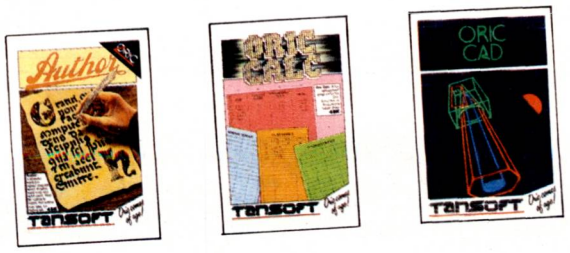
Author: A powerful word-processor program which includes word-wrap and word-count. Ideal for letters and reports. **48K. £14.50.**

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For the full range of Tansoft software – which currently numbers over 20 titles – pick up a catalogue in your local Computer Store or contact Tansoft at Unit 1, The Techno Park, 645 Newmarket Road, Cambridge. Tel. Teversham (02205) 2261.





TANSOFT

WITH #FF (GREY BACKGROUND)
170 STORE #FF IN SCREEN MEMORY
171 STORE #FF IN SCREEN MEMORY
172 DECREMENT Y
180 GOTO LINE 40
190 LOAD ACCUMULATOR WITH 210
201 STORE IT IN SCREEN MEMORY
202 STORE IT IN SCREEN MEMORY
210 INCREMENT Y
220 GOTO LINE 40
230 LOAD ACCUMULATOR
240 STORE IT IN SCREEN MEMORY
241 STORE IT IN SCREEN MEMORY
250 INCREMENT Y
260 GOTO LINE 40

Alan Culverhouse

```
  5REM "SIGHT & SOUND" FOR THE ACORN ATOM (12K)
  6REM BY Alan Culverhouse
  7REM THE CODE TAKES UP 124 BYTES
 10DIMBB10
 20P=#3300
 21F.I=1TO2
 22P.$21
 30[
 40:BB1 LDA #B002
 50CMP @199
 60BEQ BB1
 70CMP @215
 80BEQ BB1
 90CMP @71
100BEQ BB2
110CMP @103
120BEQ BB3
130CMP @119
140BEQ BB4
150JMP BB1
160:BB2 LDA @#FF
170STA #8000,Y
171STA #8100,Y
172DEY
180JMP BB1
190:BB3 LDA @210
200STA #8000,Y
201STA #8100,Y
210INY
220JMP BB1
230:BB4 LDA @97
240STA #8000,Y
241STA #8100,Y
250INY
260JMP BB1
270]
280N.;P.$6
290LINK #3300
```

Tandy merge

There do not seem to be many programs or hints for the TRS-80 Color Computer around at the moment, so here is a handy little program to rectify the situation. It allows the user to merge two Basic programs together. My computer has Extended Colour Basic Version 1.0—I'm not sure whether the program will work with other versions of Basic.

```
10 'MERGE FOR THE TRS-80
   COLOR COMPUTER
20 CLEAR 200,16364
30 FOR I=16365 TO 16381
40 READ A : POKE I,A : NEXT I
50 DATA 158,25,175,140,12,
   158,27,48,30,32
60 DATA 3,174,140,3,159,
25,57
```

To merge program B onto the end of program A:

1. CSAVE program B onto tape.
2. CLOAD or type in the MERGE program and RUN it.
3. CLOAD program A.
4. Make a note of the last line number in program A.
5. EXEC 16365.
6. CLOAD program B.
7. Use RENUM to make the line numbers in program B higher than the last line number in A.
8. EXEC 16376

The merge is now complete and the program in memory can be CSAVED as one program (which it now is).

Here is the assembly language listing of the machine code:

```
        ORG   $3FED
FIRST   LDX   $19
        STX   QUIT,PCR
        LDX   $1B
        LEAX  -2,X
        BRA   +3
SECOND  LDX   QUIT,PCR
        STX   $19
        RTS
QUIT    RMB   2
```

D Winnett

Oric chain routine

I have developed a routine which enables programs to be chained or joined on the Oric. This facility is not available as a single command on this machine although I understand it has been included on the Atmos.

At first sight it appears to be complicated, but after a few tries can be used fairly rapidly as long as you remember to note the values A, B and C.

To add Program 2 to the end of Program 1, first write Program 2 then transfer it to a reserved area at the top of memory. After writing Program 1, Program 2 can be retrieved and tacked onto the end of Program 1.

Note: The two CLEAR commands are important.

It is advisable to arrange for line numbers in Prog 2 to be higher than those in Prog 1. The routine will work if they are not and the joint program may even run though GOTO and GOSUB commands may get tangled!

John B Davies

```
1. GRAB (Ret)
2. Write or LOAD Program 2
3. PRINT DEEK(#9C)-1280 (Ret)
   Note value A - length of Prog.
4. HIMEM38912 (Ret)
5. Move Prog 2 above HIMEM with :-
   FORX=1TOA:POKE38920+X,PEEK(1280+X):
   NEXT (Ret)
6. NEW (Ret)
7. Write or LOAD Prog 1
8. PRINTDEEK(#9C),DEEK(#9C)-1280 (Ret)

   Note values B and C
9. Re-assign end of prog marker
   DOKE #9C,(1280+A+C-3) (Ret)
10. CLEAR (Ret)
11. Transfer Prog 2 to end of Prog 1
   FORX=1TOA:POKEB-3+X,PEEK(38920+X):
   NEXT (Ret)
12. CLEAR (Ret)
13. BY=B-2: BX=1281 (Ret)
14. Re-allocate line pointers
   REPEAT: LL=DEEK(BY)-BX: DOKE BY,
   (LL+BY): BX=BX+LL: BY=BY+LL: UNTIL
   DEEK(BY)=0 (Ret)
```

Spectrum operating system quirk

I have found an interesting quirk in the Spectrum operating system. It occurs whenever the 'scroll?' command is encountered when printing to the screen. Typing CAPS LOCK (SHIFT and 2) produces the last command interpreted (for example, when listing a program, LIST is produced). Try typing in the following as a direct command:

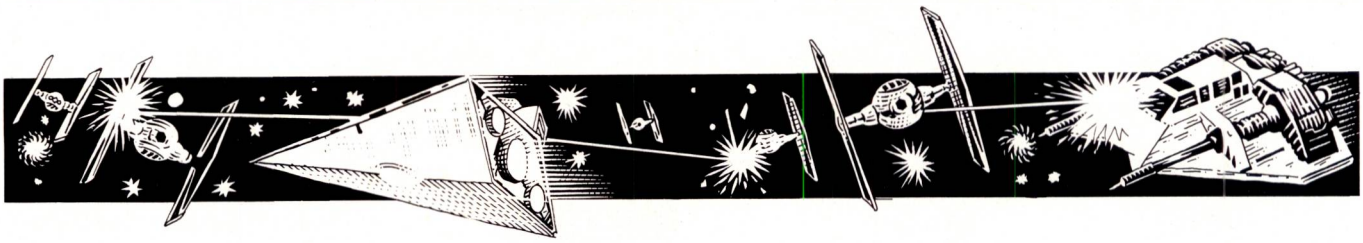
FOR A=1 TO 1000: PRINT "FRED": NEXT A

When the scroll? prompt appears type caps lock—the whole of this line will reappear. Also, after pressing another key, all the keywords are listed.

Christopher Evans

END

SCREENPLAY



Addiction is the name of the game this month. Dispose of Spectrum rubbish, search the BBC galaxy, command a Commodore patrol truck and defend Earth. This is the stuff obsession is made of, as Tony Hetherington discovered.







Codename Mat

Supplier: Micromega
Computer: 48k Spectrum
Price: £6.95

Codename Mat belongs to that rare breed of games so good they cause sleepless nights, joystick-damaged fingers and one or two divorces.

Forget the awful name and the average packaging and load the game in — you're ready to defend Earth from the marauding Myons. To be successful, you'll need a keen sense of strategy and an accurate fire-button finger.

You are commander of the fleet operating from the bridge of the revolutionary spaceship USS Centurion, complete with warp drives and photon torpedoes. From there, you control planetary defences spread throughout the solar system by sending orders via your subspace transmitter, but don't bank on much support as they'll be heavily outnumbered. You alone are Earth's best chance of survival. A quick look at the sector display reveals that the Myons are surrounding Saturn; raise your shields and warp into the fray.

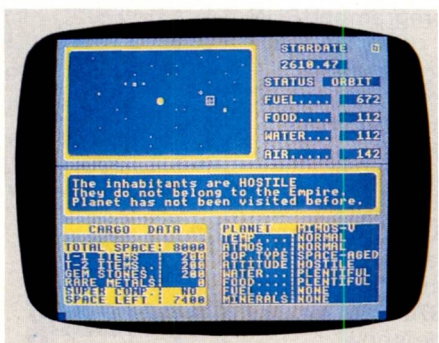
Your battle computer flashes 'RED ALERT' as three Myon fighters scream in towards you; track one when it falls in your sights and turn it into space rubble. This annoys the other two so they shower you with laser bolts, taking out your photon torpedoes, long range scanner and shields.

Time for a tactical retreat — warp out and limp to the nearest planet for repairs. Repaired and refuelled, you're ready to rub out more Myon fighters, cruisers and base stars.

The depth of detail and wealth of options available to the player separate this game from the rest.

Presentation: Average
Addictive quality: Compulsive
Use of graphics: Cosmic
Value for money: Buy it





Star Trader

Supplier: First Byte Software
Computer: BBC B
Price: £7.95

You are a galactic salesman, exploring the galaxy in search of the ultimate in computers.

Unfortunately, this computer is owned by a race of superbeings who are charging an exorbitant fee for it, and all in rare metals. The only way to obtain sufficient quantities of these metals is to trade with other aliens who value gems or T1-metals more highly.

To trade, you must first orbit their planet and test their reaction. You have the option of inviting them to join your empire, or forcing them if they're inferior to you. You can then offer to trade and take on food, water and air.

You also have the option of sending out mining robots to mine for fuel and minerals. However, you should take care not to mine for precious commodities on an inhabited planet, or the natives may turn nasty and destroy the robots. Such mining activities are best performed on the uninhabited planets, of which there are many in the universe. You shuttle between the planets juggling their resources, while keeping your ship suitably stocked with fuel, food and water.

The graphics are adequate, being a fixed instruments display split into various areas. This shows information on your ship's status and stocks, planet data, a message area and a plan of the solar system you are currently in.

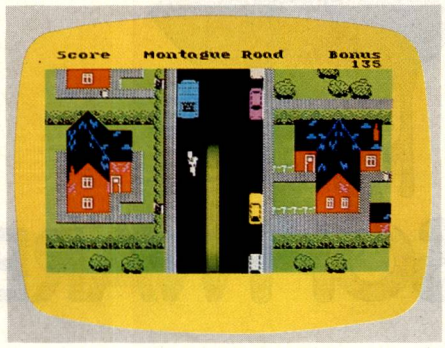
The game is spoilt by poor presenta-

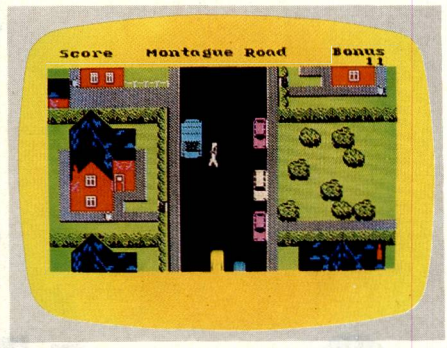
tion. You must load the game to find out anything about it, despite the expanse of blank space on the inside of the cassette insert.

Presentation: Poor

Addictive quality: Out of this world
Use of graphics: Adequate
Value for money: Good







Trashman

Supplier: New Generation Software
Computer: 48k Spectrum
Price: £5.95

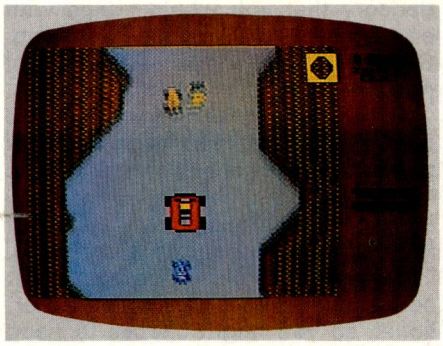
This game is a load of rubbish but in the best possible way. The rubbish is in dustbins you must empty in order to score points and achieve the 'Trashman of the Year' award.

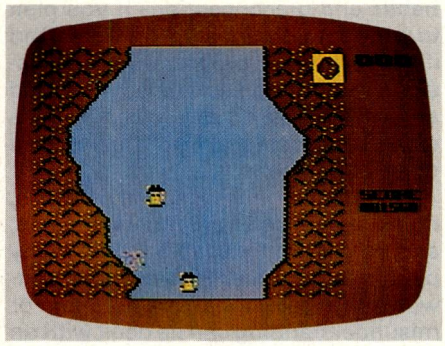
It's played on a series of levels, or streets, in which you have to empty a number of bins before the bonus score reaches zero. However, a trashman's lot is a perilous one: he must avoid being run over by fast-moving cars or brats on bikes.

The author of the game has obviously had his lawn severely trampled by his own trashman — the penalties for stepping on the grass are severe. Bonus points plummet and you may be attacked by savage dogs. These bonus points can be replenished by performing tasks for householders, which range from watching television to taking away a Spectrum. Completion of these tasks is accompanied by a witty comment, but, unfortunately, you haven't time to read it while playing the game.

In later levels, you have the opportunity to visit a cafe or pub, but I've always been despatched to that great dustcart in the sky before reaching such levels.

Presentation: Good
Addictive quality: Excellent
Use of graphics: Streets ahead of the others
Value for money: Good





Bumping Buggies

Supplier: Bubble Bus
Computer: Commodore 64 + 1 joystick
Price: £6.99

If you've ever fancied forcing someone off the road, then Bumping Buggies is for you. In this crazy car race, reckless driving is the way to score points.

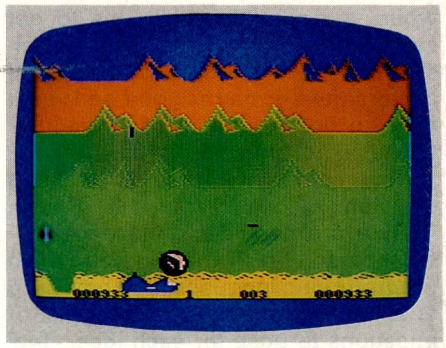
You drive your car along 20 tracks through the four seasons of the year, leaping large expanses of water and bashing other cars.

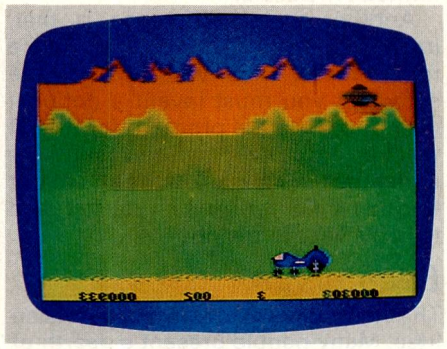
Using the joystick, you can move your car left and right as well as control its speed.

At over 100 mph you can jump over other cars, which requires careful control — landing on another car produces unpredictable results, the most likely being loss of life.

The games are short and sharp, so there's plenty of opportunity for practice.

Presentation: Average
Addictive quality: A1
Use of graphics: Good
Value for money: Good





Troopa Truck

Supplier: Rabbit Software
Computer: Commodore 64
Price: £5.99

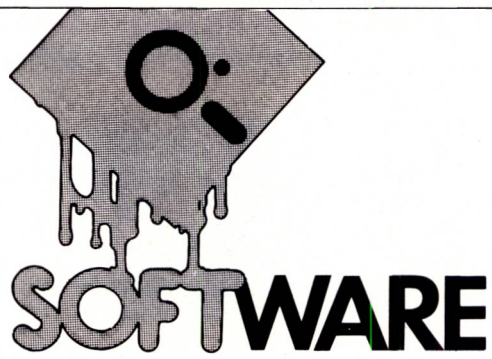
This delightfully simple game places you inside a patrol truck on the surface of the planet Zon. Unfortunately, you are marooned, the terrain is nasty and the natives are hostile.

You must manoeuvre your truck along the planet's surface avoiding all obstacles in your way. These obstacles include craters and boulders to be jumped over, and Helichargas and Lasa Slamma Tanks to be shot. Missing a jump or shot results in the loss of a life, graphically represented by the truck's wheels falling off.

A warning. Beware of combination attacks in which all the planet's nasty elements gang up and jump on you. When you dodge a missile from a hovering Helicharga, it hits the ground and forms a crater, causing a vacancy in the wheel department. It's a mean trick.

The action is accompanied by a catchy soundtrack, a feature of the better 64 games.

Presentation: Standard Rabbit format
Addictive quality: You'll be humming the tune
Use of graphics: Great wheels
Value for money: Good



Creating a program

Ever gazed wistfully at the name on a successful software package and wished it could happen to you? Dream no more. Mike Liardet, creator of Caxton's BrainStorm, begins a two-part lesson in producing your own mass-market software. This month: strategy.

The microcomputer revolution has put computer power within everybody's reach, spawning a new class of computer user unknown in the industry only a few years ago. Today's computer users are 'software consumers' with no training or deep knowledge of computers, but a huge appetite for easy-to-use games, educational and business software.

Programmers today face a unique opportunity. The time is ripe for fresh faces who understand the new medium and can feed the public what it wants. They won't need huge budgets and teams of programmers to obtain their success — just one or two individuals with the right idea can make it.

If you aspire to these giddy heights, then read on. I'll be describing some of the issues involved in producing a mass-market product, and some of the tricks of the trade to give your concoction an 'edge' over the opposition. This article is aimed at the home-worker with scarce resources and precious few people to call upon. Big budget projects are not catered for.

Of course, there is no simple formula for success — you can rest assured I'd keep it to myself if I knew it! — but it is possible at least to point yourself in the right direction.

Thousands of programmers spend thousands of hours and millions of pounds developing software for consumption by just one or a handful of users. This bespoke software is presently the backbone of the software industry and has nothing to do with writing mass-market software. If you're one of these aforementioned programmers you'll have to throw out a lot of old habits and preconceptions if you plan to write something for the masses. And if you've never programmed professionally, although you haven't learned any software skills at someone else's expense, at least you won't have picked up any bad habits.

In comparison to bespoke software, mass-market software must appeal to, and be eminently usable by, as many people as possible. With bespoke software, the occasional malfunction or misunderstanding can be dealt with on a one-to-one basis. With a mass-market product, every problem is literally multiplied (by the number of users). To have any reasonable chance of success, a mass-market product mustn't have these problems, and must be as close to perfection as is possible in a limited time-scale.

Another major difference is that, initially, there are no users to define the requirement. Thus, when writing the software, you must invent a notional user and write the program for him. If you've only ever written software under the direction of others you might find this difficult, but when you get used to it, it's very refreshing!

Beginnings

The starting point for any product is an idea. Many people present a dearth of ideas as an excuse for not doing anything. I believe that getting an idea can be difficult for everyone, and that sometimes even Paul McCartney sits with a blank sheet, chewing his pencil.

Acknowledge that you're looking for an idea. As soon as a notion hits you, however silly it may seem, write it down. Some ideas might seem so derisory that you would cringe with embarrassment if anyone saw them. Still, write them down — you might need them later.

To stimulate ideas it can be useful to go to exhibitions, read magazines, talk to others, and generally soak up the current state of the micro world. Many ideas can be stimulated by thoughts of improving existing software, and so on. The main categories of software are: educational, games, business and personal, so you might choose to hang your ideas on these pegs. But don't let that stop you inventing a new category — that really would be a winner. If you have a collaborator, then a brainstorming session can be invaluable.

Eventually, you must call a halt to this ideas generation. How long you allow yourself is entirely up to you, but after a while you should be anxious to get started on something. Leave the decision-making too long and the era of garret software may be gone, and you'll have to go seeking massive venture capital to get anywhere at all.

Now comes the time to make a decision.

There are many decisions to make — what to do, which machine, in which programming language, and how long to spend on it. Build up a checklist of questions to pose for each idea. How well will it sell? Who will buy it? What will they use it for? Is it feasible to implement with the resources available (time, money, machine, the current state of technology). Is it UK specific, or an international product? Obviously, your own level of interest should figure highly in your list of criteria.

Whatever you choose, you will have

to live with it for some time, through moments of great doubt and hard work. If it doesn't really interest you as a project, you won't see it through. Try to think into the future when making the decision. It's highly unlikely that whatever you do will see the light of day for 12 months or more, and where will micros be then?

Finally, avoid choosing a project that has already been well covered by the industry. Even if you can write a better word processor than anyone else, no-one will want to know about it. Your strength as an individual is to seize fresh opportunities quickly. In comparison, the industry giants are like lumbering armies. It's not easy for them to change direction, but if your product happens to be in their way they won't even notice as they trample all over you. Make doubly sure that you are somewhere else, where you can really make your presence felt.

Choices

It's possible that this decision is already made — you have a computer and it's all you can afford. However, you can always try to develop the software in a machine-independent fashion so that the choice of machine(s) can be delayed. The price you pay is that you cannot usually take advantage of the special features of your own machine.

The micro world currently offers six different types of computer: home computers, lap-held portables, transportables, desktop personal computers, local area networks and multi-user machines. You might hope that your software will be relevant to several types of machine. If you are working under one of the industry standard operating systems, like CP/M and MS-DOS, with only minimal effort it should be possible to design software that will operate on a great many machines in the latter four categories.

At the moment, all except the first two categories can be assumed to have disk drives. Their presence or absence will have a major impact on the design of the software. Some types of software are not practicable without them (database, for example).

You should identify the minimum capacity machine that will support your software, and estimate the minimal RAM, disk capacity, minimal screen size, printer paper dimensions, and so on. You should also itemise any optional extras, such as light pens and graphics hardware, that might be needed. Now ask yourself — would anyone want all this lot if it weren't for the program? If they must buy extra options just to run your product, it effectively puts the price up. Plan the product around a minimal machine, where the extra goodies can be bought later if the purchaser wants to use all the wonderful facilities you have in mind.

Bear in mind that you don't have to develop the software on the target machine. While recovering from an illness, a friend of mine developed a space war game on a cassette machine in hexadecimal machine code. If I were to try that, it would *cause* an illness! I much prefer to work with disks, text editors and assembly language, then hit the target machine at the end of the project, either by downloading the software or using a ROMwriter with a mutually compatible ROM chip. If you decide to develop on another machine, make sure you don't do the equivalent of developing a 35-foot yacht in the spare room: establish early on that you will be able to extract the fruit of your labours when you have finished.

If you are stuck for cash you might consider hiring a machine, but after a few months the bill can mount up to the cost of an original purchase. However, a short-term hire is a valuable option for checking out your software in special configurations. For example, performance testing your floppy-developed software with a hard disk.

There are four different types of programming language available: interpretive, compiled, intermediate and assembler (some languages are embraced by more than one category).

Interpretive: the code you type is the same as the executable image. An 'interpreter' continually translates code throughout the execution of your program. The best known such language is Basic but there are many others, like some versions of Lisp, Logo and Prolog.

Although it's easy to work with interpretive languages, I'd rule them out for product development. They are admirable for quickly checking ideas, learning programming, and, in the case of Basic, come free with many micros. But there are three problems: the purchaser may need to buy the interpreter to use your product; they run very slowly (because of the interpretive overhead); and they provide little or no security for your code. With an interpretive language, it would be easy for anyone to list all your hard work, change a few bits here and there and come out with a rival product that you would be hard-put to prove was a rip-off.

Compiled: the code you type is translated, by a compiler, into an executable image that can be understood immediately by the computer's processor. Compiled languages include C, Fortran, PL/M and Pascal. A lot of sanctimonious twaddle is written about Pascal in particular, but don't let this browbeat you into using it. With this proviso, I rate compiled languages as the preferred environment for most product development.

A good compiler will generate fast, secure, compact code, but because you are using a high level language you can maximise the portability of the software. Moving your software from an 8-bit to a 16-bit machine need involve no more than purchasing the new version of the compiler and transporting your source code onto the new machine, with little or no changes.

A word of warning about compiled Basic: All Basic compilers I have ever seen generate large program files, and provide disappointing improvements in execution speed. Some of the interactive techniques I'll be introducing later won't work in compiled Basic as it's too slow.

Intermediate: compromise between compilers and interpreters. A pseudo-compiler translates your original source code into a pseudo-machine language which must then be interpreted; of which UCSD Pascal and CBasic are the best-known languages. Language suppliers can implement intermediate languages across a wide range of machines more easily than any other type of language. This is often billed as an advantage, but like everything else concerned with intermediate languages, it's really a pseudo-advantage which accrues to the implementor and not the user. Intermediate languages offer the worst of both worlds.

Assembler: you develop your program directly with your processor's instruction set, albeit symbolically, and not in hexadecimal code. Assembly programming produces the fastest and most compact code, but is the most difficult to work with.

Most micros use one of the following processors (or a compatible one): 8080, 6502, 8086, M68000. Unfortunately, each of these processors has its own unique instruction set, and so once committed to a particular processor it's very difficult to translate your program for another.

There are translation programs available for converting code between processors, but they're not as easy to use as two different versions of a high level language compiler, for instance.

You might consider developing your program as a hybrid, using different languages for different bits. I did this to great effect with my own product, BrainStorm, where the installation software was developed in compiled Basic and the rest in Assembler. As the installation software is only ever used once, and is not time or space critical, it was possible to develop sophisticated installation features quickly and easily using Basic. This enabled me to devote more time to the key part of the software, and optimise its time and space requirements by using Assembler.

Having just passed the ideas phase it may seem rather early to start thinking about selling the software, but as it's the whole point of the exercise, it's best to keep it in mind from the earliest moment. I hold the view that only rarely do marketing and software design skills reside in the same head; unless you are one of these rarities you should acquire a partner to complement your skills.

There are now a number of software publishers in the UK, and although it's

SOFTWARE

easier said than done, there's a lot to be said for a publication arrangement. Software publishers are analogous to book publishers, and in exchange for you signing away all or most of your rights to the software, they will do all the marketing and production, paying you a royalty for each unit sold. The deals offered can vary greatly, some publishers offering a percentage of the transfer price, and others on the retail price. If you are in the fortunate position of having several offers, it's impossible to predict which will be best as the big question is how many units each publisher might sell.

Without prior thought, it's easy to anticipate ludicrous royalty percentages which would put the publisher out of business. Consider a £100 product: if sold direct to a dealer, the publisher will only receive £70, perhaps even less, if it's part of a multiple order. Of that £70, perhaps £10 was spent manufacturing the product, £20 advertising it and £10 allocated for support. This leaves £30 to spare, which the publisher might generously agree to split down the middle with you, or not. So don't be surprised if you're offered a single-digit percentage. You won't be alone — most royalties in other industries are around this mark.

Of course, publication is not the only method of selling your magnum opus — advertising is another alternative. You might care to check out advertising rates at this early stage, too.

Campaign

Programmers are notoriously bad at estimating time-scales for projects, but it's essential to try. Even an inaccurate plan of campaign will get the project finished quicker than none at all, and next time round your planning will be better.

I consider it dangerous to attempt a first project that you anticipate will take more than 12 months. The micro market is moving rapidly, and unless you are very far-sighted you're likely to be left languishing with a software dinosaur.

It's easy to overlook the 'hidden extras' when drawing up time-scales. In the absence of any better ideas, use the following rule of thumb to plan your project right through from inception to product launch:

5%: total time to study the operating system and programming language.
5%: feasibility studies.
30%: implementation of program proper.
10%: implementation of peripheral supporting software (for instance, installation).
15%: writing documentation.
5%: alpha-testing; internal checking and debugging.
5%: beta-testing; independent checking and assessment.
5%: implementation of corrections and enhancements following testing.
5%: final beta-testing.
15%: publication; printing and advertising.

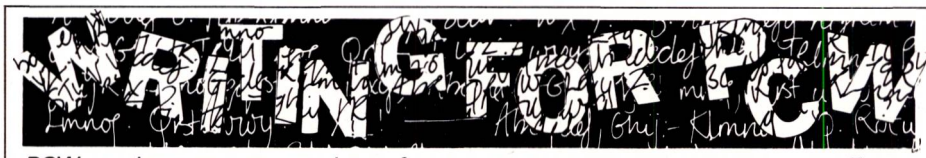
Note, in particular, that there is probably some core part of the program proper, perhaps a quarter of it, which encapsulates the original idea. The other three quarters comprise essential 'extras', such as file handling. Thus, only 7-8 per cent of the overall project is actually taken up with writing, hence the saying that genius is 95 per cent perspiration and 5 per cent inspiration!

Unless you are living with Mum or rich enough to support yourself on what might be a highly speculative venture, you will have to do the work alongside a regular job. Check the small print on your employment contract — you might have signed away all rights to the software already. Ideally, your job should be compatible with software work, which means NOT being a programmer already — you can't face another computer in the evening.

If you are working in collaboration, then aim for a good demarcation between you. The first 50 per cent of the percentage breakdowns can very easily be assigned to one, with the other handling the documentation onwards.

Finally, I pass on a tip which increased my productivity by 50 per cent. Decide where in the house you most like to sit, and put your computer there! In my case, that happens to be somewhere near the TV which produced not a few grumbles from the rest of the household, but stick to your guns, and good luck! **END**

Next Month: Making mass-market software part II: tactics.



PCW welcomes approaches from would-be writers, even those who have never appeared in print before. In this game it's often those with practical experience who have important things to say so we don't mind if your prose is less than perfect — providing submissions have a sensible structure and follow a logical sequence, we can take care of the polishing.

If your article is already written, send it in — taking care to ensure that your name and address, together with a daytime phone number if possible, appears on both the covering letter and the manuscript. Manuscripts should, preferably, be typed or printed out (dot matrix output is quite acceptable) but *must* be double line-spaced with ample margins top and bottom and on each side. Make sure you keep a copy of *everything* you send us.

We accept articles on ACT Sirius 1 (CP/M-86 or MS-DOS) single-sided. In an emergency we can accept stuff over the phone by modem using BSTAM at 300 baud but as we can only do this during office hours (10am to 6pm) it's not exactly a cheap way of getting your article to us! We can also accept material by Telecom Gold. Please note that if you want to send your article in this way, it should be as an ASCII file rather than as a 'work file' for any one type of word processor — that is, use your word processor to print the text to disk instead of to paper.

Please note that we cannot undertake to return manuscripts, diagrams and photographs, although we always try to return the latter. We can only return disks if they are accompanied by adequate postage *and* packaging.

If you have an idea for an article or a series, write us a letter outlining your ideas. A one- or two-page synopsis giving the proposed structure, sequence and content is what we're looking for. But before you send anything to us, take a good look through *PCW* to see what sort of articles get published and to see what style or writing we prefer (basically, avoiding pomposity at one extreme and flippancy at the other). Also take a look through the Back Issues advert to see what sort of things we have already published — no point in re-inventing the wheel.

Once you've sent off your article or proposal, please don't hassle us for a decision. We receive far more submissions than we can ever use and it takes us a while to sort through them, acknowledge receipt and give an opinion one way or the other. Please be sure to tell us if you've sent the article to another magazine — it would be very awkward indeed if the same article appeared simultaneously in two publications! Frankly, we're more likely to accept something which has been offered exclusively to us.

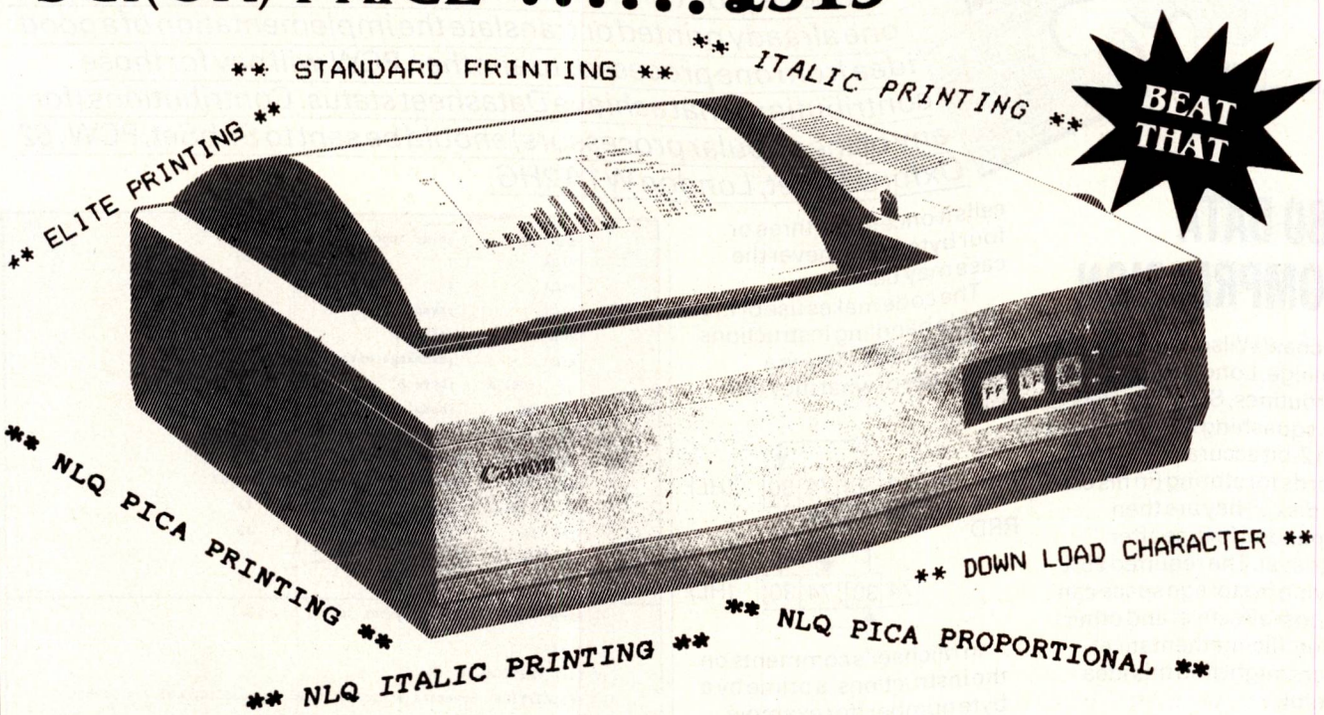
Finally, we do pay for published work but please be patient! Payment *normally* follows about 4-6 weeks after publication.

END

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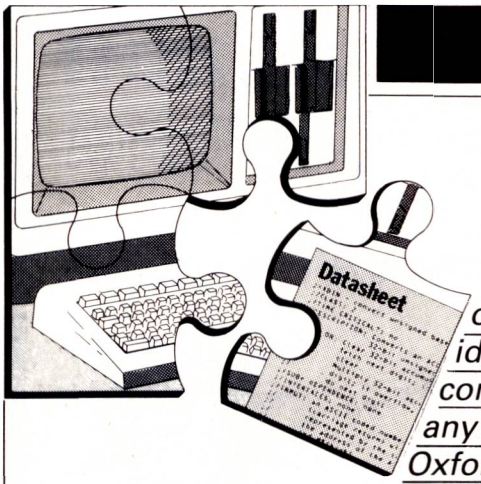
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SUBSET

This is your chance to help build a library of general-purpose routines, documented to the standards developed by Alan Tootill and David Barrow in this series. The documentation enables you to use the routines, even if you don't understand the code. You can contribute a Datasheet, improve or develop one already printed or translate the implementation of a good idea from one processor to another. PCW will pay for those contributions that achieve Datasheet status. Contributions (for any of the popular processors) should be sent to SubSet, PCW, 62 Oxford Street, London W1A 2HG.

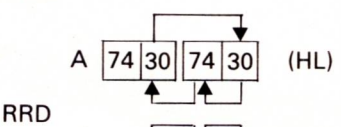
Z80 DATA COMPRESSION

Michael Wilson of University College, London sends a pair of routines, SQSH and EXPD, for squashing numbers held to 12-bit accuracy in 2-byte words for storing (in his case on disk). They are then expanded for use after retrieval. The required 25% saving in storage space can be cost effective, and other scientific/mathematical users might find this idea useful.

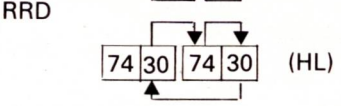
The numbers are held with the least significant byte first. In this example (hexadecimal), the pair of numbers 9C0A AB0F would be compressed to 9CAABF. Since the pointers are advanced in both routines, you can zip through a long block of numbers by putting the routine in a loop which calls it once every three or four bytes, whichever the case may be.

The code makes use of the nibble handling instructions RLD and RRD. Here is a reminder of what they do:

RLD



RRD



In Michael's comments on the instructions, a prime by a byte number (for example, byte 2') indicates that this is a processed value being placed in the output block.

When compressing data, the input block is corrupted and, in either direction, you may overwrite the input with the output block. The routines are thought to be very fast and reliable (unless you know differently).

DATASHEET

```
;= SQSH - Compress 4 bytes to 3 by truncation

;/ CLASS:  2
;/ TIME CRITICAL ?:  No
;/ DESCRIPTION: Removes 4 most significant bits of every other byte
;/              of a 4-byte input block and repacks to a 3-byte
;/              output block. For long data blocks ( consisting of
;/              unsigned 16-bit quantities held to 12-bit accuracy
;/              or less ) set up input and output pointers to the first
;/              byte of the block and CALL once for every 4 bytes in
;/              the data block. The input block will then be replaced by
;/              the output block ( except for the last 25% ).
;/ ACTION:      Takes 4-byte block, processes, places in 3-byte block.
;/ SUBr DEPENDENCE:  None
:/ INTERFACES: None
;/ INPUT:  HL points to the start of a 4-byte input block
;/         DE points to the start of a 3-byte output block
;/ OUTPUT: HL advanced by 4 ; DE advanced by 3
;/ REGs USED: AF, DE, HL
;/ STACK USE: None
;/ LENGTH: 22
;/ PROCESSOR:  Z80

SQSH:  LD   A,(HL)    ;byte 1                7E
       LD   (DE),A    ;byte 1'               12
       INC  DE        ;bump output ( 1 )     13
       INC  HL        ;bump input  ( 1 )     23
       LD   A,(HL)    ;byte 2                7E
       INC  HL        ;bump input ( 2 )      23
       RLCA           ;                      07
       RLCA           ;                      07
       RLCA           ;swap                  07
       RLCA           ;nibbles               07
       RLD            ;exchange with (HL)    ED 6F
       LD   (DE),A    ;byte 2'               12
       INC  DE        ;bump output (2)       13
       LD   A,(HL)    ;byte 3                7E
       INC  HL        ;bump input (3)        23
       RRD            ;exchange with (HL)    ED 67
       LD   (DE),A    ;byte 3'               12
       INC  DE        ;bump output (3)       13
       INC  HL        ;bump input (4)        23
       RET            ;return                C9
```

```
;= EXPD - Pad out 3 data bytes to 4 ( cf. SQSH )

;/ CLASS:  2
;/ TIME CRITICAL ?:  No
;/ DESCRIPTION: Reverses action of SQSH  by padding out 2 x 12-bit
;/              values ( 3 bytes ) to 2 x 16-bit values ( 4 bytes )
;/              by adding 4 zero most significant bits to both values.
;/ ACTION: Expansion proceeds from highest to lowest byte. In practice,
;/         start with input pointer at end of squashed data and output
;/         pointer at desired end of reconstituted data.
;/ SUBr DEPENDENCE:  None
;/ INTERFACES: None
;/ INPUT:  DE points to END of 3-byte input block
;/         HL points to END of 4-byte output block
;/ OUTPUT: DE, HL decremented by 3 and 4 respectively
;/ REGs USED:  AF, DE, HL
;/ STACK USE: None
;/ LENGTH:  40
;/ PROCESSOR:  Z80

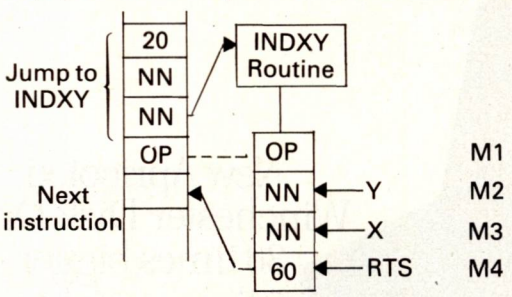
EXPD:  LD   A,(DE)    ;byte 1                1A
       DEC  DE        ;drop input ( 1 )      1B
       LD   (HL),0    ;set a zero            36 00
       RLD            ;byte 1'               ED 6F
       DEC  HL        ;drop output ( 1 )     2B
       RRCA           ;                      0F
       RRCA           ;                      0F
       RRCA           ;swap                  0F
       RRCA           ;nibbles               0F
       LD   (HL),0    ;set a zero            36 00
       RLD            ;rotate in             ED 6F
       LD   A,(DE)    ;byte 2                1A
       RLCA           ;                      07
       RLCA           ;                      07
       RLCA           ;swap                  07
       RLCA           ;nibbles               07
       AND  0F0H      ;mask low nibble       E6 F0
       OR   (HL)      ;get low nibble        B6
       LD   (HL),A    ;byte 2'               77
       DEC  HL        ;drop output ( 2 )     2B
       LD   A,(DE)    ;byte 3                1A
       DEC  DE        ;drop input ( 2 )      1B
       RRCA           ;                      0F
       RRCA           ;                      0F
       RRCA           ;swap                  0F
       RRCA           ;nibbles               0F
       AND  0FH       ;mask output high nibble E6 0F
       LD   (HL),A    ;byte 3'               77
```

```
        DEC  HL         ;drop output ( 3 )      2B
        LD   A,(DE)     ;byte 4                 1A
        LD   (HL),A     ;byte 4'                77
        DEC  DE         ;drop input ( 3 )       1B
        DEC  HL         ;drop output ( 4 )      2B
        RET             ;return                 C9
```

6502 REGISTER INDIRECT

David Heal's XYMOD (Sub Set April 83) providing operations on the address held in the XY registers, set some of you thinking. David's routine is short and simple but depends on modifying the calling code, which we sub-setters are not much taken with.

Cormac Duffin of Highgate, London gives us INDXY, which does a similar job without modifying the calling code, by having the indirect instruction executed in page zero memory thus:



Our standards provide for 16 contiguous bytes of page zero memory, designated M0 to MF in the mnemonics and ZZ in the machine code, to be reserved for 6502 routines. INDXY uses eight of these as follows:

M1 OP Transferred op code
M2 NN Y register—address low byte
M3 NN X register—address high byte
M4 RTS Return from subroutine instruction
M5 ZZ Store for accumulator
M6 ZZ Store for processor status
M7 lo | Address of op code
M8 hi | to be transferred

Cormac points out that INDXY, although longer than XYMOD, is called in only four bytes against XYMOD's six.

DATASHEET

```
;= INDXY - To use the address in XY as operand to given op code

;/ CLASS: 1
;/ TIME CRITICAL ?:  No
;/ DESCRIPTION: Executes the op code, embedded in the code following
;/              the jump to subroutine instruction, using the address
;/              in the XY registers as the operand.
;/ ACTION: The op code, address from the XY registers and an RTS
;/         instruction are placed in page zero and executed from there.
;/ SUBr DEPENDENCE: None
;/ INTERFACES:  None
;/ INPUT:  XY holds the 16-bit operand address ( high, low )
;/         The bytes following the jump to subroutine instruction
;/         holds the op code.
;/ OUTPUT: The op code is executed using the address in XY as operand.
;/ REGs USED:  X, Y and M1 to M8
;/ STACK USE:  1 byte ( + 1 byte + any stack used by the subroutine(s),
;/             if the op code is a JSR).
;/ LENGTH:  52
;/ TIME STATES: 94
;/ PROCESSOR:  6502
   INDXY: STA  M5       ;save accumulator.      85 ZZ
          PHP           ;save the               08
          PLA           ;processor              68
          STA  M6       ;status.                85 ZZ
          SEC           ;get the                38
          PLA           ;return                 68
          ADC  #0       ;address off            69 00
          STA  M7       ;the stack              85 ZZ
          PLA           ;and increment          68
          ADC  #0       ;to point to            69 00
          STA  M8       ;op code byte.          85 ZZ
          PHA           ;restore                48
          LDA  M7       ;modified               A5 ZZ
          PHA           ;return address.        48
          STX  M3       ;store X and Y registers  86 ZZ
          STY  M2       ;as operand for transferd 84 ZZ
          LDA  #$60     ;op code anf follow     A9 60
          STA  M4       ;by RTS instruction.    85 ZZ
          LDY  #0       ;transfer the           A0 00
          LDA  (M7),Y   ;op code                B1 ZZ
          STA  M1       ;to M1.                 85 ZZ
          AND  #$DF     ;is the op code an      29 DF
          CMP  #$4C     ;absolute or indirect   C9 4C
          BNE  NOJMP    ;jump instruction ?     D0 02
          PLA           ;if so, remove return   68
          PLA           ;address from stack.    68
   NOJMP: LDA  M6       ;restore                A5 ZZ
          PHA           ;processor status.      48
          LDA  M5       ;restore accumulator.   A5 ZZ
          PLP           ;                       28
          JMP  $00M1    ;execute instruction.   4C ZZ 00
```

Z80 SEARCH

In his routine KYSCH, John Fairbairn of Harrow sends a variation on the Associative Search routine TRAN we printed in the August 1981 issue. TRAN worked on a table of 1-byte entries followed immediately by a table of 2-byte entries. If a value input in the A register matched one of the 1-byte entries, the 2-byte entry from the same relative position in the second table was returned in HL.

By organising the table of keys and their associated 2-byte values into one table, KYSCH works in 10 fewer bytes of code. The routine can be used as a jump table: if the two bytes are the address (low-high) of a subroutine associated with an input key, control can be passed to it directly with JP (HL).

DATASHEET

```
;= KYSCH - Associative search or jump table

;/ CLASS:  2
;/ TIME CRITICAL ?  No
;/ DESCRIPTION: Searches a table of 1-byte key values and associated
;/              2-byte entries for a match between key value and input
;/              in A. If match found, the corresponding 2-byte entry is
;/              returned.
;/ ACTION:  Input and key value compared. If no match, skip over
;/          associated 2 bytes to next key value. If match, move to
;/          2-byte entry and copy into HL for return. If key value not
;/          in table at all, return with carry flag set.
;/ SUBr DEPENDENCE:  None
;/ INTERFACES: None
;/ INPUT:  A = key value being sought
;/         HL = start of table
;/         Table of (a) one byte containing number of key values in the
;/                      table ( max. 255 )
;/                  (b) series of three-byte units: key value followed
;/                      by two bytes of associated data
;/ OUTPUT: If match found: carry flag clear, HL = 2-byte data value, Z
;/                          flag set
;/         If no match: carry flag set, Z flag reset
;/ REGs USED: BC, HL and flags
;/ STACK USE: None
;/ LENGTH:  19
;/ PROCESSOR:  Z80

KYSCH: LD   B,(HL)     ;get number of keys.    46
       INC  HL         ;point to first key.    23
KS2:   CP   (HL)       ;key value matches ?    BE
       JR   NZ,KS4     ;no - jump              20 07
       INC  HL         ;yes - go to 2-byte     23
       LD   C,(HL)     ;data. Get              4E
       INC  HL         ;one byte.              23
       LD   B,(HL)     ;get the other.         46
       LD   L,C        ;transfer               69
       LD   H,B        ;to HL.                 60
       RET             ;return with 2-bytes    C9
                       ;in HL, cy clear, Z set.
KS4:   INC  HL         ;skip to                23
       INC  HL         ;next key               23
       INC  HL         ;value.                 23
       DJNZ KS2        ;loop.                  10 F1
       SCF             ;set cy for no match.   37
       RET             ;return.
```

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Editor, Computer Answers, Nov. 1983.

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Personal Computer World, Benchtest, Oct. 1983.

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Marketing, February 1984.

y about this one?

Our first Apricot has become something of a star. It shot to fame as one of the best selling 16-bit business micros in this country and now it sells in fifteen others.

Most recently it picked up two major trophies against the best in the world (or second best, as it turned out) for the Business Microcomputer of the Year and the coveted Sunday Times Award for the Microcomputing Innovation of the Year.

But laurels aren't for resting on, so we've brought out a faster brother for the Apricot with an even bigger capacity.

It's called the Apricot xi, the first UK machine with a 3½" built-in Winchester disk drive.

Briefly, we've replaced one of the floppy disk drives with a hard disk, sealed for protection inside the computer.

This brings with it two stunning advantages. In simple terms it means you get up to thirty times the storage capacity and up to five times the speed.

But it has the same neat footprint.

Unlike most other machines with a Winchester disk, you can clip the keyboard underneath the unit and carry it to and from the office without doing yourself or the machine any damage.

It's light as a loaded briefcase and just as likely to survive the 8.15. (For safety's sake, the disk heads automatically retract and lock when you switch off.)

Whatever your business is, ACT has the software that'll help you run it. Nobody has a bigger published library of British business micro software.

The Apricot xi comes in two versions, the 5-Mbyte at £2,695 and the 10-Mbyte at £2,995. In other words, you can get twice the storage capacity (10 million characters) for only £300 more.

Its major rival will set you back about £4,700. And that's without around £750 worth of software we give you free.

Which perhaps makes you wonder if we can come up with a comparable machine for the price?

Don't take our word for it. Look out for the reviews and decide for yourself.

Please send me details of the Apricot xi. To: ACT (UK) Ltd., FREEPOST, Birmingham B63 1BR. Or Freefone Apricot via Operator.

NAME

POSITION

COMPANY

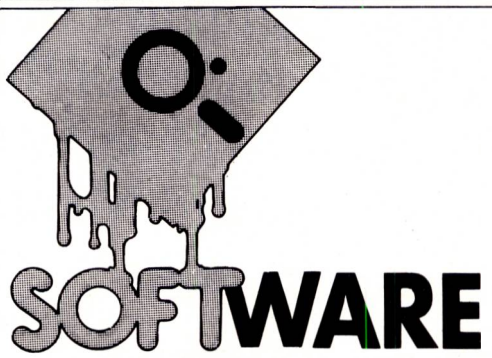
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TEL

PCW6/84

ACT

RIVE AND COMPARABLE CONFIGURATION MANUFACTURED BY INTERNATIONAL BUSINESS MACHINES CORPORATION, INCLUDING DOS 2.0 AND CP/M 86.



Business disks

Dragon Data has made amends for the previous lack of disk-based software by producing a range of business packages for the 64: a word processor, database and spreadsheet. Tony Harrington evaluates each package in the light of strong competition.

As this article was going to press, Dragon announced a further four business packages. Called the Bookkeeper Series, they consist of a cashbook and VAT register, a stock control package and sales and purchase ledger packages, all priced at £49.95.

There is nothing more irritating than buying a disk drive and discovering there is no software to run on it. Dragon Data, with the new Dragon drives, risked being in just this position. The volume of disk-based software available when Dragon announced the drives in September 1983 was slight, to say the least.

Undeterred, Dragon attempted to turn this paucity into a plus mark. Users, it said, would be spared the bother of hunting through hundreds of competing packages: Dragon Data would provide. It's a risky line to take, but the first offerings on the 'serious' business applications front are impressive. Stylograph, DynaCalc and RMS — word processor, spreadsheet and database system respectively — are good, sound packages. This software is supplied on disk by Dragon Data.

The disk drives are standard 5¼in, manufactured by ALPS on the continent, and have a good track record. The price is £275 for a single and around £389 for a double disk drive.

Connecting the drives to the Dragon 64 is a simple matter. Dragon has produced a cartridge-based disk operating system that plugs into the 64 games cartridge slot. The drives are separately powered.

The operating system is a Unix look-alike called OS-9 (Unix is the *best* operating system for the Dragon processor). OS-9 is by Motorola and Microware and is very close to the Unix standard.

The software comes from various sources in the US, though Dragon Data has standardised the manual. The three packages reviewed below are fully integrated: files created on one can be read by either of the others.

DynaCalc

If you have a proper monitor, this is a good, solid spreadsheet, capable of serving the cashflow, forecasting or budgeting needs of a small business. If you are running off a TV set, be prepared for eyestrain. The 'go51' command gives you a 51 × 24 column screen, plus full upper and lower case, but at this resolution the TV display is barely adequate.

DynaCalc offers a maximum of 255 columns and a maximum model size of around 1000 cells on the Dragon 64 (a cell is any intersection of a column and row). It includes all the standard spreadsheet features: vertical and horizontal scrolling, independent split-screen window scrolling, automatic replication of values across cells, and so on.

Most commands are issued with a single-key, though sub-command menus within a specific command (such as format) require two letter commands.

The main question to be asked of a spreadsheet concerns its functional operators: DynaCalc has the basic arithmetical operators: +, −, *, /, and exponentiate. It also has over 24 built-in mathematical functions, including averaging, rounding and summing to selected cell ranges. For most small business users, this is more than enough. The manual contains a reasonable tutorial on the command structures.

Stylograph

Stylograph is a 'bundle' of programs squeezed onto one disk, and includes 'mail-merge' and 'spell-check' programs. The latter is excellent and has a dictionary of over 40,000 words plus a facility for displaying words that don't match the dictionary, in their context — a marvellous idea.

This means that the user is left with barely 15k of user space once the disk has been booted. This is about enough for five full A4 pages of text (though it's possible to create documents bigger than the machine's internal memory). The manual recommends that anyone setting out to write lengthy documents should dump the six program files needed for spell-check onto a separate disk. This can be done even if users only have a single drive.

The word processor is a very competent piece of programming. It has all the usual features including word-wrap, left and/or right text justification, printer commands for bold, underlining, superscript and subscript, headers and footers and global search and replace facilities. The commands are single-key entries (though some control sequences require simultaneous two-key depressions).

There are three operating modes: 'Escape', 'Insert' and 'Supervisor'. The manual claims that most users will be able to find their way around the package in a couple of hours. It's not quite a 'boot-up and run' affair — word

processors seldom are since you have to know how to get from one command sequence to another. But the manual does act as a competent tutoring device and encourages a hands-on approach.

The Escape operating mode is misleading: I kept thinking of it as the ESCAPE key — which you have to hit to get into Escape mode — rather than as a separate set of commands. It's the part of the program where you browse through the document. A group of keys clustered on the right of the keyboard provides the scrolling facilities. You can either move the text up or down a line at a time — in whole screenfuls — or jump to a page number. As the Dragon 64 can only display 51 characters onscreen, Stylograph also has a command that automatically scrolls text off-screen to left or right onto the screen.

The maximum number of pages in a Stylograph document file is pre-set at 22 (well beyond the internal memory capabilities of the 64). This can be changed through a direct command from the OS-9 operating system shell, but users should be careful about creating new limits. The 22 pages represent a sensible estimate of what Stylograph can handle. If you are creating a document with less characters than usual per line (an extensive table or list, for instance), the format for changing the default page maximum would be OS-9: stylo letter +Mxx, where OS-9: is the operating system prompt and xx is the new page limit. There is nothing complex about this, but I would have preferred some hard information in the manual on the maximum character size possible in a standard document file. If you inadvertently try to type past the default page (22), Stylograph prevents you entering another character past the last line of the last page.

Search and replace facilities are part of Escape mode. You can tell the program to disregard the case of the characters it is searching for. Text strings can be moved from one place to another, duplicated or erased.

In Insert mode (reached by hitting the ';' key in Escape mode), the print modification commands are available as a series of 'control key' combinations. Any mix of modification commands is possible (that is, you can have a superscripted character, underlined and emphasised).

The package has some sophisticated text formatting commands and a reasonably comprehensive set of parameter files for various printers, so customising it to your printer is a simple matter.

The Supervisor mode (entered by hitting the '/' key) consists of a command menu which replaces the text display. It contains key functional commands like the 'PRINT' or 'SAVE' commands. The OS-9 operating system allows output to be routed to an output file for print spooling, so a 'spool' command is provided.

Considering the restricted user space in Stylograph, Supervisor mode contains a 'new' command, used with documents larger than five pages. It does this by allowing you to shuffle text between disk and internal memory. The 'new' command dumps the current contents of memory to an output file on disk and brings up the next chunk of text from the input file for editing.

The manual is well presented despite having no screen illustrations. Its 93 pages contain a reference section as well as tutorials on Stylograph, and the mail-merge and spell-check functions.

Although it's the more expensive of Dragon Data's disk-based packages, it's still cheap at the price. Given the availability of Stylograph, there is no reason for 64 users to wait for one of the old faithfuls, like WordStar, to become available.

RMS (Record Management System)

Potential users of RMS, an inexpensive database, can be thankful that Stylograph is a good word processing package: you need the latter to put RMS into operation.

Other, more expensive, database packages come with their own built-in screen form designers. These allow the user to 'paint' a layout screen for entering data into the various fields in a record. RMS relies on Stylograph or the OS-9 operating system text EDIT program to do this. Once the field characteristics have been set up, together with data prompts, the file is saved and then called up within RMS. It has to be given a '.DIC' suffix by the user at the time of saving for RMS to recognise it. It must also have the same name as the main RMS data file with which it's going to be used.

A minus point about RMS is that the number of records to be stored in an RMS file, plus the maximum record length, must be specified in advance. The length can be anything from three to 1022 characters. The number of records allocated must be at least 25 per cent more than you intend using since records are hash-coded; as the manual points out, hash-coding only works well if the target file is less than 80 per cent full. If you underestimate your needs, the only way around it is to create a new, larger RMS file and read your old data across to it.

As is usual, fields can be alphanumeric, numeric or date fields. The maximum field length is 255 characters and field names are restricted to eight characters. Note that prompts are not the same as field names: they're part of the data entry screen which is created using Stylograph (the '.DIC' file), are set in quotes and can be as long as necessary. They are the entry mask and not part of the data stored on the database. Each record has a little line of up to 80 characters, and can then have up to 50 fields.

RMS expects input into every field on a record. A new record will not be accepted unless all the fields are completed. To avoid this bureaucratic attitude, you must specify an 'optional fill-in flag' at the layout creation stage in every field to be left blank — an unnecessary complication. Any field can have a set of data validation criteria attached to it (rejection of numbers outside the range 50 to 9000, for example) — an interesting feature to find on so inexpensive a package. You can also list possible valid inputs.

Any database package worth its salt has to be able to cope with both records and transactions involving individual records (a customer account and the invoices entered onto that account). RMS does. Primary records contain the stable information while secondary records keep volatile information concerning a primary record.

The OS-9 edit program must also be used to set up the text file of commands which control the RMS report writer (called the report spec file, suffix '.REP'); this side of the package demands careful study of the manual.

The principle is simple enough. The commands which govern the production and formatting of the report are all single letter commands, qualified by values. With one exception, it doesn't matter in what order commands are written out in the text file, providing each one terminates with a semicolon. An example command is: 'E fieldname (low, high)';. This is an exclusion command which will exclude the field named from the printed report if it lies within the values specified in brackets.

It's not a good idea to sit a user down before a word processor and ask him, in effect, to write a program for producing a report. Report writers, however, always make fairly steep demands on users and this is as good a report writer as any. Numeric fields can be subtotalled and totalled at report stage.

RMS also allows index files to be created and attached to data files. An index file is used to sequence records in a database file into ascending order by one of the fields within the file. It provides a powerful tool for selective reporting and data amending. Finally, RMS files can be accessed by other programming languages, including Basic09.

Prices

OS-9 system	£39.95
DynaCalc	£59.95
Stylograph	£79.95
RMS	£54.95
Structured Basic	£59.95

Conclusion

Overall, the quality of the three business packages offered by Dragon Data is very respectable.

So, now you're prepared. If you want to run a business using the 64, you have all the practical tools to make a start.

END

NETWORKS

A most novel bulletin board has been set up in the US. It's based on 'rooms' in a building: each affiliated to a particular topic. Interested in dialling-up? Peter Tootill reports.

The latest type of bulletin board system to appear in the US is called the 'Room System Board': set up like a series of rooms in a building. You enter via the 'Lobby' and then make your way through the rooms, leaving messages as you go in whatever room interests you.

Rooms are usually linked to a topic; for example, politics, religion or technical help. Most systems also allow you to create your own room where others can also leave messages. They allow multiple conversations and discussion on a wide variety of topics. Here are some numbers of room systems boards in the Seattle area of the US that you can try, if you have access to a US (Bell) standard modem:
(0101) 206-839-4759 (SPACE Citadel).
(0101) 206-329-0436 (Ckcms Citadel).
(0101) 206-527-7638 (Eskimo North Minibin)

Now that Basicode (see reviews in April & May issues, *PCW*) has arrived in Britain via the BBC Chip Shop programme's *Take Away Service*, it would be a very useful system for the download areas of bulletin boards to adopt. There is no need for the standard cassette recording format, of course, as all download software will come via a modem and the RS232 port. However, the system of subroutines and the standard subset of Basic would mean that a wider range of download software could be carried for any machine that could cope with the rules of Basicode.

Liverpool Mailbox now has a special interest section for Basicode users, and those interested in the system.

Bell and CCITT Modem compatibility

In the April issue we looked at compatibility between Bell and CCITT modems. The only area of real compatibility is between Bell 212 and CCITT V22 systems, which are full duplex 1200 bits/sec standards. However, the fact that the modems can talk to each other doesn't mean that you can import a Bell 212 modem from the US and use it in this country. Apart from anything else it would not have BABT approval, and would be prohibited on the public telephone network. A source also informs me that Bell 212 modems will not work properly on UK telephone lines. The answer is to buy British.

South Africa		
Connection 80	Cape Town	010.27.21.457750
TRShop	Cape Town	010.27.21.215363
Clan Computers	Durban	010.27.31.66356
Peters Computers	Jo'burg	010.27.11.8345134
Peters Computers	Jo'burg	010.27.11.8345135
War Games	Jo'burg	010.27.11.6423722
Germany		
Tedas	Munich	010.49.89.596422
Decates	?	010.49.66154.51433
Finland		
XD-BBS	Helsinki	010.358.0.722272
Commodore bulletin board	?	010.358.1.16223
Australia		
CP/M	Melbourne	010.61.3.762.5088
	Sydney	010.61.2.663.0138
	Sydney	010.61.2.662.1686
	Sydney	010.61.2.997.1836

Overseas bulletin boards

Seconds limit (5.6p incl VAT)

	120	30	10	180	45	15	540	144	48	
Time Mins		**PEAK**			**STAND**			**CHEAP**		**Time Mins**
	Local	**<56 KM**	**>56 KM**	**Local**	**<56 KM**	**>56 KM**	**Local**	**<56 KM**	**>56 KM**	
1	£0.07	£0.15	£0.35	£0.07	£0.12	£0.25	£0.05	£0.07	£0.11	1
2	£0.10	£0.25	£0.64	£0.08	£0.18	£0.45	£0.06	£0.09	£0.17	2
3	£0.12	£0.35	£0.94	£0.10	£0.25	£0.64	£0.07	£0.11	£0.23	3
4	£0.15	£0.45	£1.24	£0.12	£0.31	£0.84	£0.07	£0.13	£0.30	4
5	£0.17	£0.54	£1.53	£0.13	£0.38	£1.04	£0.08	£0.15	£0.36	5
10	£0.30	£1.04	£3.02	£0.21	£0.71	£2.03	£0.10	£0.26	£0.67	10
15	£0.42	£1.53	£4.50	£0.30	£1.04	£3.02	£0.13	£0.36	£0.98	15
20	£0.54	£2.03	£5.98	£0.38	£1.37	£4.01	£0.16	£0.46	£1.29	20
25	£0.67	£2.52	£7.47	£0.46	£1.70	£4.99	£0.19	£0.56	£1.59	25
30	£0.79	£3.02	£8.95	£0.54	£2.03	£5.98	£0.21	£0.67	£1.90	30
35	£0.91	£3.51	£10.43	£0.63	£2.36	£6.97	£0.24	£0.77	£2.21	35
40	£1.04	£4.01	£11.92	£0.71	£2.69	£7.96	£0.27	£0.87	£2.52	40
45	£1.16	£4.50	£13.40	£0.79	£3.02	£8.95	£0.30	£0.98	£2.83	45
50	£1.29	£4.99	£14.88	£0.87	£3.35	£9.94	£0.32	£1.08	£3.14	50
55	£1.41	£5.49	£16.37	£0.96	£3.68	£10.93	£0.35	£1.18	£3.45	55
60	£1.53	£5.98	£17.85	£1.04	£4.01	£11.92	£0.38	£1.29	£3.76	60
65	£1.66	£6.48	£19.33	£1.12	£4.34	£12.91	£0.41	£1.39	£4.07	65
70	£1.78	£6.97	£20.82	£1.20	£4.66	£13.90	£0.43	£1.49	£4.38	70
75	£1.90	£7.47	£22.30	£1.29	£4.99	£14.88	£0.46	£1.59	£4.69	75
80	£2.03	£7.96	£23.79	£1.37	£5.32	£15.87	£0.49	£1.70	£4.99	80
85	£2.15	£8.46	£25.27	£1.45	£5.65	£16.86	£0.52	£1.80	£5.30	85
90	£2.27	£8.95	£26.75	£1.53	£5.98	£17.85	£0.54	£1.90	£5.61	90

Developed on Multiplan by Len Gould

Online telephone costs (incl VAT)

Modem Operating Frequencies

Modem Type	Speed (Bit/s)	Duplex	Transmit Frequency 0 Hz	Transmit Frequency 1 Hz	Receive Frequency 0 Hz	Receive Frequency 1 Hz	Answer Tone Freq Hz
CCITT V.21 Orig	≤300	Full	1180	980	1850	1650	—
CCITT V.21 Ans	≤300	Full	1850	1650	1180	980	2100
CCITT V.23 Mode 1	600	Half	1700	1300	1700	1300	2100
CCITT V.23 Mode 2	1200	Half	2100	1300	2100	1300	2100
CCITT V.23 Back	75	—	.450	390	450	390	—
Bell 103 Orig	≤300	Full	1070	1270	2025	2225	—
Bell 103 Ans	≤300	Full	2025	2225	1070	1270	2225
Bell 202*	1200	Half	2200	1200	2200	1200	2025

Bell 202 has no back channel as such, only a 5 bit/sec on/off signal (387Hz = on, no signal = off) used for handshaking. (CCITT V22 & Bell 212A do not use single frequencies like these and cannot be simply included in such a table.)

UK free networks

CBBS South West . . . Tel: (0626) 890014. Hours: 24 hours daily.

Mailbox-80, W Midlands Tel: (0384) 635336*. Hours: 6pm-8am daily (ring-back system).

Forum-80 Hull . . . (Forum-80 HQ) Tel: (0482) 859169. International electronic mail, library for up/down loading.

Forum-80 Users Group, PET Users section shopping list system. Hours: Tues/Thurs 7-10pm; Sat/Sun 1-10pm; nights, midnight-8am, US (Bell 103) standards.

Forum-80 London . . . Tel: (01) 902 2546. Electronic mail, library for down-loading. Hours: 7-10pm weekdays; midday-10pm weekends. Ring and ask for Forum-80.

CBBS London . . . Tel: (01) 399 2136. Facilities: electronic mail, program downloading. Hours: Sun 5-10pm.

Liverpool Mailbox . . . Tel: (051) 428 8924. Electronic mail, down-loading, TRS-80 information. Hours: 24 hours daily.

TBBS, London . . . Tel: (01) 348 9400. Hours: daily 9am-7am.

BASUG . . . Tel: (0742) 667983. Hours: 24 hours daily.

Computer Answers . . . Tel: (01) 631 3076. Hours: 24 hours daily.

CBBS Surrey . . . Tel: (04862) 25174. Hours: 24 hours daily.

Blandford Board . . . Tel: (0258) 54494. Hours: 24 hours daily.

Southern BBS. Tel: (0243) 511077. Messages, down-loading. Hours: 8pm-2am daily (ring-back system).

UK systems run by commercial organisations, which are free at least in part:

DISTEL. Tel: (01) 679 1888. Run by Display Electronics (new and surplus electronic and computer equipment, components, etc). The system provides information about stock lines, credit card sales, and some message facilities. 300 baud only at present. Cost: free. 24 hours.

REWTEL. Tel: (0272) 236628. Run by *Radio and Electronics World*, the publishing side of Ambit (electronics components suppliers). Information on stock lines, some message facilities, credit card sales; the latter only for subscribers. 300 baud only at present. Cost: limited areas free, remainder £10 pa. 24 hours.

MAPTEL. Tel: (0702) 552941. Run by Maplin (electronic components and micro-computers). Provides information on stock levels, credit card sales to existing customers only. 300 baud only. Cost: free. 24 hours.

ESTELLE. Tel: (0279) 443511 V21 (Datel 200); (0279) 441188 (Datel 600); (0279) 441222 (Datel 1200). For customers of STC Electronic Services. Office hours only.

Subscriber commercial systems in the UK:

PRESTEL. Subscribers only: Prestel consists of a database made up of individual pages provided by many different organisations (not by Prestel itself). 1200/75 baud service at local call rates for a large percentage of potential users. 300 baud service on London telephone number only, at present. Cost: domestic subscribers £5 per quarter and no time charges outside peak periods, 80 per cent of pages are free. Business users: £15 per quarter and 5p/minute up to 6pm and Saturday mornings, no time charges outside these hours (time charges also apply to domestic users). Information: tel: Freefone 2296.

MICRONET 800. An organisation providing information within the Prestel database specifically aimed at microcomputer users. Service details as Prestel. Cost: £50-£75 joining fee (covers acoustic coupler and software—for a limited range of machines at present) and £8 per quarter on top of normal Prestel charges. Information: Micronet 800, 8 Herbal Hill, London EC1R 5JB. Tel: (01) 837 3699.

Subscriber business systems in the UK:

Commercial systems aimed at business users:

TELECOM GOLD. Info from: Julie Ireland, 42 Weston Street, London SE1 3QD. Tel: (01) 403 6777.

COMET. Message handling system giving user facilities for leaving and retrieving messages: costs £30 per month. Info from: John Douglas, BL Systems Limited, Grosvenor House, Prospect Hill, Redditch, Worcs. Tel: (0527) 28515.

*RING-BACK SYSTEM—dial the number, let phone ring once and then ring back.

American/Canadian networks

TYPE	SYSTEM NAME	NUMBER	NOTES
Forum 80	HQ System	0101.816-861 7040	
CBBS	HQ System	0101.312-545 8086	
FBBS	HQ System	0101.312-677 8514	
ABBS	Ottowa, Ontario	0101.613-725 2243	
ABBS	HQ system	0101.703-255 2192	
MABBS	Fort Walton Beach	0101.904-862 1072	
Bull-80	Alabama	0101.205-492 0373	
Conn-80	Colour Computer	0101.212-441 3755	colour graphics for TRS-80 Colour

European networks

ELFA	ABC-MONITOR Sweden	010.468 730 0706	Half duplex
ABC-Banken	Halmstadt, Sweden	010.463 5110771	
ABC-MONITOR	ABC Club of Sweden	010.468 801523	Passwords required
CBBS	Gothenburg, Sweden*	010.463 1292160	75/1200 baud
		010.463 1690754	300 baud
	Helsinki	010.358 0722272	

*After receiving the tone and connecting your modem, either type <C/R> or type: <COM C/R>. The system then asks for a password which is: 'cbbs' *in small letters*!! If you only get '>' when you dial up, the system needs resetting and you type <I> C/R.



Microsoft's Word

Microsoft's new word processor for the IBM PC comes complete with windows and can be driven by a mouse. Its full of bells and whistles, says Jerry Sanders, but it wouldn't win any awards for ease of use.

Microsoft, the company that made its name with Microsoft Basic, now has a word processor in the family: Word, currently available for the IBM PC and XT under PC-DOS. Priced at £299 (excluding VAT) this is only the company's second applications program; the first was Multiplan. Word offers 'live-screen' processing — the *what-you-see-is-what-you-get* philosophy extends to italics, bold face, underline and double underline characters — providing a high-res screen is used.

Word will appeal to those who need a range of document formats and print styles plus the ability to apply them to any document. A text created with Word can be reformatted by associating it with a user-defined style sheet. This reformatting takes place at the touch of a control key. Style sheets are more complex to set up and enable the user to type a variety of documents, memos, reports or even books; and produce the appropriate format repeatedly and consistently, down to the typeface, typesize and footnote conventions.

Word *can* be used with a mouse, and windows are standard: up to eight of which can be used to display different parts of the same document, or indeed eight different documents, simultaneously. There are no icons though, which gives Word a half-way status between traditional and modern user interfaces. Since word processing is a keyboard operation, the mouse doesn't make Word significantly easier to use.

Word comes in a clear perspex box which can be used as a prop by folding back the top. Two disks are included: a misnamed 'system disk (see 'Documentation') and a program disk. Placing the 'system' disk in drive A after booting PC-DOS and typing Word gives rise to a double-vision display of the word MICROSOFT.

Also in the box is a manual and an A5 ring-binder containing 400 pages — at least a quarter of which is unintelligible. A quick-reference card completes the package. This, too, is unfortunately named. The 'card' is on thin glossy paper and far too flimsy to stand up to the amount of use intended for it. It's hardly 'quick' — being double-sided and packed with tiny print.

No key stickers or overlays are included in the package. Many keys can be user-defined, while others are straightforward mnemonics, but a set for the function keys would have been useful.

Word is menu, not icon, driven. It has two modes: Edit and Command, the latter being known as ALPHA. This is consistent with Multiplan's mode of operation. On power up Edit mode is set. The ESCAPE key switches you through to ALPHA. To switch back to Edit the 'A' (!) key is used. A toggle on ESCAPE would have been slightly more logical.

Menus are organised in a tree structure by main command, and the same words (for example, FORMAT, INSERT, TRANSFER) appear on different menus. Sometimes the meaning of a command changes according to its position on the menu tree.

This bold concept only works if the user is as clued-up as the program; take the FORMAT command, for example. It appears on the ALPHA menu and also on the GALLERY menu. Sounds confusing? It is. According to the manual *'The EDIT FORMAT CHARACTER command is used to view or set formatting attributes of characters . . . The GALLERY FORMAT CHARACTER command is used to view or set the character attributes of styles with character usage, or to view or set the character attributes of normal style for characters in styles with paragraph usage.'* All clear?

On screen Word uses a framed window for text, with a four-line menu, information and command area beneath. This includes a 30-character window on a scrap buffer, a question mark for indicating with the mouse to help call up information (on the keyboard help is provided using Alt-H). Every time a DELETE or COPY command is issued, the selected text replaces the current contents of the scrap buffer. An UNDO command allows the last command issued to be reversed, so deleted text could, for example, be replaced *in situ* from the scrap buffer. You also get a percentage figure for free disk space and the name of the current document. In the GALLERY menu this defaults to the name of the currently active style sheet: in GLOSSARY menu to the current glossary.

Placing this interface area at the bottom of the screen is a design fault. The natural tendency of the eye is to travel downwards, which is why well-designed word processing programs place information at the top of the screen, where it can be comfortably ignored until required.

Limitations

A window does not initially show a ruler or an indication of the current page, line or column number. A ruler may be displayed through the Window Options menu, but it will only show tabs and column widths. INSERT mode can't be

toggled on/off with a straightforward control sequence. This is because you have to key in sub-menu options and use the tab and space bar keys to select the required option. Word falls into the dual interface (keyboard/mouse) operation trap: procedures which work well with the mouse cause extra work from the keyboard.

A point about hardware here. The IBM monochrome display monitor doesn't show the mouse cursors or the different character styles, as it is not a high resolution, bit-mapped display. However, *PCW*'s review machine was fitted with an ABM Colmon adaptor which plugs between the monitor and the video output to give high resolution (green on black) display on a normal monitor in use with a colour card. The trade-off is a reduced main window size leaving a one-inch border around the screen which is lost to the application: single-spaced text is very squashed up on the display.

On power up, a set of control keys for onscreen character control is enabled (see Fig 1). These can be reconfigured and new ones added via the INSERT command under the GALLERY menu, itself an option on the ALPHA menu. At any time ASCII graphics characters may be generated onscreen by holding down the Alt key and typing the character number on the numeric keypad. The character appears when the Alt key is released.

Word's functions

Onscreen functions	
Graphics characters	Yes
Multiple text windows	Yes
Set page width	Yes
Set page length	Yes
Auto page number	Yes
Search	Yes
Replace (optional/all)	Yes
Centre	Yes
Cut & paste	Yes
Define tabs	Yes
Justify/range l/r	Yes
Word wrap	Yes
Reformat para/page/document	Yes
Headers/footers/footnotes	Yes
Insert on/off	Yes
Backspace destructive	Yes
Live screen	Yes
Colour	No
Upper/lower conversion	No
Page/column/line/cursor position	No
Cursor position indicator	No
Disk/Utility System functions	
Mouse option	Yes
Auto back-up	Yes
Create document on open	Yes
Glossaries	Yes
Repaginate	Yes
Style sheets	Yes
Spellchecker	No
Auto save	No
Save to old file obligatory	No
Word/character count	No
Rename .bak files	No
Text buffer size	Virtual: Depends on RAM fitted
Maillist	Coming
Printing functions	
Printer installation files	Yes
Justification	Yes
Variable line space	Yes
Proportional print	Yes
Print selected pages	Yes
Multiple copy	Yes
Paragraph protect	Yes
Columns	Yes
Type mode (direct print)	Yes (Without onscreen echo)
Sheet/continuous feed	Yes
Print=screen image	Yes
Background print	Yes
Headers/footers	Yes

Character format	Alt + key
Normal	spacebar
Bold	b
Italic	i
Small caps	k
Strikethrough	s
Underline	u
Double underline	d
Superscript	+
Subscript	–

Fig 1 Direct Formatting Commands

Style Sheets

By attaching a style sheet — a file with a .sty extension — to a document, the formatting parameters associated with the sheet will be applied to the document. Word comes with two pre-set style sheets: article.sty and draft.sty. A style sheet is attached to a document by selecting FORMAT from the main menu once the document is in use (or before starting the document). From the next menu select STYLE, and from the menu after that select SHEET. You are then prompted for the filename of that style sheet. On pressing return the sheet is assigned to the current document, and the chosen function sequences operate.

Long Divisions

Word uses virtual memory: the length of a document being limited only by the amount of free RAM and disk space. This can result (and did during Benchmarking) in a text file too large to be saved onto the disk. As well as the normal breakdown of a document into pages, paragraphs and characters, Word offers the use of Divisions. Within a document a new division can be defined with its own set of six parameters (see Fig 2).

Placement of page number
Page number sequence
Page number style
Margin sizes
Column number and layout
Headers and footers

Fig 2 Division variable parameters

Gallery

GALLERY allows a formatted document to be displayed at the touch of a button. On start-up Word has certain function keys pre-set to give live-screen attributes, assuming a high-res monitor is used (see Fig 1). By choosing the INSERT function from the GALLERY menu, users may define their own mnemonic keystroke(s) so that the format required can be set before writing begins. A format chosen from a standard set can be customised through the FORMAT function of GALLERY, and each set of defined formats may be stored on disk as a .STY file as described above.

Disk management

Word defaults to listing its own files when requested to print a disk directory to the screen. Even then, it only lists files with a .DOC extension. Although automatic back-up on save is performed, Word — like WordStar — won't allow the user to load a file with a .bak extension. The rename function refuses to rename files with a .bak extension: if a .doc file is corrupted you have to quit Word altogether, rename the back-up copy under PC-DOS, and then load it all over again. If a directory of everything on the disk is required, there's no alternative but to specify '.' as the filename before actioning the command.

Documentation

The documentation attempts to explain mouse and non-mouse use of Word under subject headings. The same typeface and typesize is used for both varieties. This makes reading for either configuration annoying because it's not clear which relates to which. Considering that Word includes options for specifying different typestyles and faces, it's a case of do as the manual *says*, not as it *does*.

The manual gives up after teaching the user how to type in a couple of paragraphs and subjecting him/her to some very basic editing and blocking functions. Non-UK standard terminology is used: very annoying if you want to look something up. Don't waste time searching the index for load, merge or read: the word to look for in all cases is transfer. Among the other key words which aren't instantly obvious are ALPHA, GALLERY and LIBRARY (the latter is not implemented yet so it's hard to say what it will do).

Conclusion

Word is not for users who want standard word processing with a maximum of clarity and a minimum of fuss. It's full of bells, whistles — and even knobs if you use a mouse. The company's claim that you'll learn to use Word in no time at all is pure misinformation. Powerful features are available but you have to be prepared to sweat a little to achieve them.

Word merits an excellent rating for its lengthy list of facilities and operations, but it's no use a product having excellent features if it can only be used by people with programmers' brains. Beginners are well advised to steer clear but, if you're looking for a challenge, Word could well be for you.

END

Micro animation

While you're putting the final touches to your animation entry, here's a final reminder of the competition specifications together with the entry form.

Rules and categories

Competition Entry Categories

1a ANIMATOR PROGRAM
1b IMAGE MANIPULATION PROGRAM
2 VDU ANIMATION SEQUENCE (LIMITED MEMORY)
3 VDU ANIMATION SEQUENCE (UNLIMITED MEMORY)
4 8 OR 16mm FILM SEQUENCE



5 SPECIAL

In each category, entries will be accepted from:
a) Individuals/private groups
b) Schools

CATEGORY 1a
ANIMATOR PROGRAM

1 This category is for a program or suite of programs which may be written in machine code, assembly language and/or any high level language.

2 The program(s) must run on standard unexpanded machines. For those machines which offer different RAM versions (Spectrum, Lynx, Sirius, and so on), the judges will take the version used into consideration when evaluating the program(s).

3 The program will enable a non-programming user to carry out the following operations:
- a) Draw onto the VDU using the keyboard or joystick
- b) Display on the VDU an animated sequence created by the user
- c) Save the animation to tape or disk
- d) Load the animation from tape or disk for view/modification

4 You will be judged on (in no particular order):
- a) Ingenuity and originality of the code
- b) Efficiency of the code
- c) Effective use of the machine's capabilities
- d) User-friendliness
- e) Readability of code

CATEGORY 1b:
IMAGE MANIPULATION PROGRAM

1 See Category 1a, No 1.

2 The program(s) may run on expanded machines and may involve the use of digitising equipment (graphics tablet, and so on.)

3 The program will enable a non-programming user to carry out the following operations:
- a) Input a drawing to the program.
- b) Display manipulated versions of the drawing on the VDU for frame by frame capture on film or video tape

4 See Category 1a, No 4

CATEGORY 2:
VDU ANIMATION SEQUENCE
(limited memory)

1 In this category machines may be expanded up to a maximum of 128k RAM.

No other modifications to standard machines are permitted.

2 An entry in this section will comply with the following:
- a) Allow the sequence to be loaded from tape or disk
- b) Permit the judges to repeat view from the keyboard

3 Sequences will be judged entirely on

artistic merit in the context of the capabilities of the chosen machine.
4 The sequences must run on standard machines. Entries for the Sirius or IBM will be judged in monochrome only.

CATEGORY 3:
VDU ANIMATION SEQUENCE
(unlimited memory)
1 In this category no hardware holds are barred.
2 Entries will be judged entirely on artistic merit.

CATEGORY 4:
8 or 16mm
FILM SEQUENCE
1 Submissions will consist of a single reel of 8 or 16mm film or a single video cassette.
2 All frames on an entry must be computer-generated images. Winning entrants may be required to demonstrate the techniques used.
3 A paper detailing the program(s) and filming techniques used must accompany each entry.

CATEGORY 5:
SPECIAL
1 As microcomputer animation is a relatively new field, we understand there may be entries which contribute new insights into the subject but which fall outside the categories drawn up for the competition. Category 5 entries will be those which, because of their innovative nature, deserve special mention. Nominations for this category will be made by the judges only.

General rules

1 Any entry which contravenes any or all of these rules will be disqualified.
2 Entries must be submitted in an envelope clearly marked ***PCW* MICRO ANIMATION COMPETITION, 62 Oxford Street, London W1.**
3 Program entries shall consist of three copies of the material on disk or cassette. The software shall be labelled, stating format, baud rate, hardware requirements (including RAM) and any other relevant data.
4 Film and video entries shall consist of one copy of the material, fully labelled.
5 Comprehensive and legible documentation shall be included .
6 For entries in Category 1a or 1b a full listing must be enclosed.
7 Each entry shall be accompanied by a completed entry form (not a photocopy) from *PCW*. All entry material received after 31 July 1984 will be deemed ineligible.
8 Employees of VNU and/or their relatives are not eligible to enter.
9 *PCW* reserves the right to declare any category vacant if no entry of sufficiently high standard is received.
10 In the above and in all matters relating to the competition the judges' decision is final. No correspondence will be entered into.

Micro Animation Competition Prizes

Schools Overall Winner: Fujitsu 16S microcomputer (*)
Individual Overall Winner: Fujitsu 16S microcomputer (*)
Schools Category Winners: 48k Spectrum, Microvitec colour monitor, Sinclair Macmillan software
Individual Category Winners: Oric Atmos 48k microcomputer
Best Animated Sequence: Hantarex high quality colour monitor
Special Category Winner: Fujitsu FM7 microcomputer (*)
Best NewBrain Entry: 200k NewBrain integrated disk drive and controller plus CP/M disk and licence
Other prizes to be awarded at the discretion of the judges: Atari 600 XL microcomputer; two £100 libraries of microcomputer books; and a host of software prizes for all makes of micros
(*) Fujitsu specifications
16S: 128k RAM, 2x320k double-sided, double-density drives, 6809 plus Z80A plus 8086 processors, colour monitor, CP/M-86, WordStar, Supercalc 2, FBasic, software selection to suit.
FM7: 64k RAM, 48k video RAM, 6809 and Z80A processors, colour monitor, CP/M-80, WordStar, Supercalc 1, FBasic, software selection to suit.

Our thanks to: *Fujitsu Mikroelektronic, Sinclair Research, Oric Products, Microvitec, Hantarex (UK), Brainwave Software, Atari Inc and Century Publications for their interest and sponsorship of this competition*

PCW MICRO ANIMATION COMPETITION **ENTRY FORM**

Category entered (one per entry form)

Please tick
- 1a Animator program ☐
- 1b Image manipulator program (digitiser use) ☐
- 2 VDU sequence (limited memory) ☐
- 3 VDU sequence (unlimited memory) ☐
- 4 8 or 16mm film sequence ☐

Name of entrant (or school entry project leader)
.....

School (if school's entry) .....
.....

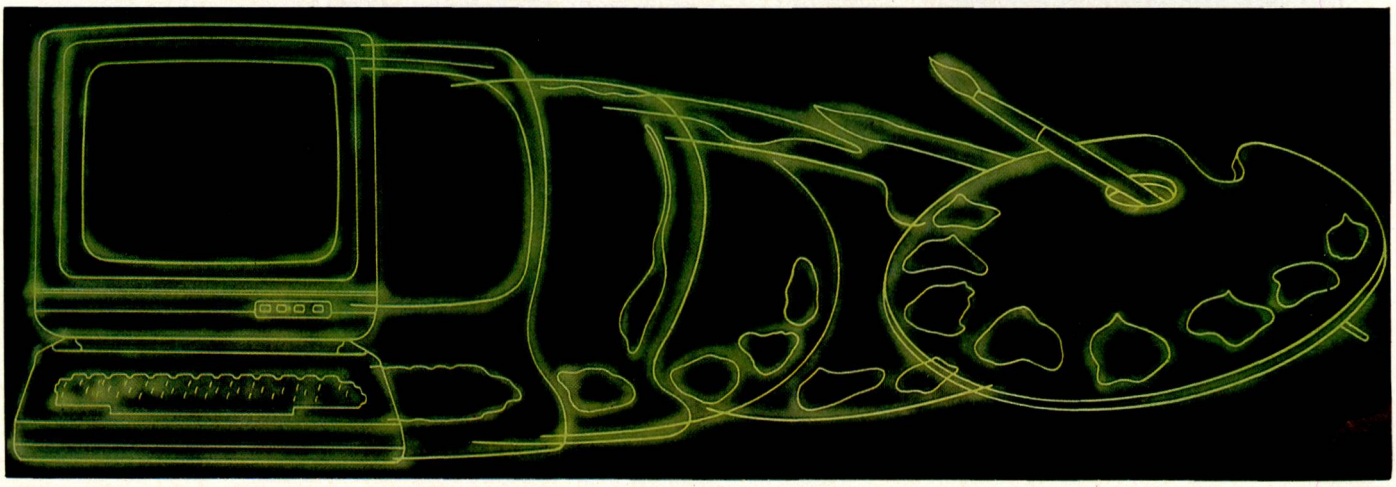
Address for correspondence .....
.....

.....

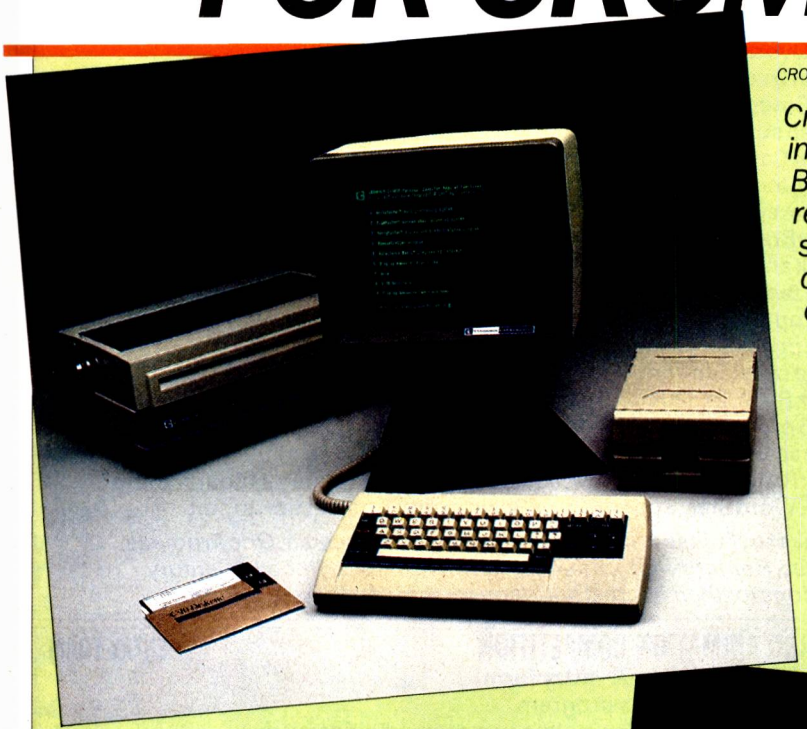
Telephone number (day) ..... (evening) .....

If Category 2, 3 or 4 state sequence title .....

Machine ..... RAM (if appropriate)



CALL MICROCENTRE FOR CROMEMCO



CROMEMCO C-10MP

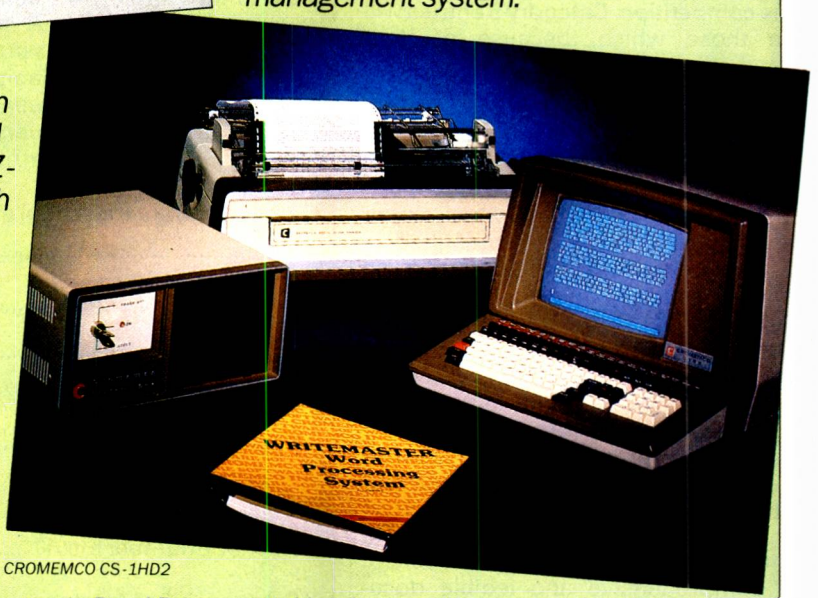
Cromemco's C-10 personal computer includes a Z-80A microprocessor with 64K Bytes RAM, 24K Bytes ROM, high resolution 12" green phosphor 25 x 80 screen, detached keyboard, 5" floppy disk drive with 390K Bytes capacity, communications and printer ports, terminal emulation, graphical characters, CDOS operating system and 32K Structured Basic.

In the C-10MP we add a software "Super Pak": a full screen editor, WordStar, MailMerge, Writemaster, CalcStar and PlanMaster spreadsheet programs, Chess game, MoneyMaster financial analysis and InfoStar data base management system.

The System One Hard Disk computer, with an integral 21 Megabyte Winchester hard disk, includes Cromemco's dual 68000/Z-80A DPU processor (featured below), with 256K Bytes of RAM and 390K Bytes of floppy disk storage.

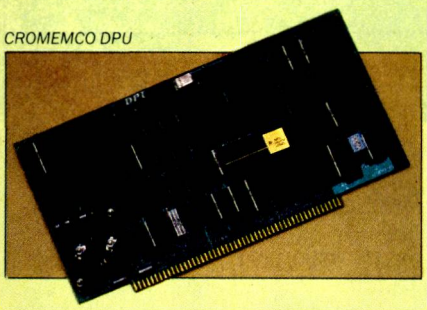
The S-100 bus has eight card slots, sufficient for expansion utilising Cromemco's range of interface cards for high resolution colour graphics, process control, analogue-digital data conversion and telecommunications.

A choice of operating systems includes CDOS, CP/M and CROMIX.



CROMEMCO CS-1HD2

CROMEMCO DPU



Cromemco's Dual Processor Unit is the ultimate professional micro-computer. It combines the flexibility of Z-80A 8-bit systems with the speed and versatility of 68000 16-bit technology and an address space of up to 16 Megabytes of RAM.

The DPU can be installed in several Cromenco computers, including the CS-1 featured above. For larger applications we recommend the CS-2, with up to 4 floppy disk drives, each of 390K Bytes capacity, an optional 21 Megabyte Winchester hard disk, screen and printer interfaces plus a 21 slot S-100 bus -- sufficient capacity to cope with the most demanding industrial or laboratory requirements.

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BIBLIOFILE

Bookshelf flavour of the month is the Acorn Electron, with elementary stages catered for. Linnet Evans explores the rudiments of games, Basic programming and education on the BBC Micro.



Take Off with the Electron and BBC Micro

Authors: Audrey Bishop and Owen Bishop
Publisher: Granada
Price: £5.95

Congratulations to the originators of *Take Off* . . . for bracketing the two Acorn machines between one set of covers.

First impressions were of a rather worthy, didactic piece of writing. But you can't judge a book by its cover — or at least by its intro. *Take Off* . . . is very near the wacky entertainment its title suggests.

The first chapter takes the novice through the nuts and bolts of very basic Basic. You sense that the authors are also experienced listeners, and have thoroughly appreciated the niggles and pitfalls of their early experiences.

The following 11 chapters are each dedicated to a program, most of which are refreshingly fresh and practically practical. 'Birthday Book' is oversold as a database, but it does give a rare opportunity for some datafile I/O to either disk or tape. The reader is then invited to button up his birthday suit with all kinds of fixes (how to cope with twins' birthdays, anniversaries on the horizon). These are suggestions for genuine enhancements, not spoon-fed globs of code. It's just the right balance between stretch and achievability for the average avid Electronite.

'Limerick' is fairly random verbosity. Of greater interest to many will be the visual variant using pixellated limbs to re-enact the old pen and paper game of 'Heads, Bodies and Legs'.

Program listings are straight off the Epson. Each is followed by a how-it-works section explaining the different routines both logically and syntactically. The level of explanation is, again, precise. Problem areas are positively opened out without the too-frequent wallow in beginner's lacklustre lucklessness. You're scarcely aware just how often new buzzwords, even new concepts, are introduced.

Take Off . . . is an excellent learning curve, and should be even more fun.

Games and other programs for the Acorn Electron

Editor: Lee Calcraft
Publisher: Penguin Acorn Computer Library
Price: £3.95

Editor Lee Calcraft has deftly picked up some 20 programs from *Beebug* heartland and re-presented them in organised book form.

The mainstream games programs straddle two sections, Action and Thought. They make no apology for covering the largely familiar ground of Frogger ('Hedgehog') and Adventure ('Return of the Diamond') modes. Programs are, on balance, well thought out and exceptionally well structured: good to run and valuable as models. A brief description of the workings of each often includes suggested modes (for instance, for differing player abilities).

Taking a slice in a different dimension are the 'other programs'. Visuals concentrate on that often overlooked backwater of pure screen tableaux such as the kaleidoscopic 'Square Dance'. If nothing else, these are typically short routines of 15-20 lines, which is a neat way of finishing a hands-on session. More headily adventurous is a documented '3D Rotator' routine. (BBC writers tend to keep *that* sort of thing strictly for the advanced classes.)

Lastly come the Utilities, a rogues gallery of goodies and baddies. 'Sound Wizard', which enables you to test-drive different SOUND parameters, is the type of routine that every other Clever Joe has written for himself at some time, but might still be useful for the remainder who haven't. 'Double Height' and '3D Lettering', which bump out your titles a treat, are the stuff of which magazines — particularly those of the machine-dedicated kind — are made. Lastly, the real utilities of 'Rescuing a Bad Program' and 'Bad Program Lister' are the stuff of which fortunes were very nearly made before the magazines, and certainly the Electron, were around. Thankfully, in both cases the authors clearly point out the limits and pitfalls of both these routines.

Games and other programs for the Acorn Electron is a neat, energetic book which will serve a lot of interests while compromising few. There's enough substance and authority to keep any veteran happy, while for the less experienced the listings can still be



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tackled on a type and RUN basis. And at a price of just under four quid, it's a virtually unavoidable bargain.

A program cassette is also available from *Beebug*.

Learning to use the Electron Computer

Author: Andrew Cryer
Publisher: Gower
Price: £4.95

The arrival of the Electron took no-one by storm. It was, let's face it, the perfect face-saver to criticisms of the BBC Micro being overpriced — an argument that ran so long it became academic. Offering the facilities that had hooked doubtless 80% of BBC owners in their weaker moments (making noises and drawing pictures), the Electron also had the immediate bonus of a vast cavalcade of software, mags, user groups *et al* immediately available.

Publisher Gower, veterans in this game, have a long and honourable tradition of *'Learning to use . . .'* titles: relatively brief but comprehensive introductions to the politics and practice of the models in question. They are clear, trenchant and logical; beginner's books that don't end with the beginning.

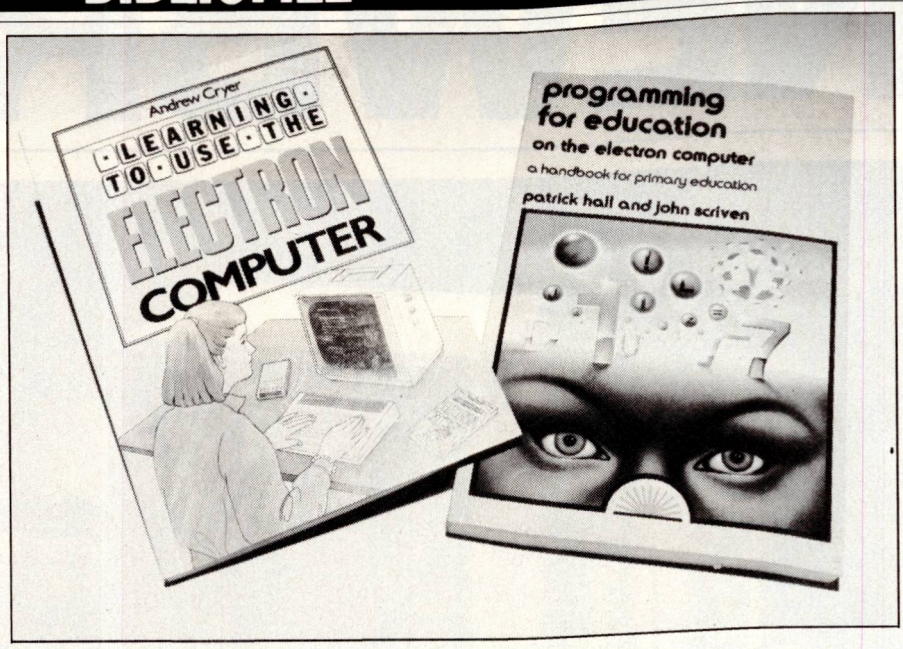
In the light of either or both of the above, *Learning to use the Electron Computer* disappoints. Andrew Cryer's text is annoyingly down-market and simplistic without any charisma to compensate. A large part of this *very* slim volume (82 pages) is at the what-is-a-floppy-disk level without the benefit of clarity for a novice.

If I were on a desert island with my Electron, Mr Cryer's book and a stable 240v 60Hz electricity supply, then I suppose I'd be grateful for small mercies. I would, however, miss the congenial company of AN Other with whom I could shake out a certain amount of confusion accumulated towards the end. The only bonus at that stage would be having time on my hands to try to plug a few gaps. Back in the UK the question doesn't arise: the competition's simply much better.

Programming for Education on the Electron Computer

Authors: Patrick Hall and John Scriven
Publisher: Sunshine Books
Price: £5.95

Considering the number of micros now used in schools, there's a surprisingly lean range of publications aimed primarily at teachers. Pupils, yes. Parents, yes (though less so). But the teachers, who with micros as with sex education, have to handle all the nasty, necessary bits — sensibly and responsibly, remember — haven't a great deal of back-up.



(It shows. A fifteen-year-old recently reported that eight BBC Micros, dutifully bought by her school, had stayed locked up and unused for a term because no member of staff knew how to use them in the classroom, or lacked the confidence to learn alongside the kids.)

Programming for Education picks up a different aspect of this same root problem. It doesn't set out to teach 'programming', and does assume some familiarity with the tools of the trade. What it does examine is the application of software to learning. At its crudest, it offers a sequence of listings covering everything from the old glory of the tables test to a demonstration of Pascal's triangle. More importantly, the programs are carefully documented, not just in terms of line numbers and functions, but also with an eye to their suitability.

Without slamming the opposition for the sake of it, the authors — both experienced teachers — point out various sore spots they have found in practice with some of the precedents. Contrary to jovial opinion, many kids find a perpetually flashing, jumping screen just as unnerving as the majority of adults. Similarly, a great burst of sound to celebrate the completion of a task can be thoroughly disturbing to the rest of the class concentrating on a different task.

If that's re-stating the obvious in educational terms, it's got to be invaluable advice for anyone putting together interactive software for any other application.

Basic Programming on the Acorn Electron

Authors: Neil Cryer and Pat Cryer
Publisher: Prentice Hall International
Price: £6.95

Of all the Electron books reviewed this month (and indeed those that escaped) this one is physically, and in other ways, the most substantial.

Even for a book this size — 300-plus pages — a significant amount of space is taken with the mechanics of plugging in, editing, and SAVE and LOAD which, as ever, kicks back at the official documentation: Is it them? Is it us? The luxury of all this space does mean that different themes can be sensibly given to different chapters ('Making Decisions'; 'Animating Displays'). In each case, the ground is covered briskly but thoroughly with lots of examples, diagrams, tables, a boot (or boost) in the form of 'Activities', and an official breathing space, 'Points to Ponder'.

While there is no one-for-one table of comparisons between the Electron and the Beeb, the authors are conscious of their inheritance. The more limited parameters of the Electron SOUND command, for instance, are swiftly and clearly explained in terms of the BBC Micro's ability in this respect, without demoting the cheaper machine in any way. It only seems a shame that an extra section couldn't have been given to the general problems and prospects for converting BBC listings to Electron and *vice versa*.

Basic Programming is a head-in and hands-on book. At present, it casts an unusually wide net; in the future, it should remain valued in its own right. It may well be just too earnest and thorough for some users. That apart, it's excellent value for money. **END**

NEWBRAIN



The NewBrain total

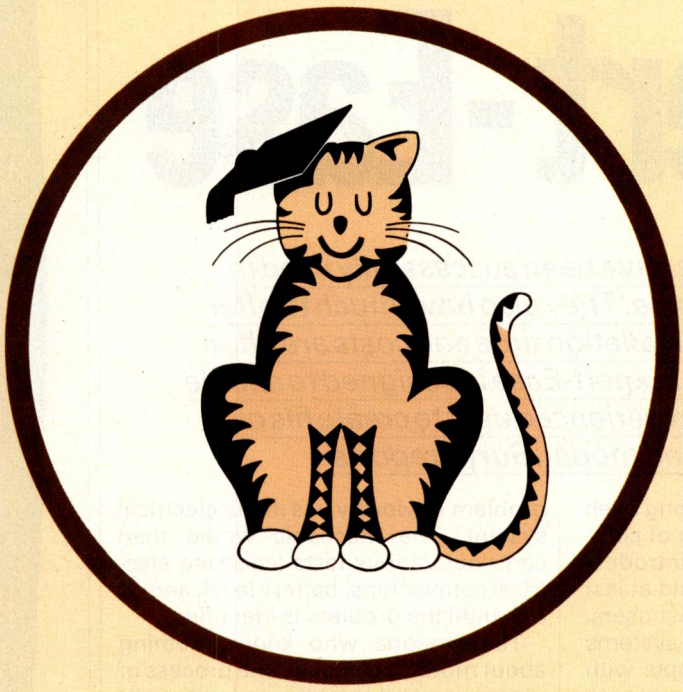
Unique Unix-like operating system, making the NewBrain a multi-functional microcomputer: unlimited and flexible string manipulation; string length up to full memory-space + a hefty 255 pages; maximum page-lenght of 255 lines + 255 independant input/output streams + the superb, full-screen editor (40 or 80 columns; 24, 25 or 30 lines); 4 character sets, 512 characters with various display possibilities + comprehensive graphics facilities; hi-res display of 640 × 250 dots + Basic (in ROM) and additional programming languages: Pascal, Comal, Elan (and all languages available under CP/M©) + the Masternet-module: the sophisticated, low-budget NewBrain educational network + CP/M© + Basicode + Prestel

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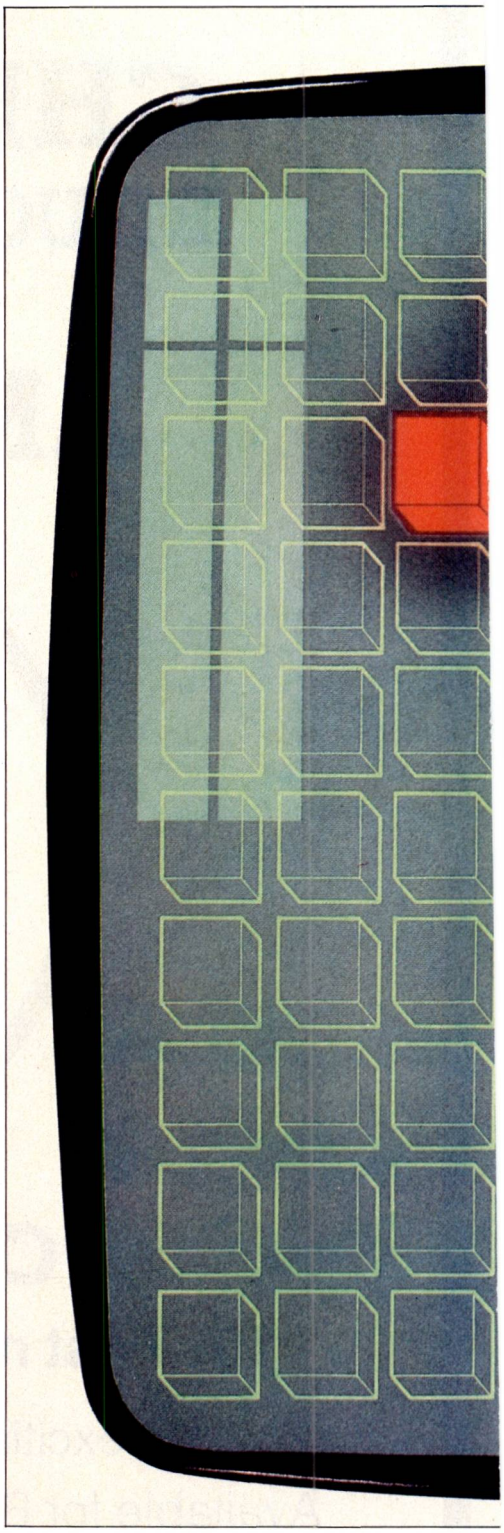
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and other good computer stores

EXPERT SYSTEMS



Expert-Ease

Expert Systems have been successfully used in diagnostic medicine. They also have much to offer businesses but installation time and costs are often prohibitive factors. Expert-Ease is designed to enable even the most inexperienced user to create his own 'intelligent' model. Surya reports.



Artificial intelligence (AI) has long been considered solely the domain of computer scientists, but with the introduction of expert systems, AI could at last make its mark on non-specialist users. Expert-Ease is an expert systems generator which enables people with little or no programming experience to create and interrogate expert models.

The term 'artificial intelligence' conjures up a variety of images, from programs which play chess to the HAL of Arthur C Clarke's *2001*. To date the most practical application of research into AI has been the development of computerised 'models' of intelligent thought: expert systems.

Theory and practice

Expert systems are based on the principle that an expert is simply a person who has access to specialised knowledge, and can apply this knowledge using a set of logical rules. Given both the knowledge and the rules, a computer is capable of modelling the thought processes of the expert. To see how this might work in practice, let's take the example of a motor mechanic.

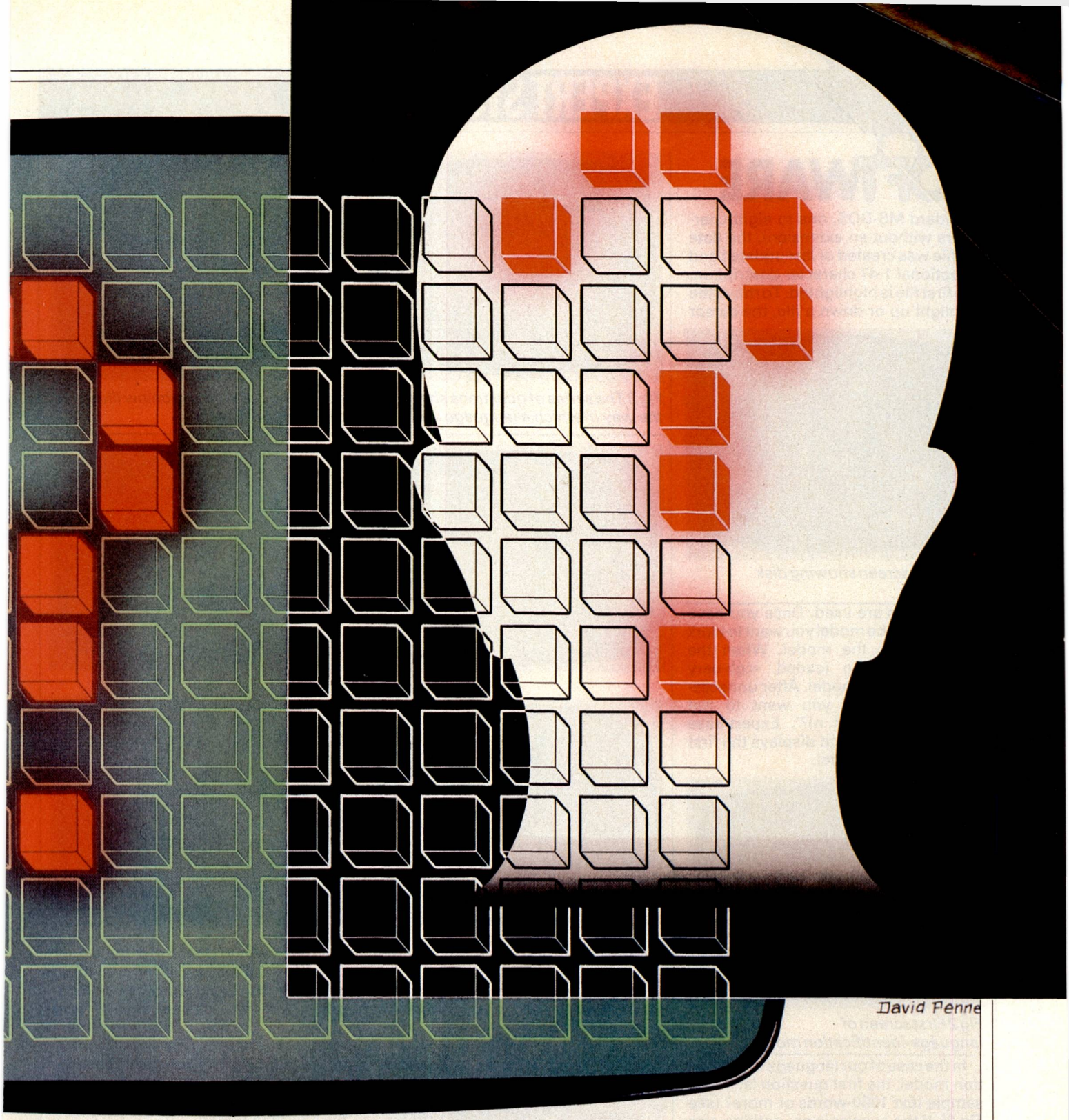
A mechanic, faced with a faulty car, looks first of all at the observable symptoms. These might range from no response when engaging the ignition, to a slight tapping sound at high speeds. Based on these symptoms, the mechanic will immediately be able to narrow down the range of possible problems. If there is no response when the ignition key is turned, then the problem obviously lies in the electrical system. The mechanic would then carry out various tests (checking electrical connections, battery level, and so on), until the problem is identified.

To someone who knows nothing about motor mechanics, the process of identifying and correcting a fault might seem the result of inspired guesswork. In reality, of course, the mechanic simply observes, tests and makes deductions by using a set of specialised knowledge (with perhaps a touch of inspired guesswork!). Someone with little or no knowledge of mechanics is quite capable of carrying out the tests and observations; they just need the expert mechanic to tell them which tests to make — and to draw conclusions from the results. The basis of an expert system is to take this reasoning one stage further: the mechanic becomes superfluous and only the mechanical expertise is required.

On its simplest level, an expert system simply presents the user with a set of questions and uses the answers to indicate likely solutions. This in itself is nothing new; there have been books available for years based on this principle — not least for DIY emergency car repairs! You work through a checklist and — depending on the results of the tests to be executed — are referred to a page or section which reveals the likely problems and how to correct them. A computerised version of this process is easy to write, even in Basic. But a true expert system does more than simply store a set of information and rules for manipulating them; it should act 'intelligently', both when accepting the information and rules, and when interrogated by the end user. It is the degree of 'intelligence' an expert system can demonstrate that determines its usefulness.

The beauty of an expert system is that someone's expertise can be made available as required without the need for the expert to be present. This is invaluable when a specialist's time may cost several hundred pounds per day. But true expert systems take time to write, and are costly, requiring the services of a skilled programmer. This is what prompted Export Software

Illustration by David Penny



International to produce Expert-Ease.

Expert-Ease allows a user to create and interrogate expert systems or 'models' easily and without programming skills. At present it runs on the IBM PC and the ACT Sirius in 128k minimum RAM.

Based around a 'spreadsheet', it provides an easy — if a little tedious — method of creating an expert system.

PCW created a simple model to identify the language in which a piece of text is written by presenting the user with a series of questions, primarily concerning the type of accents in evidence. I'll begin by describing the way in which our model would look to the user, then go on to examine the process of creating it.

Running an Expert-Ease model

To run Expert-Ease, the main disk is placed in the left-hand drive. This disk contains MS-DOS system tracks, the program itself and three demonstration files. The disk takes one minute and 20 seconds to boot and load Expert-Ease, during which time the software licence number, copyright notice and disclaimer are displayed. The last recorded date is then displayed, and you can either press <CR> to leave it as it is, or enter a new date. This is to allow date stamping of files.

Expert-Ease is based around five screens: filer, query, attribute, example and rule; all of which are divided into three areas. The top status line always displays the name of the currently loaded model and the amount of free RAM. The main area of the screen consists of seventeen lines of workspace, and the bottom three lines show the title of the screen, a menu of valid single-key commands and a prompt line. After entering the date, you are taken into the filer screen.

The filer screen displays the models present on the currently logged disk, the currently loaded model, the amount of free RAM and the file menu (see Fig 1). Each model is displayed by its title

(standard MS-DOS, one to eight characters without an extension), the date the file was created or last updated and an optional 1-47 character description. The first file is highlighted. To move the highlight up or down a file, the cursor



Fig 1 Filer screen showing disk directory

control keys are used. Once you have highlighted the model you want to work on, '1' loads the model. When the model has been loaded, <q>uery interrogates the model. After unnecessarily asking 'Do you want to run <filename> (y or n)?', Expert-Ease clears the screen and displays the first question in the model.

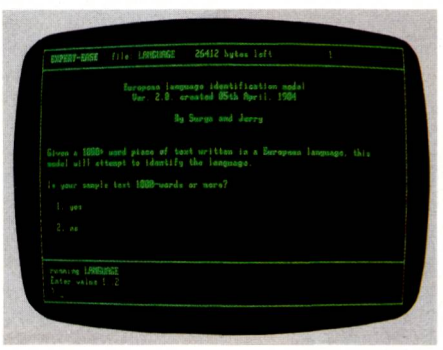


Fig 2 First screen of language-identification model

In the case of our language identification model, the first question is: 'Is the sample text 1000-words or more? (see Fig 2). If the answer is no, nothing else matters since the sample text is not large enough to allow accurate identification. The model therefore jumps to the 'no-can-do' screen. If the answer is 'yes', the model proceeds to the next question: 'Are the letters "English" (ignoring accents for the moment)?'. The options are yes, no and some. Again, if the answer is 'no', we need go no further since the language is obviously not European. Fig 3 illustrates the way in which a language is identified.

To create an Expert-Ease model, the user must first of all create the 'attribute' screen. This defines the different questions to be presented to the user, the text that will be displayed on the screen and the options available. In our

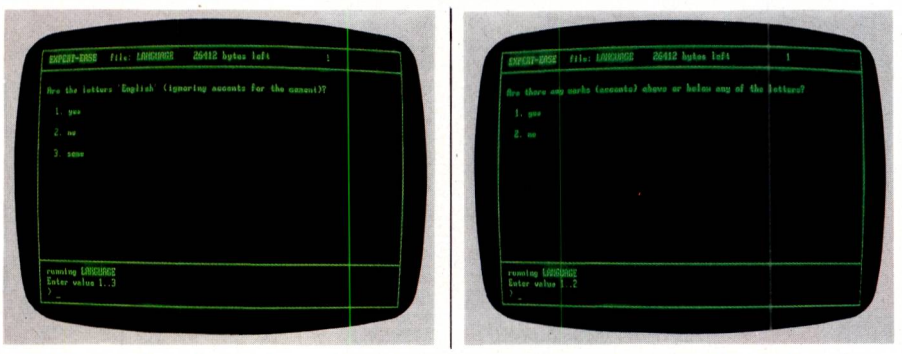


Fig 3 The series of questions shown in the screenshots above and below illustrate the way in which a language is identified using Expert-Ease



language model, the attributable screen looks like Fig 4 below.

Expert-Ease allows this to be dumped to a printer, with or without the text (see Printout I).

Creating the attribute screen is straightforward using the spreadsheet-

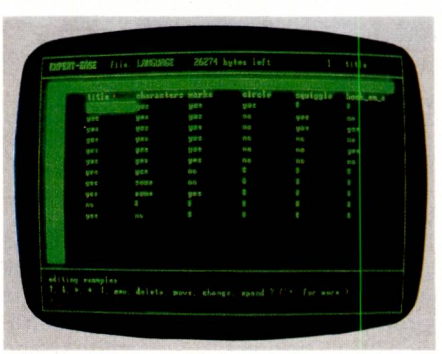


Fig 4 Attribute screen is created first

style format. The attributable screen merely defines the different sections of the model. Once this has been done, 'e' selects the <e>xample screen.

If we were writing an expert system in a high level language, the most obvious approach would be to work out a flow-chart for the system. While anybody who is able to program will be quite at home with flow-charts (even if they never use them!), non-programmers might find them a little daunting. For this reason, Expert-Ease doesn't ask the user to work out the logic of the model, but only to show it by example. Hence the example screen.

On the Printout of the example screen for the language model, you can see how the logic is built up. Under each heading, we have entered yes, no or asterisk (the 'don't care' symbol). Under title (the title screen containing the '1000-word+' question), we need look no further if the user does not have a large enough sample. So this 'route' comprises 'no' in this column, and asterisks under the rest leading to a 'no-can-do' message. To identify a Scandinavian language, the model needs to check as far as the 'circle' question ('Is one of the marks above the letters a small circle?'). On Printout 3 you can see how each language is similarly identified.

So far, Expert-Ease has not done

```
EXPERT-EASE Attribute Listing, Problem: LANGUAGE    Date:  4-apr-84
title      :                European language identification model
                              Ver. 2.0, created 05th April, 1984
                                          By Surya and Jerry
            Given a 1000+ word piece of text written in a European language, this
            model will attempt to identify the language.
            Is your sample text 1000-words or more?
     yes        :
     no         :

characters : Are the letters 'English' (ignoring accents for the moment)?
     yes        :
     no         :
     some       :

marks      : Are there any marks (accents) above or below any of the letters?
     yes        :
     no         :

circle     : Is one of the marks above the letters a small circle?
     yes        :
     no         :

squiggle   : Is there a horizontal 'squiggle' (tilde) above any of the letters?
     yes        :
     no         :

hook_on_c  : Is there a 'hook' (cedilla) under any of the letter 'c's?
     yes        :
     no         :

capitals   : Does there seem to be a large number of capital letters in mid-sentence?
     yes        :
     no         :

slope_down :
     yes        :
     no         :

conclusion : We think that the language ...
     scandanavi : ... is Scandanavian (Norwegian or Swedish)
     spanish    : ... is Spanish
     portuguese : ... is Portuguese
     german     : ... is German
     french     : ... is French
     italian    : ... is Italian
     english    : ... is English, you illiterate wally
     greek      : ... is Greek to me, guv
     russian    : ... is Russian
     no_can_do  : ... cannot be accurately identified from the sample text available.
                  If you'd like to try anyway, press 'y' to run again and answer 'yes' to
                  the first question.  Please note, however, that the conclusion reached by
                  this system may not be accurate with a small sample of text.
     not europe : ... is not a European language
```

Printout 1

anything particularly clever. The clever bit comes next. Using the data you have entered in the example screen, Expert-Ease will attempt to 'induce' the logic behind the data. Induction is called by pressing '!' from the example screen.

The induction routine is known as the Analogue Concept Learning System. It was developed as a stand-alone routine at the Machine Intelligence Research Unit at Edinburgh University under the auspices of Intelligent Software Ltd. The ACLS correlates the example data and produces a 'rule' (flow-chart):

If the example data is inconsistent (two or more paths leading to the same conclusion) or ambiguous (insufficient data), a rule is formed and a message displayed to the effect that, for instance, 'examples 4 6 9 contradict the rule'. Once a rule has been formed, with or without contradictions, it can be displayed or printed as in Printout 2. Using this printout, it is a simple matter to see

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where the contradictions and/or omissions lie and to edit, or add to, the example data. When a rule is induced without contradictions, the model is ready to be interrogated.

The accuracy of a model obviously depends on the accuracy of the example data, but equally important is that the text presented to the user is comprehensible and unambiguous. This can be effectively tested only by 'field-testing' the model on inexpert users and modifying it in the light of their comments. If this is done, the models produced are extremely easy to use even by someone who has never used a computer.

Documentation

The documentation received with the review copy was inadequate — considering the package costs £1700! Supplier Export Software International (ESI) claims the documentation has since been improved and will be supplied to all purchasers as soon as it has been printed — it is expected to be available by mid May.

The existing documentation takes the form of a tutorial. It is clear and easy to follow: with plenty of screendumps to show exactly what the screen should look like at each stage. Without an index, though, it is absolutely useless as a reference manual; I found it quicker to learn by trial-and-error than to look things up in the manual.

Sirius version

This review was carried out on a pre-release version running on the ACT Sirius. Unlike the IBM version, the Sirius implementation did not have proper screen-addressing. Because of this, there were no scrolling facilities: the entire screen was re-written whenever it was necessary to move the current 'window'. This made the package very slow.

The Sirius is notorious for having powerful screen-handling facilities that nobody understands! ESI says it is working on proper screen-handling for the release Sirius implementation.

Conclusions

Expert-Ease is not cheap. At £1700 including VAT, it costs more than half as much as the machines it runs on. But expert information is expensive. Specialists in many fields may charge £500, £1000 or even more per day for their services. And, in many cases, an expert system could replace the expert to a significant extent — perhaps needing the expert only for a few days instead of a fortnight.

There are, of course, areas where an expert system cannot be used: for example, when subjective decisions are required, or when the decisions are too important to be entrusted to a computer! But in the many areas where an expert system is appropriate, Expert-Ease represents a convenient and cost-effective means by which to generate them.

Expert-Ease is available for the IBM PC and XT, and the ACT Sirius and costs £1700 including VAT. Export Software International can be contacted on (031 556) 3266. END

```
EXPERT-EASE Rule Listing, Problem: LANGUAGE      Date:  4-apr-84

title
       yes : characters
             yes : marks
                   yes : circle
                         yes : scandanavi
                          no : squiggle
                               yes : hook_on_c
                                     yes : portuguese
                                      no : spanish
                                no : hook_on_c
                                     yes : french
                                      no : capitals
                                           yes : german
                                            no : italian
                         no : english
                   no : null
             some : marks
                   yes : russian
                    no : greek
       no : no_can_do
```

Printout 2

```
EXPERT-EASE Example Listing, Problem: LANGUAGE     Date:  4-apr-84

    title      characters marks      circle     squiggle   hook_on_c  capitals   slope_down conclusion
    logical    logical    logical    logical    logical    logical    logical    logical    logical
    -------    -------    -------    -------    -------    -------    -------    -------    -------
 1  yes        yes        yes        yes        *          *          *          *          scandanavi
 2  yes        yes        yes        no         yes        no         no         no         spanish
 3  yes        yes        yes        no         yes        yes        no         no         portuguese
 4  yes        yes        yes        no         no         no         yes        no         german
 5  yes        yes        yes        no         no         yes        no         no         french
 6  yes        yes        yes        no         no         no         no         yes        italian
 7  yes        yes        no         *          *          *          *          *          english
 8  yes        some       no         *          *          *          *          *          greek
 9  yes        some       yes        *          *          *          *          *          russian
10  no         *          *          *          *          *          *          *          no_can_do
11  yes        no         *          *          *          *          *          *          not_europe
```

Printout 3



Mephisto's dual edge

Tony Harrington puts the theory of Mephisto III's better positional chess into practice, examining its selective search strategy.

Last month I looked at some of the design differences between the Mephisto II and the new Mephisto III, stressing that the Mephisto III is a selective search program while the Mephisto II is the traditional 'brute force' design.

In theory, the Mephisto III is supposed to play better positional chess. It can afford to look at fewer moves, because it has a better evaluation of the relative merits of a position. It 'knows', much as an experienced club player knows, what moves are worth looking at in any position.

But how does it work in practice? To get some idea of whether the two machines would perform differently in key positions, I chose two positions from *The Penguin Book of Chess Positions*, by CH O'D Alexander — a marvellous little book, rich in testing combinations. These consisted of one relatively simple combination and one rather difficult, deep combination respectively.

Both the II and the III had no difficulty with the first position, despite the fact that so great a player as Smyslov managed to overlook the win for black:



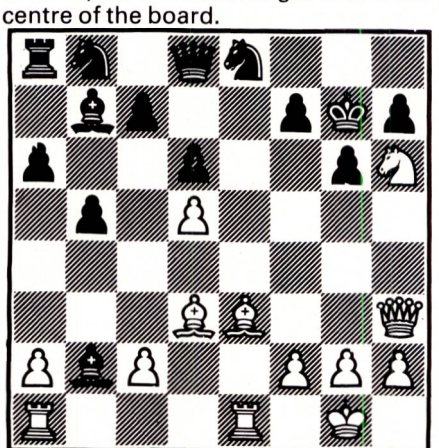
Position One, page 111, position 6

In this position, Smyslov played 1 ... Nh3-f2+ and settled for a perpetual check, moving the knight backwards and forwards between f2 and h3. He had an easy win. Both the II and the III found it in a few minutes (level setting 6). They both played 1 ... Rd2-f2. White has nothing better to do than give up his queen for the rook. The continuation more or less plays itself for the next few moves:

Mephisto II
2 Qf1×Rf2 Nh3×Qf2+
3 Kh1–g1 Qf3×e3
4 Rc1–a1 Nf2–g4+
5 Kg1–h1 Qe3×f4

Mephisto III
2 Qf1×Rf2 Nh3×Qf2+
3 Kh1–g1 Qf3×e3
4 Rc1–a1 Nf2–h3+
5 Kg1–h1 Nh3×f4

And the win, with Black's material advantage, is straightforward. Although it is not particularly significant here, notice that the two machines choose different ways of capturing the pawn on f4. The III's choice of capture is perhaps slightly better, positionally, since it puts the black knight nearer the centre of the board.



Position 2, page 85, position no 10

This is not an easy combination to discover, chiefly because of the presence of Black's bishop on the a1-h8 diagonal. The key move is 1) Nh6×f2! This wins outright owing to a beautiful combination: 1 ... Qd8-f6! (if 1 ... Kg2×Nf7 then 2 Qh3×h7+ wins, for example, 2 ... Bb2-g7, 3 Be3-d4! Re8×Re1, 4 Ra1×Re1 Qd8-g8, 5 Qh7×g6+ Kf7-f8, 6 Re1-e8 mate). So, 2 Qh3-h6+ kg7-g8 (if 2 ... Kg7×Nf7 then 3 Qh6×h7+ Qf6-g7 4 Bd3×g6+ Kf7-f6 5 Be3-g5+ Kf6×Bg5 6 Qh7-h5+ Kg5-f6 7 Qh5-f5 mate) 3 Be3-d4! Re8×Re1 4 Ra1×Re1 and Black, rather surprisingly, has run out of moves, despite the fact that two white pieces are hanging. White threatens 5 Re1-e8+ Kg8×Nf7 6 Qh6-f8 mate. Other tries by Black, such as 1 ... Re8×Be3 also come to grief.

As I said, this is not an easy combination to see. Both the II and III missed the potential of 1 Nh6×f7 and concentrated on saving the threatened white rook on a1. The II opted for 1 Ra1-b1 while the III played the positionally better move, 1 Ra1-d1, but neither found anything of interest in the position.

When I gave the two machines the key move 1 Nh6×f7, the III found the best defence for black inside five minutes, 1 ... Qd8-f6, which means that it analysed 1 ... K×N and found that it led to mate. The Mephisto II, after 20 minutes, still thought that 1 ... K×N was sound and expected white to play 2 Ra1-b1, salvaging the hanging rook! The III showed a far better grasp of the position. Its suggested continuation was:

1 ... Qd8-f6.
2 Qh3-h6! Kg7-g8 (again, rejecting K×N, which leads to the mate analysed above.
3 Be3-d4 Re8×Re1.
4 Ra1×Re1 Qf6×Nf7.

And now it spoiled the combination by taking the black bishop on b2 instead of going directly for the kill by 5 Re8+. In the sequence it expected this made no difference:

5 Bd4×Bb2 Bb7×d5.
6 Re1-e8+ Qf7×Re8.
7 Qh6-g7 checkmate.

But instead of taking the pawn on d5, black can play a much stronger defensive move, 5 ... Nb8-d7, when 6 Re1-e8 no longer works.

Still, despite this flaw, the evidence is strong that the III performs better than the II in rich positions. There is still a

great deal of room for improvement, but the selective search strategy is perhaps not the total disaster some of its critics claim it to be.

Games section

White: Mephisto II. Black: Mephisto III. Game played at level 3. Notes by John Nunn.

The interest in this game lies in the difference between the two programs. Mephisto III is a selective search program, so might be expected to be weaker in tactics but stronger in strategy. In the event the tactical ability of Mephisto III is never tested, since at no stage is Black required to enter into deep calculation. Mephisto II makes some strategical errors which are efficiently exploited. In human chess it is often claimed that a good positional player will usually beat a good tactical player, because the positional player will be able to steer the game into channels which allow no scope for the tactically gifted player to show his ability. Perhaps that is what happened in this game.

1	e2-e4	c7-c5
2	Nb1-c3	e7-e6
3	f2-f4	Qd8-h4+

(A time-wasting queen excursion which goes against all the advice given to beginners.)

4	g2-g3	Qh4-f6
5	e4-e5	

(The queen was badly placed on f6, preventing the natural development of the g8 knight, and this pawn thrust encourages Black to repair the damage done by his premature queen *sortie*. 5 Ng1-f3 was better.)

5	...	Qf6-d8
6	d2-d4	c5×d4
7	Qd1×d4	d7-d5
8	e5×d6 e.p.	Nb8-c6
9	Bf1-b5	Qd8×d6
10	Qd4×Qd6	Bf8×Qd6
11	Bc1-e3	Bc8-d7
12	0-0-0	Bd6-e7
13	Ng1-e2	

(The only weak square in Black's position is d6 and white should have occupied it by 13 Nc3-e4 followed by Ne4-d6+.)

13	...	0-0-0
14	Bb5×Nc6	

(White's first major positional error. In an open position a bishop is more valuable than a knight so this exchange was quite wrong.)

14	...	Bd7×Bc6
15	Rh1-e1	Rd8×Rd1+
16	Re1×Rd1	a7-a6
17	Ne2-d4	Bc6-g2

(Black, on the other hand, seems well aware that he should preserve his bishop from exchange.)

18	f4-f5	e7-e5

(A good move isolating the pawn at f5 and marking it out for future attack.)

19	Nd4-e2	Bg2-h3

(White has no way to defend f5 and must lose a pawn.)

20	Rd1-d5	f7-f6
21	Be3-c5	Bh3×f5
22	Nc3-a4	Bf5-e6
23	Bc5×Be7	Ng8×Be7

(Not 23...Be6×Rd5 24 Nc4-b6+ Kc8-b8 25 Nb6×Bd5 defending the e7 bishop and thus winning bishop and knight for rook.)

24	Rd5-c5+	

(A misguided move. Rooks belong on open files, so White should have retreated down the d-file. The rook move to c5 is heading down a dead-end street.)

24	...	Kc8-d8
25	c2-c4?	

(White generously seals off the only exit! After Black's reply the rook will have have no moves at all.)

25	...	Ne7-c6
26	Na4-b6	

(A desperate attempt to prevent ...Kd8-c7 followed by ...b7-b6 winning the trapped rook.)

26	...	Kd8-e7
27	h2-h4	Rh8-d8
28	Nb6-d5+	

(In attempting to prevent Black's rook penetrating to d3 White loses his own rook, but there was no defence in any case.)

28	...	Ke7-d6
29	Rc5×Nc6+	Kd6×Rc6
30	Ne2-c3	Be6×Nd5
31	c4×Bd5+	Kc6-d6

(Black is slow to convert his material advantage into a win, but Mephisto III is never in danger of letting the game slip away.)

32	Kc1-d2	b7-b6
33	Kd2-e3	g7-g6
34	Nc3-e4+	Kd6-e7
35	d5-d6+	Ke7-e6
36	g3-g4	h7-h6
37	b2-b3	f6-f5
38	Ne4-d2	b6-b5
39	g4×f5+	g6×f5
40	Nd2-f3	Ke6-d5
41	d6-d7	f5-f4+
42	Ke3-e2	e5-e4
43	Nf3-h2	f4-f3+
44	Ke2-e3	Rd8×d7
45	Nh2-g4	Rd7-d6
46	Ng4-f2	Rd6-e6
47	a2-a3	Re6-g6
48	a3-a4	b5×a4
49	b3×a4	Rg6-e6
50	Nf2-d1	Re6-c6
51	Nd1-f2	Rc6-c3+
52	Ke3-f4	Rc3-a3
53	Nf2-g4	f3-f2
54	Ng4-h2	f2-f1=Q+
55	Nh2×Qf1	Ra3-f3+
56	Kf4-g4	Rf3×Nf1
	0-1	

White: Superstar. Black: John Ebert (1730). French Defence. Notes by David Levy

1	e2-e4	e7-e6
2	d2-d4	d7-d5
3	Nb1-c3	Bf8-b4
4	e4-e5	c7-c5
5	Bc1-d2	

(A rarely played move which should lead to a quiet position offering chances to both sides. More usual is 5 a2-a3 Bb4×c3+ 6 b2×c3, when the advantage of the two bishops is offset by the doubled pawns on the c-file.)

5	...	Ng8-e7
6	Nc3-b5	Ne7-f5?

(Losing a pawn. The correct continuation is 6...Bb4×d2+ 7 Qd1×d2 0-0, with equal chances.)

7	c2-c3	Bb4-a5
8	d4×c5	0-0
9	g2-g4?!	

(Interesting, but very dangerous. After this move the white king may soon come under strong pressure.)

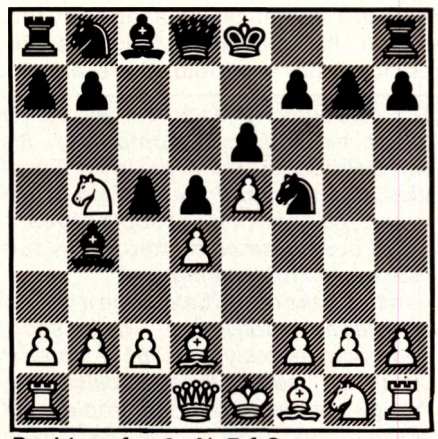
9	...	Qd8-h4??

A horrible blunder, losing a piece, but this move illustrates one of the well known axioms of human v computer play. The human player should normally try to avoid complicated tactical variations because computer programs excel at tactics, since their analytical ability is flawless within a given horizon. Humans, on the other hand, can easily make a tactical oversight.

Here Black assumes that the pin on the g-pawn (10 g4×f5 Qh4-e4+ and 11 ... Qe4×h1) will give him a good game, but he has not analysed far enough. Superstar now sees, with a 5-ply search, that Black is lost.

Instead, Black should have played 9...a7-a6, and if 10 Nb5-d6 f7-f6. For example, 12 e5×f6 Qd8×f6 with pressure on f2, or 12 f2-f4?? f6×e5 13 f4×e5 Qd8-h4+.

10	Qd1-a4	Nb8-c6
11	Ng1-f3	



Position after 6...Ne7-f5?

(The point. White's 10th move defended the g-pawn from the side, and at the same time attacked the black bishop on a5. Black was forced to react to the threat of the bishop and now White drives the queen away from h4 so that the g-pawn is free to capture.)

11	...	Qh4-e7
12	g4×f5	e6×f5
13	0-0-0	a7-a6
14	Nb5-d6	Ba5-c7
15	Bd2-g5	f7-f6
16	e5×f6	g7×f6
17	Bg5-h6	Nc6-e5
18	Nf3×e5	b7-b5
19	Rh1-g1+	Kg8-h8
20	Bh6×f8	Bc7×d6

(Of course, 20...Qe7×f8 allows 21 N (either)–f7+ and mate next move.)

21	Bf8×e7	b5×a4
22	Be7×f6 mate	

END



FT Moneywise

FT Moneywise is a specialised financial planning and forecasting tool intended for managerial use. Marketed with the blessing of The Financial Times, *this innovative book-format spreadsheet is implemented on both the IBM PC and the Sirius. Dick Pountain puts it to the test.*

FT Moneywise is a specialised financial spreadsheet system. It can only work with data which varies over constant time periods and the time axis of the sheet is automatically managed by the system. Its calculation functions are restricted (for example, there are no logs, exponents or trig) and specialised (it has functions for compound interest, net present value and other financial operations). There are also special operations to spread, bring forward, shift and realise payments over numbers of time periods with a minimum of user involvement. Some clever tricks have been used to minimise the learning period and reduce the time spent in searching for data in large models; retyping is also brought down to a minimum.

Whereas a conventional spreadsheet usually only produces hardcopy of the model (or a selection from it), Moneywise produces a whole report book, complete with a cover, contents page, key to the model, data pages, summary pages, graphs, and a customised 'at a glance' presentation of the more important results. The printed output literally needs only to be burst and collated and then stapled or slipped into a binder to be ready for the client's desk.

Moneywise is quite explicitly intended for financial forecasting and analysis; it will be of no use to scientists, engineers or any other potential user of general purpose spreadsheets.

Setting up

Moneywise is currently available for the Sirius and the IBM PC. The minimum requirements are 256k of RAM, two disk drives of at least 320k capacity and a printer capable of bit-mapped graphics, such as the standard IBM Graphics Printer.

Since Moneywise makes use of high resolution graphics, the IBM PC owner will also need to have a graphics monitor and adaptor (colour is supported if available); the Sirius can display graphics on its normal monitor.

The IBM version I tested requires DOS 1.1 or 2.00 to be installed on the work disk. This is performed by a supplied batch file and should present

The electronic spreadsheet wrought a minor revolution in computing. It's generally believed that the invention of VisiCalc prolonged the lifetime of the venerable Apple II by a couple of years, as US businessmen flocked to buy this new type of forecasting tool.

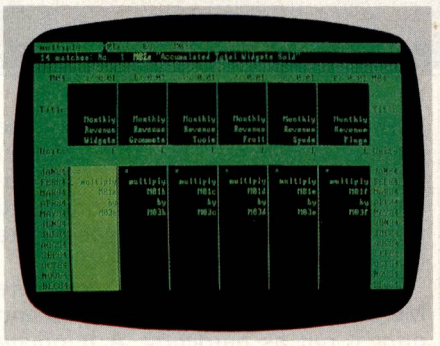
In the wake of VisiCalc came a host of 'Visiclones' following the same approach, namely that of a general purpose spreadsheet calculator, though some recent examples (of which Lotus 1-2-3 is the best) have started to integrate a degree of database management and business graphics.

The classic spreadsheet is a completely general purpose tool, presenting a blank slate upon which the user can write any sort of data at all, from sums of money to biochemical experimental results. The individual rows and columns of data are then related to each other, and results are produced by defining formulae that use a repertoire of standard mathematical functions.

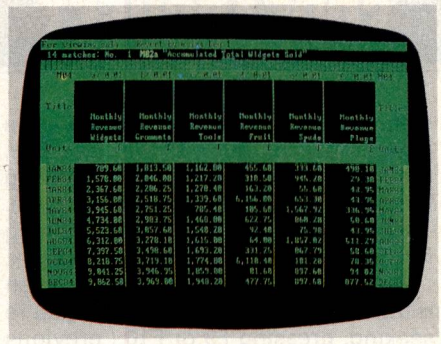
The glory of such a spreadsheet is its power of self recalculation, so that a single datum may be changed and the effect on the rest of the data seen within seconds or, at most, minutes. This renders possible the sort of 'What if?' experiments that are just too tedious and time-consuming if performed with pencil, paper and calculator; for instance, one could see the effect of altering the VAT rate to 12.5 per cent on a whole year's cashflow forecast using about five keystrokes.

This advantage, however, is somewhat tarnished for the non-mathematical businessman, because the types of complex calculation that crop up when dealing with mortgages, share yields and compound interest may well have to be expressed by algebraic formulae, in terms of exponentiation and iteration. And the very mechanism for defining formula relationships in most spreadsheets is not especially easy for non-programmers to grasp.

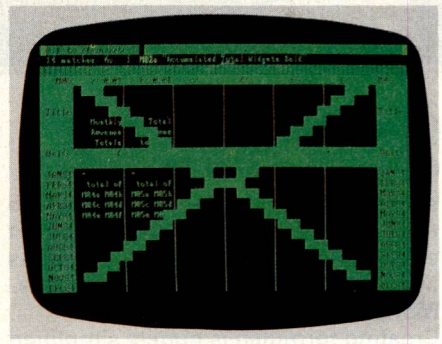
But a new generation of spreadsheets is emerging. In the US we have seen Ashton Tate's 'Bottom Line Strategist' *and the new Fox Geller* 'Oz'. *In the UK we have the subject of this Checkout,* 'FT Moneywise' *from Moneywise Software, which is being marketed in partnership with the influential* Financial Times. *Nationality of origin is more than a mere matter of jingoism here; business practices are very different on the two sides of the Atlantic, and swapping dollar signs for pound signs is only the start of it.* Bottom Line Strategist *has been withdrawn from the UK market because its extensive use of Tax Shelters (which do not exist in UK tax law) would have enforced a complete rewrite.*



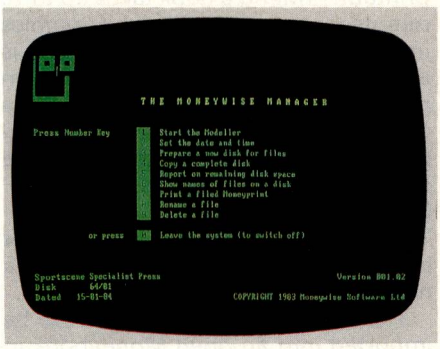
The 'Working' side contains the formulae to be used



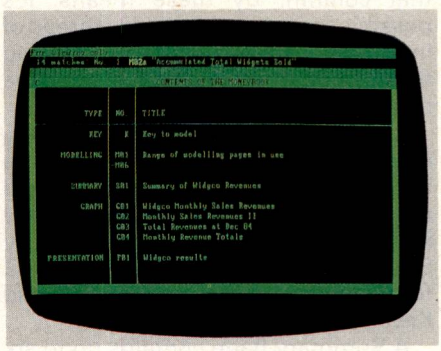
The 'Results' side shows the finished calculations (for viewing only)



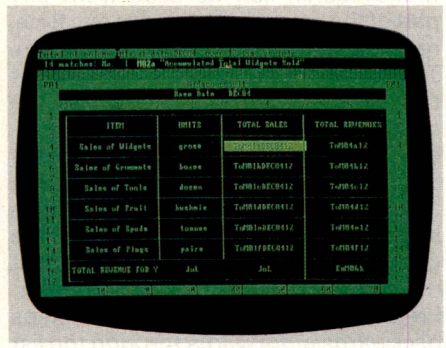
No doubt about the seriousness of 'Xterminating' a page



The Manager provides access to DOS utilities



The Contents page summarises the pages of the Moneybook



A Presentation page looks and behaves like an ordinary spreadsheet

no problem, even to a first-time user. The system utilises two disks, which must occupy their respective drives at start-up and during system operations other than actual modelling (when a data disk may be substituted in drive A). The first system disk is protected by one of the increasingly popular encryption methods, so the original must be present to boot the system.

Moneywise requires no terminal installation as each version comes ready to use the special keys available on the computer in question.

In use

In keeping with its objectives of being easy to use, Moneywise employs a metaphor subtly different from that found in ordinary spreadsheets: its spreadsheets are treated as pages of a book (the Moneybook), each of which has six columns and up to 168 rows. Scrolling is therefore only necessary in the vertical dimension; to see the next six columns you must 'turn the page', which on the IBM version is initiated by the PAGEDOWN (PgDn) key. This is a far more familiar way of working for most businessmen than the conventional two-way scrolling window onto a huge spreadsheet.

Each page is numbered and it's possible either to browse through using PgUp and PgDn or go directly to a specified page number, which eases the task of moving about in a large model. A Moneybook can have up to 67 modelling pages.

Moneybook

The most ingenious aspect of this book metaphor is that each page has two 'sides'; the top side of the page contains any formulae in use (called the 'working side') and the reverse side shows the results of their application to the data ('results side'), the side on display being flipped by a single stroke of function key F1.

A Moneybook is equivalent to a file in 'normal' computer jargon. When the program is first booted, the Manager program allows you to set the date and time and do routine disk housekeeping chores, or to enter the Modeller proper. This option leads into the Services screen, from where you can open a new or existing Moneybook. A Moneybook contains, in addition to modelling pages, compulsory contents and key pages and optional numbers of graph, summary and presentation pages.

The vertical dimension of a modelling page is always graduated in time units and these are predefined when the Moneybook is first opened. The choices are weeks, months, quarters, years or arbitrary user units, and the rows are automatically labelled with your choice by the program. The periods must be the same throughout a book.

Moneyspeak

Data entry is performed by moving a highlighted cursor (called the 'spotlight' in Moneyspeak) using the arrow keys. There are three types of data: numeric; alphanumeric (called 'markers' here); and formulae.

Formulae may only be entered into 'inactive' columns, numeric columns into which either no data has yet been entered or which have been 'deactivated'. There is no such thing as replicating a formula, or relative versus absolute; in Moneywise an entered formula automatically fills the whole column and relates the corresponding dates in the columns involved. The result of application of the formula is seen on the results side of the page. Formulae cannot be combined in a single column, so it you have a sequence of operations you'll need a column for each; with 67 pages available this is not a severe limitation.

This method of organisation brings the benefit that recalculation is extremely fast, as only the data directly affected by a change need be recalculated.

The only method of altering created columns is to delete them (called 'exterminating' by the *Dr Who* fans who designed Moneywise) or deactivate them (which clears the contents). This is quite deliberate policy; all the final formatting for presentation purposes is carried out on Presentation pages.

Numeric data is expressed in units which are entered into another small window below the title. Entry of numeric data is simplified by the provision of various 'generators' which can automatically copy a figure down a column, increment the figure by a constant step, multiply the figure by a constant factor or interpolate equally spaced figures between two limits. To use a generator, place the cursor in the cell below the required figure and type the command (only the first two letters are needed — GRow, INterpolate, REpeat and STep).

Formulae are similarly entered by typing the first two letters of the command, whereupon the full text of the formula is displayed (in words) on the command line as a template, with blanks to fill in for the parameters. In addition to add, multiply, subtract and divide there are a number of more esoteric financial operations. A typical

such function is 'tax —% of—', which adds tax to a column but is smart enough to offset negative amounts against future liabilities automatically.

Moneysearch

Creating formulae is hugely simplified by the use of the Moneysearch facility, a central concept in Moneywise. Moneysearch can be used from any part of the spreadsheet and at any time, regardless of what else is going on. Typing an open quote '"' character causes the cursor to jump to the command line and 'search:"' is displayed. Typing any string and a closing quote initiates a search for that string among the column titles. The results appear in the search window, with the number of matches found and the first match complete with column number. Pressing the F7 and F8 keys then steps backwards or forwards through the list of matches. For example, if you were to search for 'Value' the result might be: 6 matches No,1 M23b "Value Added Tax", which says that the word occurs in six titles and this is the first. The M23b is a column number; each modelling page has a unique number from M01 to M67 and the columns are 'a' to 'f'.

Formulae use these column numbers (it's only possible to work on whole columns) as parameters, and the truly clever bit comes now. Stepping through the list of matches till you find the relevant one, hit the F6 ('insert match') key and the column number is inserted automatically into the current blank in the formula. This feature means that it's unnecessary to remember where in the book each item is kept, or to move between pages to find out. The search can be used in reverse to find the title of a given column number, and it will find matches on parts of words according to well defined criteria (it would have found 'Val').

When using the 'next match' feature with a title that is only partially matched, it's possible to advance beyond the range of active columns. Rather than cause an error condition, the non-existent columns are given 'pending' status; if you wish, you can create a new, empty column with the given title, ready for future use and without having to move to the corresponding page. This is extremely useful for defining formulae which look ahead in the book.

Another nice feature of Moneysearch is that, having found the column you're seeking, pressing F9 or F10 ('previous use' and 'next use') shows you all the formulae in other columns which use that column. By these means, it's possible to unravel a complex thread of interrelationships without moving from your current location, even in the middle of entering a formula.

Once a model has been completely entered the other kinds of page come into play. To reach any of these pages one uses the 'which page:' facility, but the page numbers are now prefixed by S for Summary, P for Presentation, G for Graph and C or K for Contents and Key.

A Summary page contains up to six modelling columns copied from anywhere in the model and in any order you like. A Presentation page consists of the results of your modelling activity presented in a table. Any figures from the modelling sheets can be extracted, totalled, annotated and generally jigged about to form a table of results in any desired format. Unlike a modelling page, Presentation pages can scroll up, down and sideways.

Operations are performed by 'compositors', accessed as usual by typing the first letters of their names; templates appear on the command line with gaps to fill in. Typical operations are WIdth, JUstify, COpy, MOve, TExt and LIne (horizontal or vertical).

A Graph page has as its working side a full screen template which requests you to fill in details of graph type, data columns to use and their order, type of shading and other details. The results side is the graph itself, which is automatically scaled, annotated and shaded, and may be of bar (stacked or not), pie or line type. On the review machine this appeared on a separate graphics monitor, but if a colour monitor is used the graph will appear on the same screen as the rest of the data.

The Contents page is a list of the pages contained in the current Moneybook, while the Key page contains a list of all the column titles and numbers together with the type of data or formula they contain.

Having created a complete Moneybook, one can save it to disk and print it out as hardcopy. A template similar to that for graphs allows selection of pages to be included in the printout. Printing a book takes up to 10 minutes as there is so much bit graphics involved, and no print spooler is available at present. This situation can be ameliorated by 'printing' a book to a disk file, called (what else?) a Moneyprint, to be actually printed out later at a convenient time.

Moneypost

This very important facility provides for consolidation of the results from a number of Moneybooks.

The contents of a Moneypost can be imported into an open Moneybook in one of three ways: overwriting the existing data entries (the destination pages are specified in the input template), adding the new figures to the existing ones or subtracting the new figures from the existing ones. Using this feature it's possible for, say, the regional branches of a firm to send in their monthly figures on floppy disks and for the head office accountant to merge them all without difficulty into his overall model. Moneyposts need to be compatible with the Moneybook into which they are merged, in the sense that the time periods and type of data must be the same in both (this is not checked by the program and is the user's responsibility).

Moneyposts are stored as ASCII text files and so can be used to transfer data to and from word processors and databases, in addition to Moneywise itself.

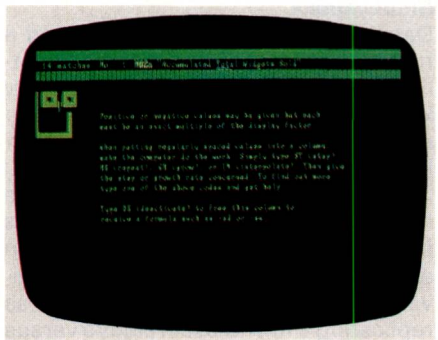
User-friendliness

Moneywise is an extremely slick piece of programming. Only Lotus 1-2-3 comes anywhere near it in ease of use.

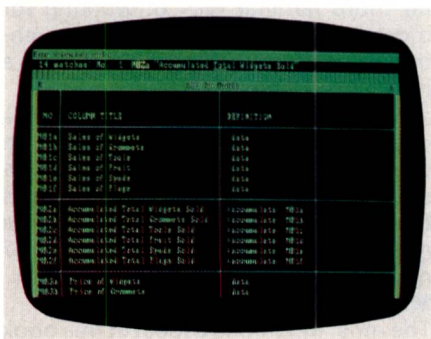
Users of conventional spreadsheets will find that a certain amount of mental readjustment is necessary at first,



The 'top side' of a Graphs page is a template of options



A typical Help screen (but the Help key must be depressed)



because the Modelling pages behave rather differently from a spreadsheet despite the superficial resemblances. On the other hand, first-time users who have been used to pencil and paper bookkeeping will be immediately at home.

Once you've adjusted to this different way of working the benefits are enormous. The actual amount of movement required around the model is very small compared with the scrolling back and forth that goes on in a large spreadsheet. Using Moneysearch and other facilities, most operations can be performed without moving anywhere at all. If movement is required, there's a system of 'bookmarks': a particular page can be assigned to one of the function keys so that pressing it will send you straight there.

'Smart' cursor controls are implemented throughout the program. The first time you hit cursor left, the cursor remains in the same cell after an entry. If your next move is also cursor left, then Moneywise assumes that you're moving across a row and gives you an automatic cursor left after each entry.

Heavy use is made of templates. As mentioned previously, all commands are in the form of single line templates with blanks to fill in. Other parts of the program which require the user to supply parameters take the form of full screen templates with highlighted boxes for entering options. The cursor skips from box to box, and a list of the options is either present on the screen or available from Help.

Almost any spot in Moneywise can be reached with one or two keystrokes. Striking ESC at any time produces the 'page please:' prompt for page selection. A second strike produces the 'which service please:' prompt, from which all the Moneybook manipulations such as opening, saving, renaming, deleting and Moneypost can be performed. Pressing Help at either of these prompts will display a summary of available pages or services, and hitting ESC toggles between the modes. The summaries of pages and services are not merely standard menus, but actually reflect what is available at this point in the program; for instance, only 'Open a Moneybook' will be available if you haven't opened one.

Once in a page, all the commands for using formulae, generators and compositors are achieved by typing only the first two letters, whereupon Moneywise types the rest of the template on the command line for you. Again, Help will give a summary of the commands available.

This Help facility is really quite exceptional. Although the amount of information is not as copious as in Lotus 1-2-3 or Multiplan, the way it's delivered is better. Help is obtained by hitting the '/' key at any time and it only remains on the screen as long as the key is depressed (this has the unfortunate side effect that one can't use '/' in text).

A most laudable (and uncommon) feature is that special help is given with errors. A message appears telling you what to do about the error condition which has just occurred, and also that a second press of the Help key will give help with the operation being attempted. If, for instance, you type an illegal filename, a beep occurs and a message appears on the command line. Hitting Help at this point gives the rules for well-formed file names, and a second press brings up the Help screen for saving files. The command line cursor points to the illegal character.

The potentially dangerous Exterminate command is cleverly handled: a huge cross appears through the designated area and the command line asks 'OK to exterminate?'.

Moneywise appears to be very robust. All disk operations give warnings if an existing file is about to be overwritten or the current book has not been saved. Even errors such as no disk or an open disk drive door are gracefully trapped (it says 'door on drive b: is open') and the opportunity is offered to try again. There seems to be no way to crash the system with an open Moneybook, thus losing data, though it is possible to crash the Manager by putting a wrong format disk into the right-hand drive.

The Manager is the only part of the whole user interface which is less than superb. It consists mainly of a shell over the ordinary PC-DOS disk utilities, but the Directory function is extremely slow. The Directory is only available in the Manager and not in the Modeller, which is where you need it when opening a Moneybook whose name you've forgotten. In this case, you'd have to Exit back to the Manager to look it up. In addition, the arrangement of the drives (data in the left, system in the right) is contrary to usual practice, and the need to have both system disks in place to return to the Manager is irksome as it involves removing your data disk. This would probably work much better with a winchester.

A minor problem in the Manager is that the prompt for setting the date shows the format 1-05-1984, but the program will only accept the format 1-05-84, resulting, in my case, in several 'invalid dates' and some foul language. Moneywise has promised to look into this.

Documentation

The manual supplied with Moneywise was not the finished printed version but a final draft in word processed form without the diagrams. It was nevertheless excellent, covering all aspects of the program's operation in clear, jargon-free and readable prose. Moneywise has taken great pains to coin everyday, non-computer terms (for example, 'spotlight', 'exterminate', 'bookmark').

The manual contains 12 descriptive chapters followed by a full tutorial course in 10 lessons, with accompanying disk files for hands-on practice. Each lesson on the tutorial disk contains a partly filled Moneybook which the student can play with and add to, and every important aspect of Moneywise is covered in some depth in the accompanying text.

There was no index in the reviewed preliminary draft but I'm assured that there will be in the release version; this will be profusely illustrated with screen diagrams as an aid to explanation.

To help with the use of special keys, a keyboard map, complete with the Moneywise names, is supplied to stick on your keyboard, and a smart three-sided (*Toblerone*-style) reference card summarises their uses.

Customer support

Moneywise is offering users a support scheme/service contract at the rather substantial price of £145 per annum. This entitles the user to upgrades, replacements and telephone hot-line assistance. As Moneywise is a product which may continue to grow significant new features (print spooling, for example), this would probably be a wise investment for a managerial user at whom it is primarily aimed — to whom the price will not be a deterrent.

Upwardly compatible products featuring multi-dimensional modelling, goal-seeking, time projections and probabilities are currently in preparation.

Conclusions

It's tremendously gratifying to review a product from a UK company which shows the attention to detail and ergonomic standards that is usually only seen in US software. Moneywise breaks new ground in ease of use and reliability in a financial modelling product, and it can stand up — in terms of both program and documentation quality — to the best that's available anywhere. The selling price of £395 places it in the same market as the more advanced spreadsheets such as Lotus 1-2-3, and programming-based modelling systems such as Micromodeller.

Financial decision makers who are currently using spreadsheet or programming-based modelling software have a treat in store for them should they decide to sample the Moneybook way of working.

It must be stressed that Moneywise is not a general purpose modelling tool, and that it's quite unsuitable for scientific, engineering and other non-financial uses. In its intended realm though, it will set a new standard to be matched.

FT Moneywise is available from Moneywise Software Ltd, tel: (01) 878 1182. It is currently available for the IBM PC/XT and Sirius and costs £395 with a service contract of £145 per annum.

END

System Builder

System developers will be interested in this powerful data manipulation tool. Its wide range of Pick-like features will enable the experienced user to set up complex data management applications. Kathy Lang checks it out.

The Pick operating system includes a particularly powerful language for data manipulation, Data Basic. System Builder uses its features to provide a tool for users who want to develop powerful applications, but need a range of features common to virtually all database management applications. These include not only facilities for creating, updating and displaying stored records found in all data management packages, but also more powerful features such as good general-purpose validation features, transaction processing capabilities, and the ability to design menus and procedures tailored to the needs of particular applications. If these facilities are still not sufficiently sophisticated, you can design the main parts of your application in System Builder and do a little 'fine tuning' in Pick Data Basic.

I borrowed a Crystal 68000 system from Aston Technology, which distributes System Builder in the UK on all systems except those with the Pertec label (Pick and System Builder both originate in the US). System Builder can also be run with a Pick look-alike called Revelation (reviewed in April, *PCW*), which runs on the IBM PC and its clones. System Builder works in the same way on the IBM PC, and applications built with System Builder are interchangeable between Pick and Revelation systems.

System building

System Builder is exactly what its name implies — a tool for system developers who want to save themselves time, effort and errors when building applications for clients. It also has appeal for data processing departments and users in organisations where an individual or department sets up applications for other users to operate. System Builder provides good facilities for adding online help for users of applications developed with it, coupled with the ability to define user menus and automatic procedures.

System Builder is menu-driven (the main menu is shown in Fig 1). When building a system, most of the operator's time will be spent using the options on the System Builder Tools Menu (see Fig 2). Once a system has been built a developer can remove the ability to call it Tools Menu, so that other users cannot make major changes to the system. In fact, the menus can be tuned appropriately for each user. A tailored application's appearance will vary tremendously according to the way it's been set up.

```
Kathy's System Builder
Main Menu
Select menu option
1 SYSTEM BUILDER TOOLS MENU
2 FILE MAINTENANCE MENU
3 REPORTS MENU
4 FILE ENQUIRY MENU
5 TRANS PROCESSING & FILE
  UPDATE MENU
6 AUTOMATIC PROCEDURES
  MENU
```

Fig 1 System Builder Main Menu for user Kathy

```
System Builder Tools Menu
Select menu option

1 FILE CREATE/RE-SIZE/DELETE
2 FIELDS IN FILE
3 SCREEN DEFINITIONS
4 REPORT DEFINITIONS
5 MENU DEFINITIONS
6 AUTOMATIC PROCEDURES
7 HELP/LETTER TEXT
8 DEFAULT/VALIDATION
  DEFINITIONS
9 PRINT FORM DEFINITIONS
10 TRANSACTION DEFINITIONS
11 PERIODIC FILE UPDATE
   DEFINITIONS
12 ACCUMULATOR MAINTENANCE
13 CROSS-REFERENCE FIELD INDEX
14 PRINT DOCUMENTATION
15 CONTROL ACCOUNT
```

Fig 2 System Builder Tools Menu

Constraints

System Builder has a limited range of field types, permitting only alphameric, numeric and date fields. But this limited range contains excellent data validation features to provide access to much more finely honed data specifications. System Builder allows a pattern of alphabetic and numeric characters to be specified to which an entry must conform — two letters followed by three digits for an account number, for example. You can specify ranges within which field values must fall. Arithmetic expressions, conditional expressions and calls to Data Basic subroutines can also be included, allowing valid values of the field to be determined dynamically. Another check allows you to specify that a field value must (or must not) already exist as a key to another file, ensuring that all invoices entered are for customers whose records already exist in your customer details file.

System Builder provides a variety of formats for date display, including those most popular in the UK, so the user is not restricted to the MM/DD/YY favoured in the US. A variety of formats is also available for displaying numbers such as currency. Fig 3 shows all the major constraints imposed by System Builder, including the

Constraints & Facilities		System Builder	
Maximum file size	999,999 records	Data validation	Good
Max record size	32,000 characters	Screen formatting	Column definition
Max no fields	200 (not including correlatives & sub-fields)	Unique keys	1M
		Report formatting	Default, column defn, letter format
Max field size	99999	Store calculated data	Input, batch update
Max digits	11	Totals & Statistics	Totals, sub-totals
Max prime key length	99999	Store selection criteria	Permitted
Special disk format?	No	Combining criteria	And, Or
File size fixed	No	>1 criterion/field when selecting?	Yes
Link to ASCII files?	Yes, fixed format	Wild code selection?	String within
Data types	N,C,D	Browsing methods	Any field (viewing)
Fixed rec structure?	Yes	Interaction methods	Menu, limited tailoring programming language
Fixed record length stored?	No		
Amend rec structure?	Yes		
Link data files?	Yes		
No data files open	UL		
No sort fields	16	Reference Manual+	* (new one coming)
No keys	UL	Tutorial Guide+	None (promised)
Max key length	99999 chars, 1 field	Reference Card+	None
Subsidiary indexes kept up-to-date?	Yes	Online Help +	****
		Hot line?	Dealer support

Notes: + = rating, max five stars

Fig 3 System Builder constraints and facilities

(very generous) limits on field and file sizes.

File creation & indexing

The process of file definition involves several steps, as shown in the 'Road map' in Fig 4. The first step is to give System Builder approximate figures for file size and average record length. These can easily be changed without the need to copy the data file in either circumstance.

The next step is to define each field by entering the responses to 15 prompts displayed by System Builder, as shown in Fig 5. This screen is re-presented for each field in the record, using the number of fields given during file creation. It's possible to specify a default value (which may be a constant, variable, expression result or subroutine result, as with validation) to allow conversion of the format, and to allow or prohibit amendment (of calculated or default values). You can specify 'correlatives', which are values calculated from fields in another file. These values are not actually stored in this file, but are calculated each time the record is retrieved by referring to the source values in the other file.

In the design of a system for use by other users, the ability to supply 'help' information about any field is invaluable. Such help is accessed by the same methods with System Builder itself.

An unusual feature of System Builder records is the ability to specify multi-value fields; any field may contain up to 32,000 values, providing several alternative values stored together for the same field. This is particularly helpful in the case of fields which you want to group and view together, and to treat separately at other times. For instance, there may be several balances for one customer statement: amount owing for one month, two months and three months, perhaps. System Builder allows you to specify one field to cover all three balances, which has the advantage of a shorthand for describing related fields. But the order of the sub-fields can also be specified so that each individual sub-field can be referred to separately. This feature is supported by the underlying Pick language Data Basic, so that the System Builder files using this feature can also be processed directly by Data Basic.

While entering information about each field, you can correct prior mistakes by backing up one definition line at a time and re-entering information using the System Builder line editor. Once the definition is complete, you are asked if you have any corrections to make; System Builder then prompts you for the line number to alter. This process is also used to amend field definitions. Fields can be added and deleted at any time, or field definitions altered in any way, except that the onus is on you to ensure that changes do not corrupt the data held in those fields: for instance, by reducing the field length to less than that of the longest value held in that field in any record.

You cannot, however, change the field position, which is the mechanism System Builder uses to relate a particular item in a record to the relevant definition. As System Builder always uses field zero as the record key, this also means that once the key field has been decided, it cannot be changed without copying the file. In every respect, System Builder is very flexible about data definition and storage. This

Option 1, Main Menu → option 1 System Builder Tools Menu

↓

FILE CREATE/RE-SIZE/DELETE

Select menu option 1
1 CREATE A NEW FILE
2 REDEFINE SIZE (MODULO) OF AN EXISTING FILE
3 DISPLAY EXISTING FILE NAMES
4 DELETE FILE

→CREATE A NEW FILE

1 File Name KATHY PCW BT
2 No Fields in Record
3 Number of Records
4 Average Length of Records

Then press F1 twice to return to System Builder Tools Menu, followed by option 2 there

↓

FIELD DEFINITIONS: KATHY PCW BT

Select menu option 1

1 INSERT FIELD DEFINITION
2 AMEND FIELD DEFINITION
3 DELETE FIELD DEFINITION
4 REVIEW FIELDS ON SCREEN
5 LIST FIELDS ON PRINTER
6 COPY DEFINITIONS FROM ANOTHER FILE

Fig 4 'Road map' of file creation

extends to the way records are actually stored. The structure of each record is fixed at file definition time, but the amount of storage space taken up depends on the amount of information stored. While you must allow for a name field to be as long as the longest in your customer list, the package actually uses only as much space as the name entered.

Once the fields have been defined, the next task is to design at least one appropriate screen format with which to display records. Several different formats can be used to display records from a file, and they needn't all include every field from the record. Screen design involves giving the row and column number for the starting position of each field. The screen used to request this information displays a grid with numbered row and column positions. As each field location is defined, System Builder displays it on this grid, so the effect of your instructions can be seen.

This technique is used instead of the paint-a-screen technique to ease portability. I prefer paint-a-screen, but at least System Builder shows the way the screen will look as the format is built up. My only serious criticism of the process is that the package uses the field description as a caption, and, regardless of the actual field description length, always allows a full 22 characters (the maximum permitted) in which to display it. This is rather odd, and takes up a lot of otherwise useful space on the screen.

INSERT FIELD DEFINITION:
KATHY PCW BT

1 Field Name
2 Field Description
3 Field Position. Sub Pos
4 Type (A/N/D)
5 Length of Field
6 Justify (L/R)
7 Report Heading
8 Conversion
9 Correlatives
10 Controlling/Dependent
11 Allow Amendment (Y/N)
12 Default Value
13 Validation Code
14 Help Reminder (Code)
15 Field Fixed (Y/N)

Note: Whole set of 15 repeated once for each field

Fig 5 Prompts for field definition

Both file definitions and screen formats can be copied, so definition and formatting for two similarly structured files can be carried out by amending the descriptions appropriately. In addition to having the field in position zero as the primary key, indexes can be set up at any time using other fields. There is no formal limit to the number of such indexes which can be built, and the indexes are kept up-to-date automatically.

Data entry & updating

The facilities for direct entry and updating of records are accessed from the File Maintenance Menu, which is normally option 2 on the main menu. The appearance of this menu depends on which screens have been set up for the user, and can include options for screen formats relating to several different files. As an example, Fig 6 shows the menu constructed for me by System Builder, indicating that two screen formats have been set up under my user identifier. Once System Builder has been told which screen to use, another menu showing the options to insert, amend or delete can be seen.

FILE MAINTENANCE MENU

Select menu option

1 Data entry for PCW DMS Benchtest
2 Enter data to test file

Fig 6 Menu generated by System Builder as screens set up by developer

When records are entered, each field identifier is presented in turn and the value is requested; this value is then displayed in the appropriate position on the screen. This method is clumsy compared with the ability to update in place, by entering values and moving from field to field with the cursor. When updating records, you can either request the Scroll Amend option, which works in the same way as Insert, or use Amend, which asks you to identify each field to be updated. Records are selected for update by specifying the primary key value required.

In addition to updating a file directly, it's possible to update it automatically using an automatic procedure: for instance, to raise selected prices by 10 per cent. Alternatively, the transaction processing facilities can be used to enter a batch of records which can then update one or more other files, either as each record is entered or in a batch when all the records have been entered. Transaction processing is the only feature which allows updating of several files in one operation. Direct updating permits only the *reading* of several files and the updating of one. System Builder's transaction processing feature provides a powerful facility — not often found on micro database management systems — which allows System Builder to construct integrated systems such as accounting suites. In such a system, a transaction file can be used to enter invoices which would subsequently update both the customer records and sales ledger. Working in this way makes it easier to provide security checks and a proper audit trail

Any number of formats can be defined for the display of records on the screen, and these formats can span more than one physical screen. The method used to define a screen format is the same whether the format is for insertion and amendment or for viewing. System Builder provides a password mechanism which makes it possible to prevent a user accessing a particular menu or menu option, so there may be some screen formats only available to a restricted group of users. This permits unrestricted updating of non-sensitive information while restricting the viewing or updating of sensitive data, such as salaries in a personnel records system.

In addition to the specially designed screen formats, records can be displayed using the formats for printed reports.

System Builder supplies three ways of producing printed reports. The simplest method involves telling it which fields are to be displayed — these are then printed using one line for each record; each field takes up the maximum length allowed in the field definition. The printing of totals, subtotals, and page-breaks on change of field value are permitted in this mode.

A more sophisticated approach is very similar to screen format design. The required format is laid out on screen, with one record per page. The paper used may be either plain paper (in which case field descriptions will be printed as well as field values) or pre-printed forms (when field descriptions will not be printed). The only calculations permitted in this mode are the printing of correlative fields already defined for the particular file being processed: for instance, the printing of invoices necessitates the definition of correlative fields in the invoice record for the VAT amount and the total.

The third type of report is the free-format letter style, in which text can be typed interspersed with field values. The text is typed in line-by-line; the line editor can be used to amend text, but don't expect any fancy wrap-around or paragraph adjustment features. More sophisticated 'mail-merge' facilities can be obtained using System Builder in conjunction with one of the word processing packages available under Pick.

Field values can be calculated when a record is displayed if the field has been defined as a correlative. Calculations

permitted include arithmetic, string concatenation and the extraction of parts of field values, and operands may, as appropriate, be constants, field values in this file or in another. Correlative fields may also take on the value resulting from a call to a Data Basic subroutine. Tests can be included in the calculation, so the value displayed may depend on the outcome of IF . . THEN . . ELSE tests. During reporting the values of these correlative fields can be displayed, but the only other calculations permitted are sub-totals and totals during the printing of one-record-per-line reports.

Using System Builder, records can be selected for screen display from the File Enquiry option on the Main Menu. You are asked which screen format is to be used, and then given the option of specifying the key value of the required record, or a selection containing one or more tests. Such a test can employ the relational operators (<, >, and so on), and select fields starting, ending with or containing a specified string. If you have set up cross-reference indexes for fields other than the primary key, System Builder will use these in every test except those for strings containing or ending with a particular set of characters. Tests may be combined with 'AND' (both tests must be passed) or 'OR' (either test may be passed). AND and OR may both be used in the same selection, using brackets to ensure the correct combination of tests. In addition to testing on fields within the record, you can test for transaction types allocated during transaction processing. The selection is entered by typing a command line or lines on the screen, but help is available for the user who does not remember how to construct tests. If the '?' key is pressed once, two lines of prompt appear at the top of the screen as shown in Fig 7. A second '?' gives a whole screenful of help. This method of providing help is universal within System Builder.

Display data from test file
ENTER KEY-VALUES OF RECORDS YOU REQUIRE, OR SELECTION STATEMENT [Eg BALANCE = 0] USING FIELD NAMES, OPERATORS]=<>>=<=NE] AND LITERAL VALUES.

)ENTER SELECTION CRITERIA OR KEYS SEPARATED BY COMMAS:

Note: Screen heading here is same as 'Screen Description' entered by developer when screen set up

Fig 7 File enquiry mode, showing first-level help with selection criteria

System Builder allows up to 16 fields to be specified, which are used to order records for display during file enquiry or printing for producing reports. As with selection, you can, in addition to sorting on fields in the record, sort on transaction type.

During data entry and display, fields may be defined as correlatives (they may be derived values). The fields from which correlatives are calculated may be fields in other files. The existence of keys to other files can also be checked. The other provision for multiple file access is the transaction processing feature, which allows several master files to be updated from one transaction record, either individually or in a batch after a set of transactions have been entered.

System Builder allows the user considerable flexibility to tailor the package to meet individual needs. You can construct your own menus and adapt those provided by the system. Procedures which carry out a set of tasks automatically can be built by depressing the series of keys used to carry out the task interactively. Such procedures can include calls to Data Basic subroutines, so while there is no built-in conditional command (apart from the IF...THEN...ELSE test provided for data validation and default field values), you can achieve the same result by branching in appropriate circumstances to Data Basic or to the Terminal Control Language used by the computer system. This does, however, mean that for more advanced tailoring you need to learn the rudiments of Data Basic.

System Builder provides password protection on menus and on some menu options. This is in addition to the protection provided by the system, which obliges each user to have an identifier and a password, as is customary on a multi-user system.

User image

System Builder makes it easy to backtrack: a single key sends you back one line (when filling in 'forms' on the screen), or one function layer (when responding to system prompts), while at any menu level responding with zero sends you directly to the System Builder main menu. From there, another zero sends you out to Pick.

System Builder is helpful in other respects too. If you need help about what you are doing, you can enter a '?' for two lines of help at the top of the screen, or two '?'s for a whole screenful. Such help information can also be provided by the system developer when building application packages, and System Builder will then ensure that it's available to the user when appropriate.

Less helpful features include an unnecessary insistence on entering responses to system prompts in capital letters.

Summary

Package Type	System development tool for software houses, dealers and experienced users
Facilities	Extensive facilities including multi-file access under Pick on multi-user systems and Revelation on IBM PC Exceptionally good data validation, link to programming language
Drawbacks	Single key access for amendment Crude letter writing Extensive menu system not always easy to navigate Expensive for one-off use
Ease of Use	Good apart from 'navigation' problem, and insistence on upper-case responses
Error Messages	Adequate
Documentation	At review time, very poor; new reference manual plus tutorial manual should be available by mid-May
Costs (ex VAT)	£750 (run-time only £350) under Pick £550 (run-time only £250) under Revelation
Supplier	Aston Technology, Aston Science Park, Love Lane, Birmingham B7 4BJ. Tel: (021) 359 4861

Documentation

My review manual, printed direct from the system, consisted of a section on each menu and menu option. It contained helpful details but no page numbers, no section numbers (not even numbers for the menu option headings), and no table of contents nor index. Far more new pages were generated than were necessary, so that each page was only a third full and the manual was three inches thick. However, a new version of this reference manual will be available shortly.

No tutorial manual was supplied with my version of System Builder, but this will also be available with the IBM PC version, which runs under Revelation, in the near future.

Conclusions

System Builder provides a good range of facilities for system developers and experienced users wanting to build a wide range of data management applications. For less experienced users, System Builder may prove too complex, at least for those who prefer manuals to courses. Whatever your background, have a good look at the new manuals before you buy.

END

GRiD Compass

The ultimate in portable computing is brought one step nearer in the shape of the GRiD Compass. But bubble memory and an electroluminescent display don't come cheap. Peter Bright looks it over.



Photographs by Crispin Thomas

If you want to know what will be happening to micros tomorrow, look at the technical specifications of the GRiD Compass (from now on 'GRiD'). Bubble memory, plasma display, it's all there. I've been itching to look at this machine for some time now. Although it's been around in the US for a while, it has only just made it across the Atlantic.

But technology costs money: you'll be lucky to see much change out of £6000 if you buy one of these beasts. So, before you fork out your hard earned cash, read on, and see if this machine really *is* for you.

Hardware

The GRiD measures just 15in × 11.5in × 2in. The only visible indication that it's a computer is the back panel which contains all the ports and the on/off switch. Running from left to right along the back panel there's the on/off switch, power in, RS232, two telephone sockets and an IEEE 488 interface.

The RS232 socket is yet another variation on the theme — this one has three layers of pins. Why micro manufacturers don't stick to the RS232 standard connectors is beyond me; all these weird sockets make life extremely difficult for people like me who never have the right cable.

The two telephone sockets are interesting. One is plugged into the normal telphone wall socket and the other one is designed to take a special handset enabling the machine to store telephone numbers and dial the call — meaning you don't have to 'wear' out your fingers in the normal way. The problem at the moment is that the built-in modem is designed to meet Bell standards in the US and is not yet approved for use with BT lines.

The IEEE 488 interface is used to hook up such things as disks, file servers and printers.

Setting up the GRiD is easy: hinge back the display to reveal the keyboard, pull down a flap on the rear to tilt the unit forward and plug it into the mains.

This is where the first surprise comes. For some reason I was expecting the GRiD to be battery-powered. This is not the case and it's a great shame. You can buy an external battery pack but because the electronics and the screen use so much juice, the batteries only last for about an hour. Not much use.

When the machine has been switched on for a while the reason for the rear flap becomes apparent. Its main job is not to tilt the unit but to raise the rear of the machine above the desk enabling the circulation of air to cool it. It doesn't do its job very well — the case gets *very* hot — so be warned. The heat is hardly surprising — there are no ventilation slots, no fans, nothing. I am very surprised the unit is reliable. No wonder it's known as the Gridiron in the US.

Inside

It took me about 10 minutes to work out how to get inside: no obvious screws or catches indicate what to do. But, eventually, I found two screws hiding behind gromets on the back panel. Having removed these the top cover slides off to reveal the inside.

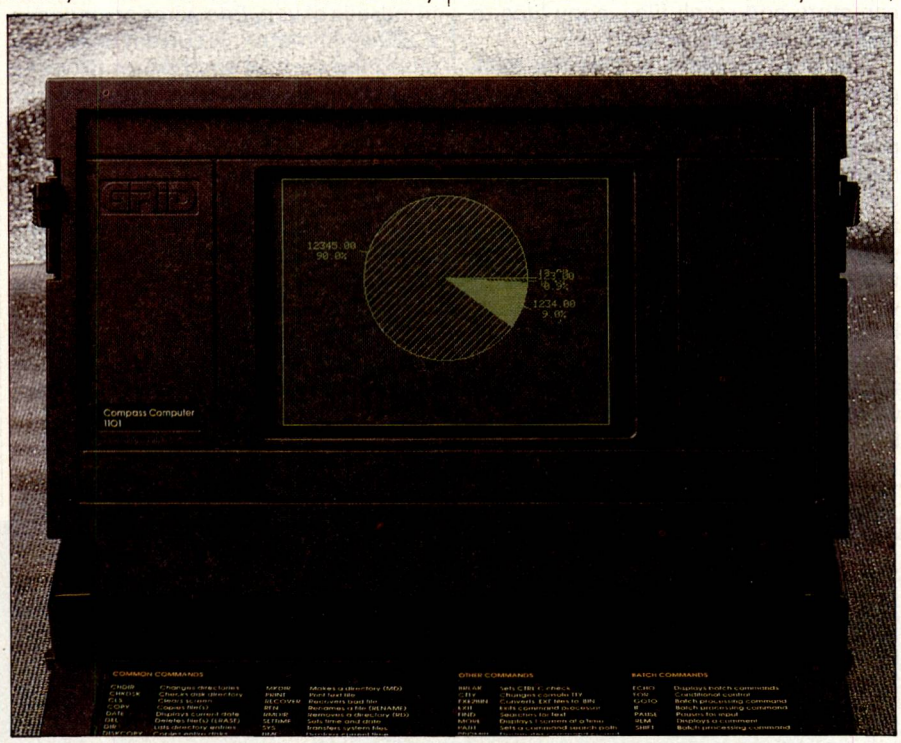
Never have I seen a machine with electronics so tightly packed. Underneath the top cover you can get at the power supply unit and two of the secondary PCBs piggy-backed together. To reach the main PCB you have to remove the power supply, various ancillary PCBs, the screen and the keyboard surround. Ease of servicing : poor. The main PCB is screwed to the casing face down, so it has to be removed in order to get at the chips.

The first noticeable thing about the main circuit board is the bubble memory capsules attached to the back of the board. These are large and silver — easily spotted — and they are also quite heavy. The rest of the PCB is very cluttered and contains the chips described below.

The main processor is an Intel 8086. Next to it is an Intel 8087 maths co-processor; this is still an expensive and comparatively rare chip, but it certainly speeds up mathematical calculations.

Semiconductor memory consists of 256k of RAM. The model 1109 has 512k of RAM by using 256×1 chips. Of this, 40k is used by the operating system and about 10k by the bit-mapped screen. There is also 16k of ROM which contains the bootstrap and some of the device drivers.

One interesting chip on the main board is a square ULA with pins on every side (a telephone call to the company evoked no reasonable explanation for this). The GRiD also has a built-in Bell standard modem — not much use in the UK where CCITT tones are used — and a battery-driven,



The display is superior to LCD, but it eats a lot of power



The keyboard is cramped — note the absence of a CAPS LOCK key

real-time clock.

Mass storage

The GRiD is very well catered for as far as mass storage is concerned with a choice of bubble memory, floppy disks, hard disks, shared file store or even its own mainframe! Standard mass storage is 384k of bubble memory. This is built into the main PCB and is accessed as if it were a disk. The main advantage of bubble memory is that it is non-volatile — allowing you to switch off the power with data remaining intact.

In practice, you could happily use the GRiD without ever having to use any other mass storage device other than bubble memory. When the machine is switched on its operating system loads just as if it were a disk: for example, you can store and recall files, copy files to and from disk, and so on.

The only problem is that the 384k provided by the bubble memory is insufficient to hold all the software packages. This is annoying because it means some programs have to be kept on disk. Bubble memory takes a while to load programs. This was a big surprise as I expected the speed to be the same as RAM. The fact is that it works by having a very long stream of bubbles representing 1s and 0s wandering around in an endless loop: these are electrically driven around what is effectively a read/write head. Bubble memory is a serial device: the 1s and 0s go past the 'head' one by one. This means that you have to wait for the data to come round again before you can read it. In general access speed is comparable to floppy disk.

The review machine was also supplied with a 5.25in IBM-compatible floppy disk which is connected to the main unit via the IEEE 488 interface. A hard disk is also available.

It is also possible to hook GRiDs up to a GRiD server. This is basically a multi-plexed hard disk which allows up to 44 GRiDs to share the hard disk and printers as well as access a central database. I didn't test this piece of kit so am unable to comment further.

Display

This is the expensive part. The GRiD uses a six-inch amber electroluminescent flat panel display made up of hundreds of very fine wires arranged in a 320×240 matrix. A current is applied along the vertical and horizontal wires so that light is emitted where the wires cross each other. This arrangement gives the display a resolution of 320×240 pixels. Its main advantage is that it occupies less space than a conventional cathode ray tube. It also gives off light rather than reflects it which means it's easier to read than, for example, an LCD display.

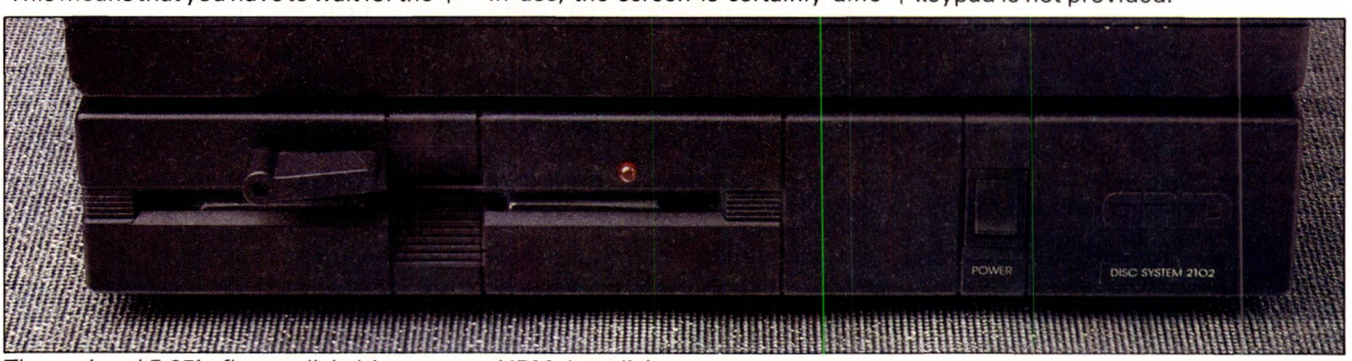
This type of display is very expensive to produce at the moment, which is the big disadvantage. It also uses considerably more power than an LCD display precluding its use as a true portable machine.

In use, the screen is certainly different. When the machine is switched on it hums slightly and the system defaults to 53 characters per line. The display is at its most impressive in this mode — clear, with well-formed characters. It can also be run in full 80-character per line mode but at this level there's a deterioration in quality and the characters become more difficult to read.

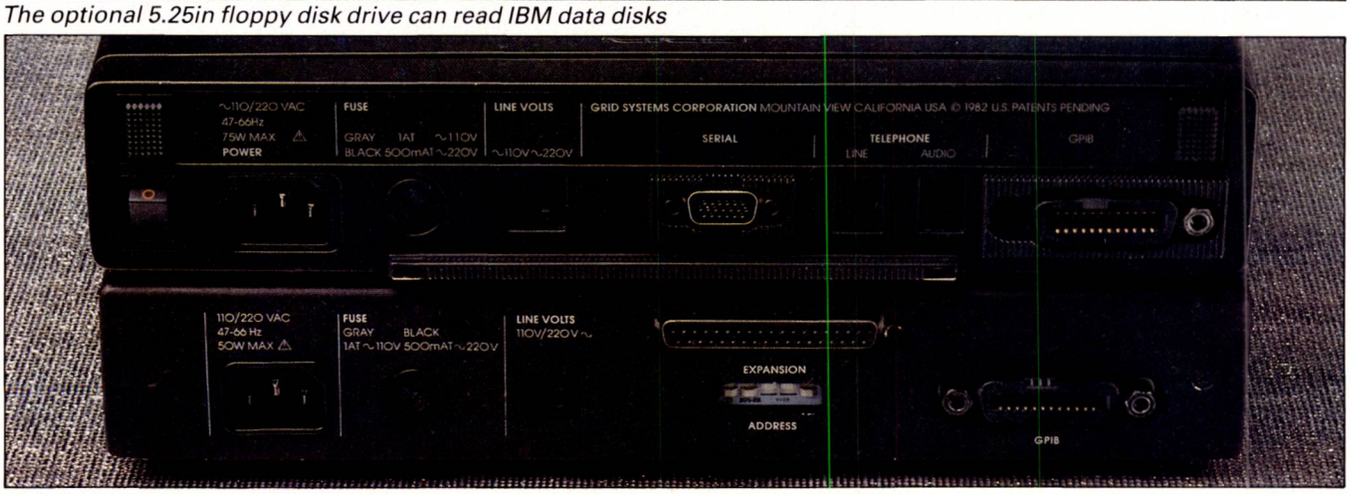
In summary, the display is novel rather than outstanding. If it had been a normal CRT display I would have said that the quality was poor. You can't adjust its angle, brightness or contrast. I'm not quite sure where this type of display will fall in the rest of the micro market. As it's very compact it will lend itself to portable applications but it uses too much power to be of any use in a truly portable, battery-powered micro. This leaves larger static or transportable machines but it's hardly worth using this technology on these because of their high price.

Keyboard

The screen hinges up to reveal the keyboard. One noticeable thing is its colour: the system prompt card at the top is orange and white, the keys are black and the lettering is either white, red or yellow depending on function. Of necessity it's very cramped — 57 keys fit into a space smaller than the qwerty section on most keyboards. In fact the qwerty section is about all you get on the GRiD. Additional keys are CURSOR CONTROL and assorted CTRL, CODE and ESCape. A separate numeric keypad is not provided.



The optional 5.25in floppy disk drive can read IBM data disks



GPIB (IEEE 488) interface is used to connect disk drives. Note the RS232 socket is unconventional

The CODE key is unusual. There are two of these: one on either side of the space bar. They are used to issue commands in much the same way as the CTRL key in WordStar: for example, CODE ? calls a help screen.

Although there are no 'programmable' function keys, it's possible to use the top line of keys in conjunction with the CODE key to imitate function keys. This is especially necessary in MS-DOS applications designed for use with function keys.

In use, the feel of the GRiD keyboard is unsatisfactory. Unlike most professional keyboards it's not pitched but totally flat. This is unpleasant to use and reminiscent of cheaper portable micros, such as the Tandy 100 — where the keyboard is only acceptable because of the machine's low price. It is unacceptable in a machine verging on £6000.

The keys themselves click nicely although they don't register until pressed quite hard. However, the most annoying point about the keyboard is the lack of a CAPS LOCK key. If you want to lock the machine in CAPS MODE you have to press the SHIFT and ESCAPE keys at the same time. This is irksome when touch-typing. Even worse nothing indicates you're in CAPS MODE. Most other machines use a LED or a message on the screen.

Software

The GRiD is capable of running two operating systems: MS-DOS Version 2 and its own GRiD/OS. I'll start with MS-DOS and then deal with GRiD/OS.

MS-DOS

MS-DOS Version 2 is supplied on a single disk. I spent a happy hour trying to find out how to make the machine boot from disk instead of bubble: it turns out that you have to switch the machine on while holding down the 'F' key. Obvious innit?

After the disk drive has wheezed into life and loaded MS-DOS, the time honoured A> prompt appears. You can't imagine how good it felt to be back with good, old, unfriendly MS-DOS after days of being hustled around by GRiD/OS.

The first noticeable thing is that the display changes from the normal 53 characters per line to the full 80-character display. Although more letters appear on the screen, the quality of the display takes a nose-dive: 80-column letters are very poorly formed.

This implementation is unusual in that GRiD has seen fit to include two extra commands in addition to conventional MS-DOS commands. These are DEVICES and SETTIME: both just extra .EXE programs.

DEVICES produces a list of the current peripherals currently hooked up to the machine. In the case of the review machine the floppy disk was drive A and the bubble memory was drive E. DEVICES also shows the address of devices on the IEEE 488 interface.

In theory bubble memory can be accessed as drive E, but any attempt to do so results in an error as the bubble is formatted for GRiD/OS (you could always reformat the bubble memory, but this would prevent its use with GRiD/OS). This is the consequence of running two different operating systems on the same machine.

As the GRiD has a real-time clock built in, you need some way of setting it under MS-DOS — hence SETTIME. Interestingly the standard MS-DOS log in, where the date and time are requested, has been kept — you just default through it because it is always right. Calling SETTIME brings back the time and date prompts.

One of the main reasons for MS-DOS on the GRiD is to make it IBM PC-compatible. I didn't get a chance to test this out fully but I suspect it's only partially true. The GRiD is *data* compatible with the PC: it can format and create data disks which can be read by a PC, and it can read PC data disks. However, it does not necessarily mean that you can put a PC program disk in the drive and expect it to work.

Still, GRiD has gone to great lengths to ensure that the majority of PC programs can be made to run. The manual is full of programmers' hints, especially on direct screen addressing — one of the main problem areas with PC programs. GRiD has also converted a number of the most popular programs to run on the machine.

GRiD/OS

When the machine is first switched on, it displays a very nice 3-D GRiD logo and then just sits there. After a while a small flickering character appears in the bottom right-hand side of the display to show that it's loading from the bubble memory. Eventually the greeting 'File Form' appears. It seems to take an age to happen but the real meaning of 'slow' only becomes apparent when loading the system from floppy.

In order to understand how 'File Form' works, it's necessary to look at the internal file structure of GRiD/OS. This is best described as 'hierarchical'. Whereas operating systems like Unix and MS-DOS Version 2 have a full tree structure starting at the root and multiplying along the way, GRiD/OS's tree structure looks like it's been attacked by a maniac with a pair of pruning shears who has cut away the top level. This leaves you with a device which has a number of directories, each of which contains programs. Sub directories aren't allowed.

In order to call a program, 'File Form' must be entered. This is a menu screen divided into two sections: the top portion displays the available files/directories; and the bottom half is for entry of choices. In order to retrieve a file, details have to be supplied for each of five headings: all of which are displayed in the bottom section of the screen. The headings are: Device, Subject, Title, Kind and Password. The 'Device' can be any of the mass storage devices: bubble memory, floppy disk, and so on. 'Subject' is the directory name, 'Title' is the file name and 'Kind' is the program associated with the file.

As an example, say you want to load Benchmark 1 which has already been saved in bubble memory in a directory called PCW. The top section of the screen will display all the valid directories so move the cursor to 'PCW' and press return. 'PCW' will be written into the Subject box in the bottom section of the screen. Next all of the files in the 'PCW' directory will be displayed complete with their associated program Kind.

Benchmark 1 has the Kind 'Basic' because it's a Basic program. Move the cursor to 'BM1 Basic' and press Code Return to indicate that selection is finished. The machine will then look at the file Kind to see which program is required. BM1 needs Basic so this is loaded, then BM1. (This takes much longer to describe than it does to execute.) If you ever get lost just press CODE? and a help screen will be displayed.

Passwords can be set for files but the manual is full of dire warnings about the consequences of forgetting a Password. Someone had password protected one of the important utilities before I received the machine so the only way I could get into it was to reformat the bubble memory and then reload the entire operating system from disk. Needless to say, I was not impressed.

There is definitely a very powerful operating system hiding behind all those menus. The problem is that hackers will have to wade through the menus to get at them. The whole design of the system seems to discourage rummaging around. This is understandable. The users at which this machine is aimed won't want to *play* with the O/S.

One interesting feature working away imperceptibly is the operating system's ability to support multi-tasking — I played with the machine for nearly two weeks before I discovered this! And, I only found that it was capable of supporting multi-tasking because it was mentioned *en passant* in the sales brochure.

The trouble is that unlike Concurrent CP/M where different programs can run simultaneously, GRiD/OS only allows multi-tasking when the depths of the system are probed. This is unlikely to be of much use to the average end user unless applications programs have been specifically written to take advantage of it.

My major criticism is that error messages are of the 'Error 123' ilk. This is totally out of keeping with the rest of the system which is very user-friendly. Having said that, at least errors don't bring the whole system to a grinding halt!

The key to Computing Power



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228 PCW

The operating system tries to be friendly without going into mice and ikons. However, the result is not a complete success.

System utilities

All of the system utilities are held in a directory called 'Programs'. Most of the housekeeping utilities are handled from a program called GRiDManager which can be called from the Programs directory.

Using GRiDManager you can: change Passwords; select an autostart program; copy and erase files; see Device usage, and so on. These are all menu-driven and can be called either by issuing the correct CODE command or by moving the cursor to the desired option and pressing CODE RETURN to select.

One of the more interesting options from GRiDManager is 'Execute Command Line'. This lets you exit to the Command Line Interpreter (CLI) whose commands allow you to control the operation of the system directly. By building mini programs of CLI commands, you can build up complex executable sets just by calling the program. That's the idea anyway, but unfortunately the CLI commands weren't included with my documentation, so I couldn't test them out.

The programs directory also contains utilities to drive a wide range of different printers, and a number of different character fonts can be selected for display.

I/O is supposed to be device-independent: you just tell your program to output data in a standard format without having to worry about individual device drivers. This is a very good idea and is usually only found in operating systems such as Unix. Again I couldn't test it out because GRiD wasn't prepared to supply me with the appropriate documentation.

Applications software

The GRiD comes supplied with a number of applications packages as standard. These are GRiDFILE database, GRiDPLAN spreadsheet, GRiDPLOT graphics, GRiDWRITE word processor and GRiDPRINT text formatter. As is the practice with conventional integrated systems, data is interchangeable between all the applications. GRiDBASIC is also supplied.

They all seemed to work well enough but I only had the time to try them out briefly. I especially liked GRiDWRITE and the graphics package GRiDPLOT. The word processor is easy to use and has some very intelligent features built in. The graphics package can produce the usual range of bar charts, pie charts and graphs. Again, it's easy to use and drawing is very fast.

Take a look at the Benchmarks and you'll see that GRiDBASIC is incredibly slow. Remember that this machine has a full-blown, 16-bit processor *and* an 8087 maths co-processor. Take no notice of the figures: they're for the record only.

My general impression is that it's quite fast — not very fast, just average. GRiD informs me that the Basic is being rewritten and customers are being recommended to use Microsoft Basic.

It's a pity that GRiDBASIC is so slow because it does have some interesting points. For a start you get a very nice full screen editor and auto line numbering. Also it is said to be compatible with MBasic. Along with the machine's other interesting points there was no documentation so I couldn't take it any further.

One of the GRiD's major selling points is its communications ability. The problem is that these have lost some of their appeal in 'crossing' the Atlantic. However, it still has a formidable range of comms software even if the hardware is illegal.

The idea in the US is that everyone who buys a GRiD can have access to the company's mainframe (known as GRiD Central) via dial-up lines. The manual says that GRiD Central could be used to store files instead of using floppy disk — an interesting idea. The main advantage of GRiD Central, however, is that you buy extra software and download it straight into your GRiD — very impressive. It's a pity that transatlantic calls are so expensive . . .

Documentation

Three manuals were supplied with the review machine: an MS-DOS users' manual, a massive, ring-bound GRiD manual and a small introductory manual.

I didn't much like the manuals. I've lost count of the number of times I tried to find something and spent what felt like hours looking for it. Often I never did find what I was looking for . . .

Prices

The GRiD is *very* expensive. The entry level system with 256k of RAM and 384k of bubble memory but no modem will set you back £5195! The model 1101 which includes a modem costs £5995 and the model 1109 which has 512k of RAM costs £6995.

If you want to go really mad you can spend £10,500 on the spy proof model 1107 which 'resists sophisticated forms of espionage.'

Conclusions

The GRiD is difficult to sum up. It has many of the features of a true 'go anywhere' portable: small size and bubble memory. And yet it isn't a CMOS machine and its display eats such large amounts of power . . . so you must have a mains power supply.

This categorises it for the transportable sector rather than the true portable. Given that you can't use it on the move, what's the point of making it so small? Why pay for such advanced technology when it has to be plugged into the mains just like any desktop?

The machine looks great in its black magnesium covers. I can only think of it as a poser's toy, but the fact remains that it's a very powerful piece of kit and is easier to move around than all the other so-called 'transportables'.

Would I buy one? In one word — No. When I buy a portable computer I don't want to be tied down to a mains supply. Even if I were willing to use mains power, I'd go for an Apricot, Hyperion or Apple Mac, all of which are a quarter of the price.

The GRiD has a great many technically advanced features which will undoubtedly find their way into more 'accessible' machines but it is overpriced. *Only for boys with small briefcases and large wallets.* **END**

Benchmarks

BM1	8.5
BM2	11.9
BM3	25.1
BM4	22.5
BM5	27.8
BM6	125.1
BM7	158.3
BM8	29.7

All timings in seconds. For a full listing of the Benchmark programs, see 'Direct Access'.

Technical specifications

CPU	Intel 8086 with 8087 maths co-processor
RAM	256k. Enhanced version available with 512k
ROM	16k
Display	Electroluminescent flat panel display, 320 × 240 pixels, variable character resolution
Keyboard	57 keys, multi-function
Mass Storage	384k internal bubble memory, optional floppy and hard disks
I/O	RS232, IEEE 488, built-in modem
Operating Systems	GRiD/OS, MS-DOS Version 2
Dimensions	15in × 11.5in × 2in.

Oric/Atmos

Surya continues his analysis of the machines on the PCW Convertor Chart with a look at Oric HIRES mode and sound capabilities.

HIRES is the high resolution graphics mode, the resolution is 240×200. The two main statements for plotting high resolution graphics are CURSET, CURMOVE and DRAW. CURSET is similar to PLOT in that it accesses the specified point.

The format is CURSET x,y,z where z is as follows:

0 Plot the point in the background colour (unplot it).

1 Plot the point in the foreground colour.

2 Physical invert: if the point is set to the background colour, set to the foreground colour or *vice versa.*

3 Move the graphics cursor to the specified point without plotting.

CURMOV works in the same way as CURSET, but moves relative to the current graphics cursor position.

DRAW is a statement which draws lines relative to the current cursor position. The format is DRAW x,y,z.

The other graphics statements supported are PATTERN, CIRCLE, POINT, FILL and CHAR.

PATTERN selects the form of line to be used by the DRAW statement. The default is 255, which selects a solid line; other values (0-254) select different patterns of dotted line. CIRCLE r,z draws a circle using the current cursor position as the centre, r sets the radius and z is as before. POINT x,y is as with most micros, returning 1 if the pixel is set to the foreground colour or 0 if background. FILL is used to fill a specified area of the screen with a given attribute, the format is FILL r,c,a. To use the statement, the graphics cursor must be positioned at the top right-hand corner of the area to be filled, then r sets the number of rows downward, c the number of columns across, and a the attribute used to fill the area so defined. The way the attribute is interpreted is a fairly involved procedure requiring an understanding of the way in which the Oric's graphics work on the bit level. With luck, the author of the original program will have annotated the program with REM statements, otherwise choose a colour you like!

Finally, we need some way of displaying text onto the HIRES screen and the statement used to do this is CHAR. The format is CHAR c,s,z, where c is the ASCII code of the character, s is the character set (0 for standard, 1 for alternate) and z is the attribute.

The Oric also allows any or all of its characters to be redefined. The machine downloads its character set from ROM to RAM on power-up; the user can then POKE any of the addresses used to store the character set in order to redefine the character. You will have to use your own machine's character defining facilities, or select a suitable shape from your default character set.

Sound

The Oric's sound facilities are impressive for such a low-cost machine. The volume is considerably higher than most other micros, there are several pre-defined sound envelopes available, and the format of the MUSIC statement corresponds to standard musical notation.

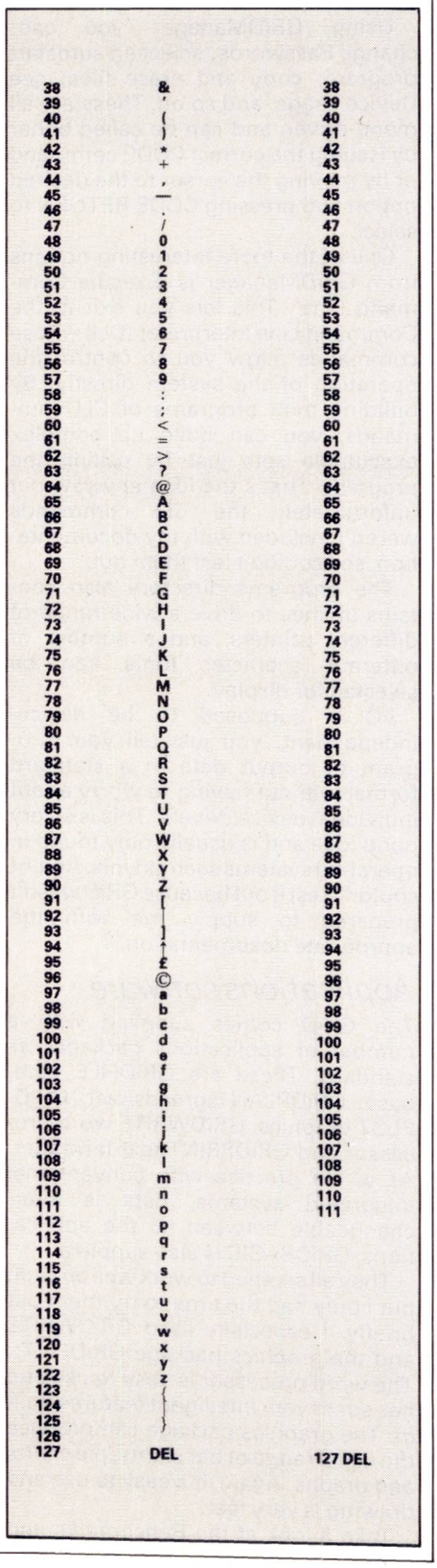
The built-in envelopes are EXPLODE, PING, SHOOT and ZAP — all of which are, I think, self-explanatory! A few FOR-NEXT loops, and some impressive sound effects, can be added to games. The three other sound statements are MUSIC, PLAY and SOUND.

MUSIC c,o,n,v plays a note where c is the channel, o is the octave, n is the note and v the volume. The channel is 1, 2 or 3; the octave is 0 to 6, where 2 is the octave directly above middle-C; the note is 1 to 12, where 1 is C, 12 is B and each increment is one semitone; the volume is between 1 (barely audible) to 15 (loud).

PLAY is used to define the way in which the MUSIC statement is executed, while SOUND is used to generate non-musical sound effects. Each machine uses sound in a totally different way. For this reason, it's usually necessary to completely rewrite sound routines when converting from one machine to another. Again, program convertors are heavily dependent on either personal experience with both machines or authors' REMarks.

Fig 1 Complete Oric character set. Alternate characters are produced in the LORES 1 mode. LORES 0 uses standard characters.

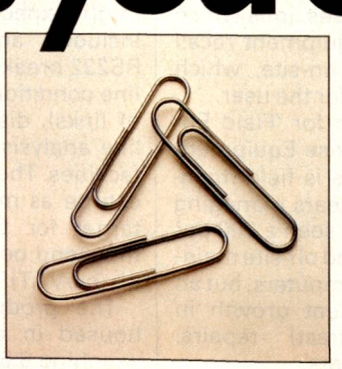
CODE	STANDARD CHARACTER	ALTERNATE CHARACTER
33	!	33
34	"	34
35	#	35
36	$	36
37	%	37





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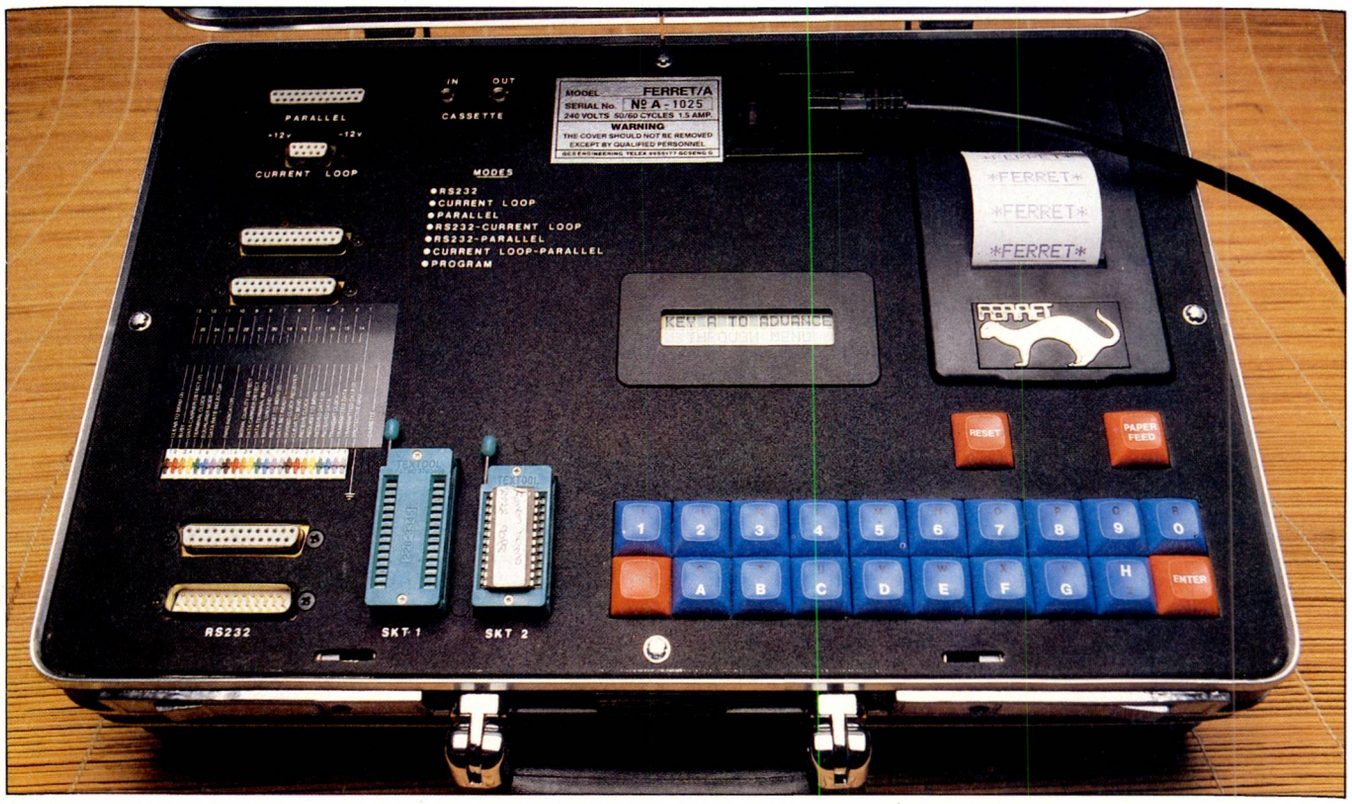
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The Ferret

Conventional computer test equipment in a briefcase is an attractive proposition, says Jerry Sanders. So, if maintenance is your problem or your business, a Ferret could be just the job.



The GCS Ferret offers up to £5000 worth of conventional computer test equipment in a single, portable briefcase for £1000 (£995 excl VAT), and promises to cut engineer attendance time by up to 60 per cent. In many cases, jobs which in the past required equipment recall can now be repaired on-site, which means less down time for the user.

Ferret is an acronym for 'Field Engineering Rapid Response Equipment Tester'. GCS's business is field maintenance, and in three years managing director Bill Nickoll has seen a 200 per cent growth in contracted on-site maintenance, mainly minicomputers, but an astonishing 800 per cent growth in chargeable (non-contract) repairs, largely to microcomputers.

As a major purchaser of test equipment of all kinds, the company was in an ideal position to come up with a product which might make more efficient use of its engineers' time.

Bill Nickoll's specification was for a totally portable and robust unit which would make other test equipment redundant, and offer a major price benefit.

Equipment which a field engineer might expect to need on a daily basis includes an EPROM programmer, RS232 break-out box (used to monitor line conditions and compatibilise ends of links), disk and printer exercisers, line analysis and protocol conversion facilities. The cost of all this equipment can be as much as £5000, but GCS's target for the Ferret was under a thousand pounds, and the target was hit (ex-VAT)!

The product (see photograph) is housed in a black plastic briefcase weighing 6.5 kilos. With dimensions of 390 × 245 × 190mm, it's slightly more bulky than an executive briefcase. To provide integration GCS came up with a 24k operating system with a menu-driven front-end, to lead the user through all the options via a two line 30-character LCD display and a 20-key keyboard. An Epson microprinter, as used in the HX-20, gives hard copy feedback. An interfacer for RS232 diagnostics and line tweaking is accompanied by two addressable EPROM sockets and in/out ports for cassette recorder use. The whole unit is driven by two processors, a Z80A main processor aided by an 8049 to drive the Epson printer. Inside the lid of the case is a wallet containing mains lead, RS232 lead, two manuals (training and user) and a set of seven patch jumper leads. There's just enough space left for a half pint coffee flask!

Design

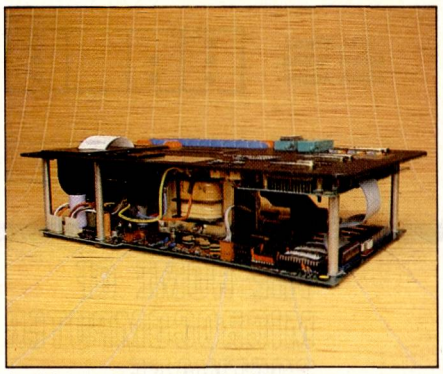
Designer Paul Spencer took pains to make Ferret comfortable to use: an obvious example of his forethought is in the circuit layout. Ferret's most bulky component by far is its transformer. All the wonders of technology cannot yet lighten this little load: a transformer is

today a heavy set of coils, just as it was 10 years ago. In order that the briefcase be comfortable to manage, Paul was careful to place the transformer slap in the middle of the circuit board so that the case would balance in the hand.

Ferret's features can be described in three groups, offering six interface modes of operation and a seventh, programming mode. On power-up the machine executes a self test, and then offers a main menu prompt. Options available by keying through the menu are RS232, current loop and parallel output, RS232 to current loop (bi-directional), RS232 to parallel and current loop to parallel (these last two are 1-way only), conversion and, finally, program mode.

In interface mode, the user keys in parameters to configure the Ferret as required. Baud rate, data bits, parity, stop bits and handshake may all be set in RS232 and current loop modes, after which the Ferret can serve as a Host Emulator, Line Analyser or Protocol Convertor. Tape input/output ports are also provided for block storage and retrieval of dumps from the Ferret's memory, which itself can be data received from external equipment. The Ferret comes with 48k, 8-bit words as standard, and another 16k can be added by using the external EPROM socket as an extension.

Two zero-force ROM insertion sockets are included. Anyone who has broken the legs off a ROM spider will drool at the simplicity of these sockets. The ROM is dropped into place in the guide holes, and a spring-loaded lever traps the legs in place and makes the contact. They should be standard on all computers that use ROM changes for full exploitation, but they cost 10 times as much as the standard sockets found in most computers. Their function is two-fold: programs can be read from them (a demo chip came with the machine), and they can be used for blowing EPROMS from data either read into memory from a comms port or from the other socket. This means an engineer can build up a library of test routines for different equipment and carry around a little box of EPROMs, duly labelled, in the Ferret briefcase. Ferret can handle a wide range of EPROMs.



Inside: neat, compact layout

The demonstration chip prints information on the Ferret's pinouts, an ASCII chart, and a list of compatible EPROMs on the integrated Epson printer.

One of the cleverest tricks the Ferret can perform is to detect incoming parameters and change the Ferret's own parameters to match. All the user is required to do is send a continuous stream of upper case 'A's from the source hardware — a terminal keyboard, for example. As the diagnosis proceeds, the LCD display shows a succession of baud rate alternatives as each is tried in turn. A successful parameter detect overwrites the receive values set by the user on start-up.

Set into the Ferret is a device known in the trade as an 'interfaker' after a popular branded product of the same name. The Ferret's 'interfaker' is a 24-line patch-panel with switches and indicators on each line. Though its most common use is for the diagnosis of RS232 interface problems, it may also be used to customise the Ferret's parallel output for a non-Centronics type of configuration, using the dip switches and patch jumpers.

In RS232 interface mode, and at any other time when the Ferret is using the RS232 port, the interfacer becomes part of the input/output circuitry of that port. At all other times the interfacer's signal lines are isolated (Pin 1 is permanently connected to the Ferret's mains earth; pin 7, the signal ground on the male-connector side of the dip switches, is permanently connected to the Ferret's DC common).

With all 25 switches in the off position the Ferret's interface acts as a straight-through, 25-way cable, but not all the target peripherals to be driven by the Ferret will be data terminal equipments (or DTEs). To communicate with a Data Communications Equipment (DCE), cross-patching is required, which explains the set of coloured wires included in the lid of the case. The Ferret can then be reconfigured to act as a DTE itself, or lines can be tweaked into high or low voltage states to suit the equipment being investigated.

The interfacer's LEDs illuminate when their respective lines go above 0V, and extinguish when the line goes below 0V. This doesn't necessarily mean that the line is positive or negative in RS232 terms: RS232 'positive' must be +3V to +25V; negative must be −3V to −25V. An LED will not illuminate unless a signal is present. To pull lines high or low, a 12V pull-up and a −12V pull-down are available at the current loop connector.

Once the communications protocols for the equipment under test have been established, the Ferret can then be used as an exerciser for disk drives and printers. Hex code sequences may be stored and transmitted to cause disks to spin, printers to print, or even plotters to plot.

Ferret can run programs direct from EPROM, treating it as an extension of internal memory. Any development system capable of editing and assembling Z80 assembly language programs can be used to prepare programs. The assembled Z80 code can then be downloaded via an RS232 port into the Ferret's RAM, and from there into an EPROM. Several independent programs can be loaded into the same EPROM, and access is by specifying the relative start address from the keyboard (default is 0000H).

Using program mode, a non-standard protocol can be interrogated by customising the Ferret to emulate it, using a newly burned PROM as an extension to RAM.

The Ferret comes equipped with some of its own subroutines which users can incorporate into their own programs. 'Keyboard' loops until a key is pressed, and returns the ASCII value to the A register. 'Display' causes 32 successive characters to be sent to the display. Other routines include 'DART output', 'DART input', 'Parallel output', and 'Exit' (which allows the user to jump to an address which terminates RAM programs), 'Print' and 'ASCII to Hex' and 'Hex to ASCII' conversion routines.

One thing the Ferret lacks is an ohm-meter. In early field trials GCS decided that putting a multi-meter in the case could lead to access problems, since engineers like to put their meters where other probes cannot reach. Moreover, it would have been the only part of the Ferret not strictly relevant to data manipulation. GCS realised that for roughly the same cost price a PROM burner could be substituted, giving great data engineering flexibility.

Only one problem emerged during *PCW*'s test: the shift key stuck intermittently. The alphabet and numerals are accommodated on 18 keys. The top row has 1 through 0 (unshifted), I through R (shifted). Underneath are A through G, plus Z (unshifted) and S through Y, plus H (shifted). This layout takes a bit of getting used to.

The first 1000 production Ferrets, manufactured to GCS's specification at Datac in Manchester, have already found homes in Australia, Norway and the States as well as here in the UK, and if GCS's order book is anything to go by there could be a waiting list. GCS produces a Ferret newsletter at regular intervals which is free to owners, and the next version of Ferret is already on the drawing board.

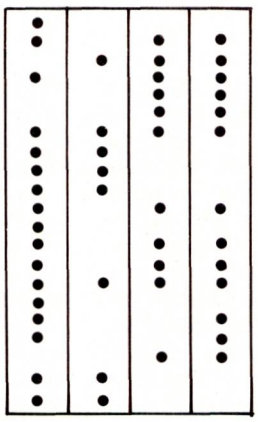
Conclusion

The Ferret is a versatile original product. Though designed for on-the-move engineers, the concept of hardware emulation, diagnostics and EPROM burning in a briefcase makes it an attractive toolkit for any user with a multiple machine installation, mini *or* micro.

More details from Paul Alexander at GCS, tel: (01) 898 5251/6. END

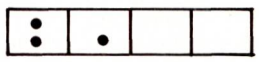
A SELECTION FROM OUR PRODUCT RANGE

High Level Languages



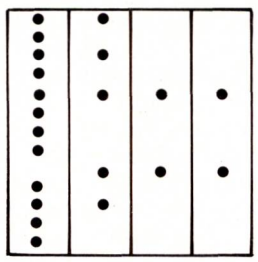
		CP/M	CP/M-86	MS-DOS	PCDOS
ADA	Supersoft	●			
BASIC INTERPRETER	Microsoft	●		●	●
BASIC COMPILER	Supersoft		●	●	●
BASIC COMPILER V5.3	Microsoft	●		●	●
BUSINESS BASIC COMPILER	Microsoft			●	●
C COMPILER	Microsoft			●	●
C COMPILER	Supersoft	●	●	●	●
CBASIC	Digital Research	●	●		
CBASIC COMPILER	Digital Research	●	●		
CIS COBOL	Micro Focus	●	●		
COBOL COMPILER	Microsoft	●		●	●
FORTH	Supersoft	●			
FORTRAN	Supersoft	●		●	●
FORTRAN COMPILER	Microsoft	●		●	●
LEVEL-2 COBOL	Micro Focus	●	●	●	●
LISP	Supersoft	●			
muLISP	Microsoft	●			●
muMATH/muSIMP	Microsoft	●			●
PASCAL COMPILER	Microsoft			●	●
PASCAL MT+	Digital Research	●	●		
PL/1	Digital Research	●	●		

Low Level Languages



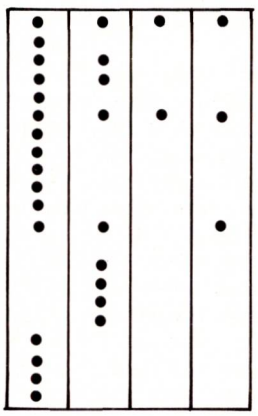
		CP/M	CP/M-86	MS-DOS	PCDOS
MACRO-80	Microsoft	●			
PROGRAMMERS UTILS (RASM)	Digital Research	●	●		

Program Development Tools



		CP/M	CP/M-86	MS-DOS	PCDOS
ANIMATOR	Micro Focus	●	●		
BUG	Phoenix Software	●			
DISPLAY MANAGER	Digital Research	●	●		
FTNUMB	Micrology	●			
LEVEL II ANIMATOR	Micro Focus	●	●	●	●
PDEVELOP	Phoenix	●			
PLINK	Phoenix	●			
PLINK II	Phoenix	●			
PLINK-86	Phoenix		●	●	●
SID	Digital Research	●			
SPEED PROGRAMMING PACKAGE	Digital Research	●	●		
XLT-86	Digital Research	●			
ZSID	Digital Research	●			

Utilities/System Tools



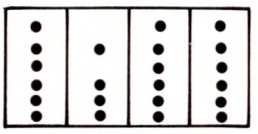
		CP/M	CP/M-86	MS-DOS	PCDOS
CLIP	Keele Codes	●	●	●	●
DESPOOL	Digital Research	●			
DIAGNOSTICS II	Supersoft	●	●		
DISK DOCTOR	Supersoft	●	●		
DISKED-2	Slogger Software	●			
DISK-EDIT	Supersoft	●	●	●	●
DISKMAN	Slogger Software	●			
DISKORG	Slogger Software	●			
DISKTOOLS-1 (DISKMAN & DISKORG)	Slogger Software	●			
DISKTOOLS-2 (DISKTOOLS-1 & DISKED-2)	Slogger Software	●			
dUTIL (FOR DBASE-II)	Fox & Geller	●			
FILESHARE	Micro Focus	●	●		●
DEC RAINBOW SERVICE S/W:	Silicon Valley Corp.				
(1) Format/Verify Service			●		
(2) Autorun Service			●		
(3) Function Key Service			●		
SERVICE S/W VOL. 1 (1, 2 & 3)			●		
SYSTEM CHECKER	Supersoft	●			
THE OPERATING GUIDE	Decision Systems	●			
UTILITIES I	Supersoft	●			
UTILITIES II	Supersoft	●			

Sorting



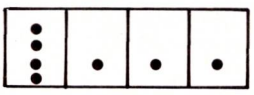
		CP/M	CP/M-86	MS-DOS	PCDOS
MSORT	Microsoft	●		●	●
SUPERSORT	Micropro	●	●	●	●

Code Generators



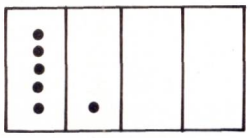
		CP/M	CP/M-86	MS-DOS	PCDOS
AUTOCODE	Stemmos	●		●	●
FORMS-2	Micro Focus	●	●	●	●
QUICKCODE	Fox & Geller	●		●	●
SOURCEWRITER	Softwright	●	●	●	●
THE LAST ONE	D.J. 'Al' Systems	●	●	●	●
THE LAST ONE—COMPACT	D.J. 'Al' Systems	●	●	●	●

Telecommunications/Conversions



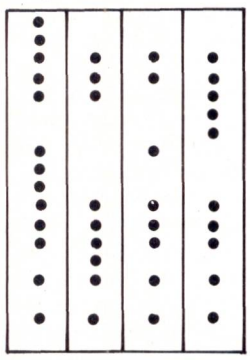
		CP/M	CP/M-86	MS-DOS	PCDOS
BACDEBIT	Comley	●			
BACSCOPY	Comley	●			
BSTAM	Byrom Software	●	●	●	●
BSTMS	Byrom Software	●			

Telecommunications Cont.



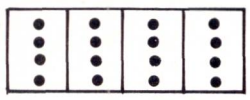
		CP/M	CP/M-86	MS-DOS	PCDOS
ICL CO3 EMULATION (Bulk)	Synchro Systems	●			
ICL CO3 EMULATION (Interactive)	Synchro Systems	●			
ICL CO3 EMULATION (Interactive & Bulk)	Synchro Systems	●			
REFORMATTER CP/M ⟷ DEC	Microtech Exports	●			
REFORMATTER CP/M ⟷ IBM	Microtech Exports	●	●		

Word Processing/Text Editing/Editors



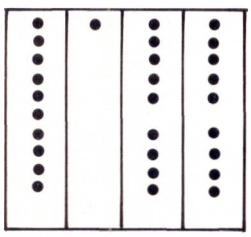
		CP/M	CP/M-86	MS-DOS	PCDOS
CORRECTOR	Supersoft	●			
EDIT-80 V2.02	Microsoft	●			
FRIDAY	Ashton Tate	●	●	●	●
MAILMERGE	Micropro	●	●	●	●
MEMOPLAN	Chang Labs	●	●		●
WORD	Microsoft				●
WORD WITH MOUSE	Microsoft				●
PARAGRAB	Focus	●		●	
PEDIT	Phoenix	●			
PMATE	Phoenix	●			
SPELLSTAR	Micropro	●	●	●	●
STARBURST	Micropro	●	●	●	●
STARINDEX	Micropro	●	●	●	●
WORDMASTER	Micropro		●		
WORDSTAR	Micropro	●	●	●	●
WORDSTAR PROFESSIONAL (WS+MM+SS+STAR INDEX)	Micropro	●	●	●	●

Databases/Data Management Systems



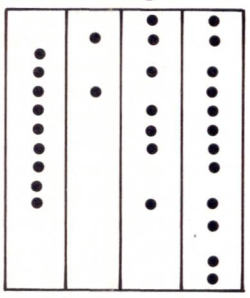
		CP/M	CP/M-86	MS-DOS	PCDOS
DATASTAR	Micropro	●	●	●	●
dBASE-II	Ashton Tate	●	●	●	●
INFOSTAR	Micropro	●	●	●	●
REPORTSTAR	Micropro	●	●	●	●

Financial Accounting



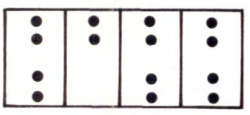
		CP/M	CP/M-86	MS-DOS	PCDOS
INCOMPLETE RECORDS SYSTEM	MPI	●	●	●	●
NOMINAL LEDGER	Padmede	●		●	●
OPEN ITEM PURCHASE LEDGER	Padmede	●		●	●
OPEN ITEM SALES LEDGER	Padmede	●		●	●
PADMEDE BUSINESS CONTROL SYSTEM	Padmede	●		●	●
PAYROLL	MPI	●			
PURCHASE LEDGER	Padmede	●		●	●
SALES INVOICING	Padmede	●		●	●
SALES LEDGER	Padmede	●		●	●
TIME & COST RECORDING	Padmede	●		●	●

Financial Modelling/Problem Solving



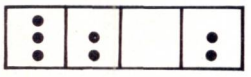
		CP/M	CP/M-86	MS-DOS	PCDOS
CALCSTAR	Micropro			●	●
DECISION ANALYST	Executive Software		●	●	●
LINEAR & GOAL PROGRAMMING	E A S	●			
MATHSPACK	MPI	●		●	●
MICROPLAN	Chang Labs	●	●		●
MULTIPLAN	Microsoft	●		●	●
PLANTRAC 1	Computerline	●		●	●
PLANTRAC 1+	Computerline	●		●	●
PROFIT PLAN	Chang Labs	●			●
QSTAT	Pivotal Software	●			
STATSPACK	MPI	●		●	●
TK! SOLVER	Software Arts				●
TK! SOLVER PACKS					
FINANCIAL MANAGEMENT					●
MECH ENGINEERING					●

Business Applications



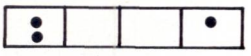
		CP/M	CP/M-86	MS-DOS	PCDOS
JOB COSTING	Heseltine	●	●	●	●
POLICY MASTER	CSA Micro Systems	●	●	●	●
PRINT ESTIMATION	Software Mgmt Systems	●		●	●
STOCK CONTROL	Padmede	●		●	●

Training Aids



		CP/M	CP/M-86	MS-DOS	PCDOS
CP/M TUTOR	Syntax Software	●			
KEYBOARD MASTER	Anthony Ashpitel	●	●		●
TYPING MASTER	Anthony Ashpitel	●	●		●

Graphics



		CP/M	CP/M-86	MS-DOS	PCDOS
dGRAPH	Fox & Geller	●			●
STATSGRAPH	Supersoft	●			

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The package has been developed by Hi-Yin Music, a company built around the talents of composer and arranger Per Hartmann. He has written the package to help arrangers prepare music manuscripts both quickly and easily. That however, is just one of the capabilities available with Music Mate. It can also be used to produce an arrangement of a melody for up to 14 instruments.

In its simplest role, Music Mate can be used to drive a matrix printer so that it can print out a full musical score. The composer enters the notes of a music score into the system by letter, ie A, B, C etc, with sharps and flats being shown by the # sign and lower case B (b) respectively. Rests are indicated by the letter P (bar pause) and note durations are designated numerically, with the smallest value being a sixteenth note. Octaves are shown numerically, with octave 0 being the lowest.

The system will request, in addition, the names of the instruments to be scored, their clefs, and the key signature (if any) of the music.

From this information the system will then be able to drive a matrix printer to print out a complete score of the music. Each part will be identified for the instrument desired and be ready to play. It will save a great deal of time and effort in producing the written arrangements to a piece of new music.

Music Mate goes further, however. Using probabilistic techniques, the programme can be used to generate melodies itself or to provide arrangements to an existing melody line. To stop the computer picking any notes, octaves, note durations and instruments at random, the user sets up a table of weighted probabilities. These set the likelihood of any particular note, duration, instrument or octave appearing in the score. Once the score has been produced by the computer the package allows the composer the chance to modify and manipulate the music so that it can be tailored to suit requirements. The score can be transposed, for example, to a different key, or swop notes or octaves around.

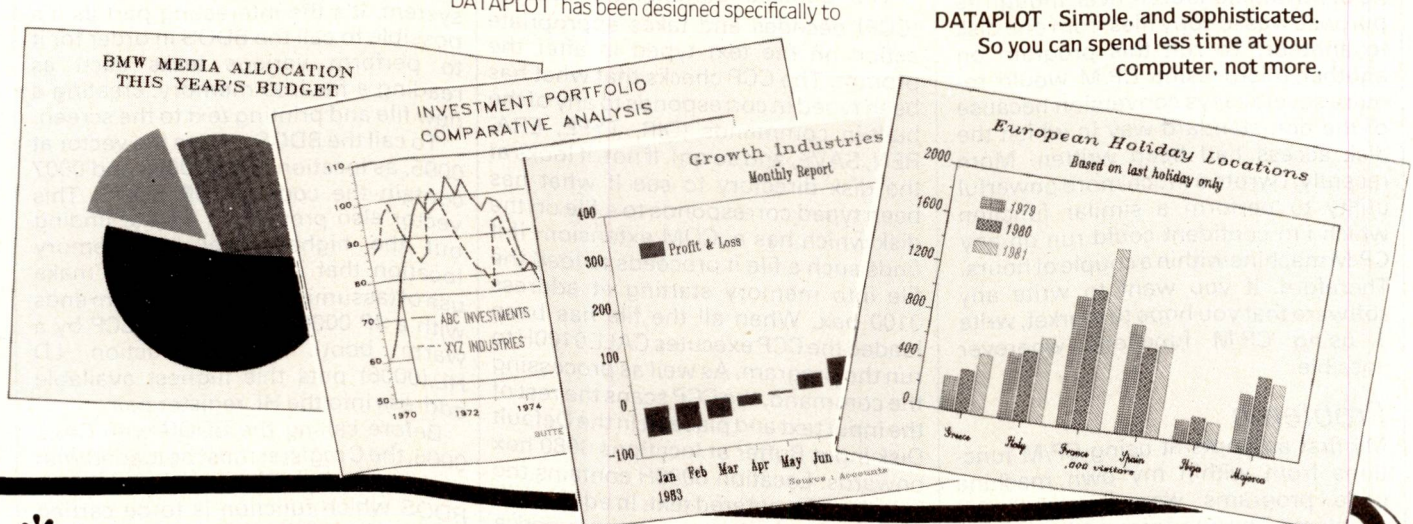
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CP/M access

Programs written for one CP/M machine should run without modification on another, or at least that's the theory. Richard Moffat explains how to call CP/M functions from within your own machine code programs.

There are several reasons why it can be a good thing to persevere with writing programs using CP/M, and not the routines hidden deep within the ROM in your machine. The first major advantage of accessing files on disk is easier — for example, how many times have you erased a file only to discover that you have deleted the wrong one? I'm sure nearly everyone has done this at some stage, and if you don't have a back-up of the file it can be very annoying. However, if you know a little about how CP/M stores files in the directory, you don't need to spend a lot of money on a utility to recover 'lost' files, as you can write one yourself in under 20 minutes.

Once you have mastered file access there is a whole suite of programs waiting to be written, only bounded in complexity by your imagination and available time.

Another significant advantage of using as many CP/M functions as possible instead of CALLs to ROM routines is that your program will become much more portable. As an example, one of my early machine code programs written for an RML 380Z used no CP/M functions at all, even though its purpose was to copy files from one disk to another. To run this program on another micro using CP/M would require several days conversion because of the non-standard way in which the disk access had been written. More recently, I wrote a much more powerful utility to perform a similar function which I'm confident could run on any CP/M machine within a couple of hours. Therefore, if you want to write any software that you hope to market, write it using CP/M functions wherever possible.

Problems

My first attempts at using CP/M functions from within my own machine code programs were fraught with problems. The only information I had to work from was provided in Digital Reseach's *CP/M Interfacing Guide*, which is far from ideal as an introduction. Nearly all my first programs failed and I must have cursed the creator of CP/M more times than I care to mention. Part of the problem was due to my tendency to use the instruction manual only as a last resort, but I've certainly learnt from my mistakes.

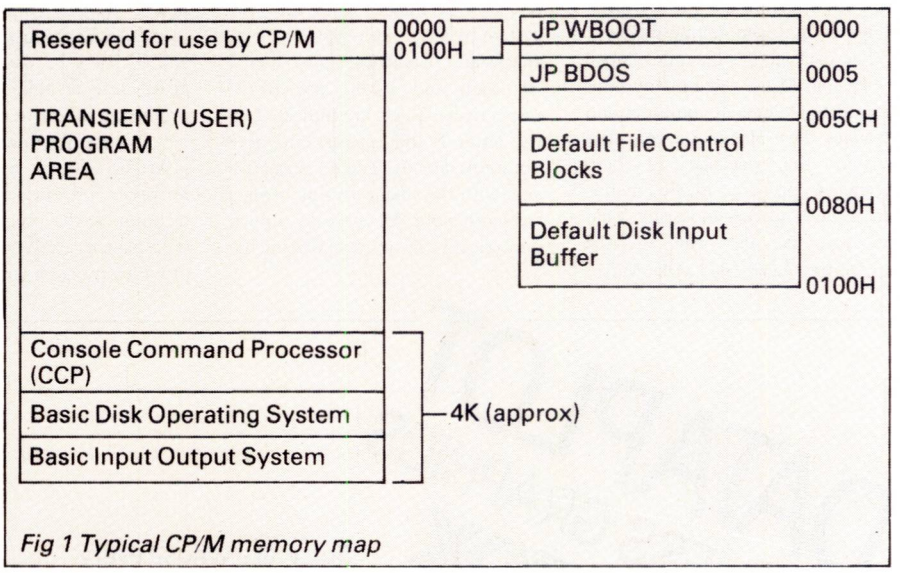


Fig 1 Typical CP/M memory map

CP/M memory map

Let's take a look at a typical CP/M system memory map (Fig 1).

The Console Command Processor (CCP) decodes and takes appropriate action on the text typed in after the prompt. The CCP checks that what has been typed in corresponds to any of the built-in commands (DIR, TYPE, ERA, REN, SAVE, and so on). If not, it looks at the disk directory to see if what has been typed corresponds to a file on the disk which has a .COM extension: if it finds such a file it proceeds to load the file into memory starting at address 0100 hex. When all the file has been loaded the CCP executes CALL 0100H to run the program. As well as processing the command, the CCP scans the rest of the input text and places it in the Default Disk Input Buffer at locations 0080 hex onwards. Location 0080H contains the length of the entered text. In addition, if the CCP finds that you have typed a possible filename or filenames after the command then it places a correctly formed file control block at location 005CH for the first filename and at location 006CH for the second — it's then up to your program to make use of these if required.

The Basic Input Output System or BIOS is the only machine-specific part of the CP/M operating system. It contains the necessary code for writing to and reading from disks, printing characters on the VDU, and so on.

The Basic Disk Operating System or BDOS is the real workhorse of the system. It's the interesting part as it's possible to call the BDOS in order for it to perform various tasks such as reading a file into memory, creating a new file and printing text to the screen.

To call the BDOS we use the vector at 0005, as locations 0005, 0006 and 0007 contain the code for JP BDOS. This vector also provides a way of finding out the highest available memory location that our program can make use of (assuming that the program ends with a JP 0000 to reload the CCP by a warm boot). The instruction LD HL,(0006) puts this highest available address into the HL register pair.

Before calling the BDOS with CALL 0005, the C register must be loaded with a code number. This number tells the BDOS which function is to be carried out, so if the C register is not correctly set up you may find that CP/M has just erased one of your programs, or performed some other unexpected operation. It may be necessary to pass a parameter to the BDOS in addition to

the code number: if a single byte parameter is required then it is placed in the E register, if an address is required it is placed in the DE register pair. Some BDOS functions return a result and this is placed in the Accumulator.

Consider the Z80 code in Fig 2 to print a message.

```
        ORG 0100H       ;  set the assembly address
W.BUFF  EQU 09          ;  code number for write strings
        LD C,W.BUFF     ;  set up function code in C
        LD DE,TEXT      ;  set up address of string in DE
        CALL 0005       ;  call the BDOS
        JP 0000         ;  perform a warm boot
TEXT:   DEFM 'HELLO $'  ;  note the dollar terminator
```

Fig 2 Z80 code

CP/M knows it has reached the end of a string to be printed when it reaches the dollar sign.

If this simple program is assembled and run (with any slight adjustments needed for your assembler) you will notice a delay between the message 'HELLO' appearing on the screen and the return of the prompt. This is caused by the JP 0000 instruction which causes the operating system to be reloaded from the disk. To avoid this delay we can use the fact that the CCP executed the program with a CALL 0100H. Provided we leave the stack in exactly the same state as when the program was run it's possible to return to the CP/M prompt with a simple RET instruction. The modified program is shown in Fig 3.

```
        ORG 0100H
W.BUFF  EQU 09
        LD (OLDSP),SP   ;  save the stack pointer
        LD SP,STACK     ;  set up our own local stack
        LD C,W.BUFF
        LD DE,TEXT
        CALL 0005
        LD SP,(OLDSP)   ;  reset the stack pointer
        RET             ;  back to CP/M
TEXT:   DEFM 'HELLO $'
        DEFS 16         ;  room for the stack which grows
                        ;  down
STACK : DEFW 0000
OLDSP : DEFW 0000
```

Fig 3 Modified program

It is important to set up your own local stack when writing CP/M programs because the default stack grows down from location 0100: that is, it grows into the default disk input buffer — this is vital if your program uses this area for disk I/O.

File control blocks play an important role in CP/M. A file control block (FCB) is an area of memory containing a program's filename, filetype and other information relating to the current record being processed, where the file is on the disk. The disk directory contains the FCB for each file present on the disk, each being 32 bytes long. The exact meaning of each byte in the FCB can be found in the CP/M documentation but the ones that are frequently used are shown in Fig 4.

Byte zero gives the status of the file. A zero indicates an active file whereas E5H indicates an unused FCB or a null entry. Under CP/M 2.2 this byte can also contain the user number of an active file. When a file is erased this byte is set to E5H so that the operating system forgets the file ever existed—the rest of the FCB remains as it was before the file was erased and this provides a way of recovering accidentally-erased files. It's only possible to recover such files if no other files have been added to the directory (thus overwriting the old FCB), and the file was not erased by using ERA '.', which writes an E5Hbyte to every byte in the directory. If you have a good disk editor on your system this can be used to search the directory tracks (usually about track 2) and then change the first byte of the correct FCB to a zero. Alternatively, it's not too difficult to write a program to find the file and then change the FCB to that of an active file in much the same way.

Another important point worth noting is that when the BDOS returns to your program, the chances are that it has altered the registers that were holding precious information prior to the CALL 0005 instruction. Therefore, instead of calling the BDOS direct, call a routine in your own program, called 'CPM' for example. This routine should save all the registers (except AF, since a result may be returned), CALL BDOS and then recover all the registers again. It may also be worthwhile to include an ORA instruction at the end of the routine to set the flags, since a zero result in the Accumulator often means that the BDOS has carried out the desired function without error. For example:

```
CPM:  PUSH BC
      PUSH HL
      PUSH DE
      CALL 0005
      POP DE
      POP HL
      POP BC
      OR A
      RET
```

It's not usually necessary to save the IX and IY registers too since the BDOS is written in 8080 code which has neither of these registers. However, some machines including the Osborne 1 use these registers in the BIOS so it's really a case of trial and error to see if you need to save them on your system.

It is often necessary to copy the matched filename and filetype and copy it into memory where it can be made use of: to do this decode the byte address. When a match is found, the sector of the directory containing the matched FCB is read into the disk input buffer. Since each FCB is 32 bytes long and a single sector contains 128 bytes, there will be four file control blocks in this buffer, only one of which is required. The first step in decoding the byte address is to mask off all but the lower two bits so that either 0,1,2, or 3 remains. I then multiply this result by 32 to reach the correct address within the buffer. Once this address has been reached it's a simple matter to copy the filename and filetype into memory wherever needed.

As an example, I wrote a program requiring a table in memory containing all the directory entries. The code I used to obtain this table is shown in Fig 5.

The next eight bytes of the FCB contain the primary filename padded with blanks if necessary. The filetype or extension follows in bytes 9 to 11, again padded with blanks if required. Bytes 12 to 15 are normally assumed zero. Bytes 16 to 31 are filled in by the operating system regarding where the file is actually stored on the disk. Byte 32 is the record number currently being processed — it is important that when a file is accessed for the first time, this byte is set to zero.

Disk directory searching

CP/M provides two functions which enable the disk directory to be searched. The first, BDOS function number 17, searches the directory for the first occurrence of the file whose FCB is located at the address in the DE register pair. The next, BDOS function number 18, finds the next occurrence of said FCB.

As each file on the disk has a unique

0	1 → 8	9 → 11	12 → 15				16 → 31	32
	FILENAME	EXT	0	0	0	0		NR

Fig 4 Frequently used FCB bytes

```
GETDIR:  LD HL,DIRTBL      ;  start of my table
         LD (DIRPNT),HL    ;  set up a pointer
         LD C,17           ;  find first match
GET001:  LD DE,FCB         ;  address of FCB in DE
         CALL CPM          ;  enter BDOS (saving registers)
         INC A
         RET Z             ;  if code was FF it will now be 0
         DEC A             ;  back to original byte address.
         AND A,3           ;  get in range 0 . . . 3
         RRCA              ;  multiply by 32 by shifting
         RRCA              ;  right through carry 3 times.
         RRCA
         ADD A,81H         ;  we don't need byte 0 so add 81 hex
         LD L,A            ;  get address into HL.
         LD H,0
         LD DE,(DIRPNT)    ;  current pointer position.
         LD BC,11          ;  number of bytes to copy.
```

Fig 5 Code used for program requiring a table in memory

name and extension you may wonder why it's necessary to have this second function at all. The reason is that it's possible to include wild cards in the FCB which will match any byte at all. These wild cards are byte 3FH — that is, a question mark. If you set up a FCB which has as the primary filename ????????, it is possible to find all the files on the disk with the given extension by using function 17 followed by repeated use of function 18. It is important that after using function 17 there are no other BDOS functions used before you use function 18. Both these functions return a result called the byte address. The byte address is a code referring to the position of the FCB within the directory.

The routine in Fig 6 should prove useful — it took several days of frustration to decode the byte address correctly, and since then I have used the above routine in about 70 per cent of all my machine code programs.

The BDOS also provides functions for creating a new file, renaming a file, erasing a file, reading from a file, writing to a file, opening a file and closing a file. All these functions are described fully in the CP/M documentation but a few points are worth making here.

```
         LDIR              ;  copy the filename & filetype
         LD (DIRPNT),DE    ;  update pointer
         XOR A             ;  quicker then LD A,0
         LD (DE),A         ;  ensure end of table zero
         LD C,18           ;  set up search for next match
         JR GET001         ;  go back and do it
FCB:     DEFB 00           ;  find active entries only
         DEFM '???????????'
         DEFB 0,0,0,0
         DEFS 16
DIRPNT:  DEFW DIRTBL
DIRTBL:  DEFS 64 * 11
```

Fig 6 Routine for machine code programs

Firstly, you must open a file before reading or writing to it. This is not strictly correct as in some cases it isn't necessary, but it doesn't do any harm and it's a good habit to get into. Secondly, and more importantly, at the end of writing to a file you must close the file so that the disk map for that file is correctly updated.

A good analogy is a ring file with papers inside it. Before using it, whether for reading or for inserting new information, you must open the file first. Then, after you have used the file, you must close it before putting it back on the shelf.

Conclusion

Before using any of these features pass the address of the FCB on which the operation is to be performed to the BDOS. All you will need to set is the primary filename and the extension; the operating system takes care of the rest of the FCB. The exceptions to this are reading or writing to a file. In these cases you also need to set the NR byte of the FCB. This is worth remembering as there are many cases when this is what's wrong with a program — you have forgotten to set the record number. Note that you need only set this byte initially — after reading or writing a record the operating system automatically increments the NR field.

In case you are wondering how CP/M copes with files longer than 256 records (since the NR byte can have any one of 256 values), there is a byte in the FCB called the extent byte. One extent equals 256 records and in this way the system copes with very large files.

Finally, a hint about software protection. You will have noticed that when you type something in after the prompt which appears in lower case, the CCP automatically folds this back into upper case — making it impossible to use files with lower case letters or graphics codes. This is purely a function of the CCP, not of the BDOS.

END

LEISURE LINES

by J J Clessa

Quickie

If I spend one quarter of my money and give away three quarters of the remainder, I have 30p left. How much did I have to start with?

Prize Puzzle

The telephone numbers of two friends of mine are most unusual. Each number is a six-digit perfect square, the square root of which is equal to the sum of the two three-digit numbers formed if the original number is split into two halves.

To illustrate, if the number is 1 2 3 4 5 6, then $1\,2\,3\,4\,5\,6 = (123 + 456)^2$.

Can you tell me what the two telephone numbers are?

Answers, on postcards only please, to: Prize Puzzle June 1984, Leisure Lines, *PCW*, 62 Oxford Street, London W1 to reach this office not later than 30 June '84.

March prize puzzle

As frequently happens, it turns out that a solution exists of which we were unaware, so there are two solutions. They are:

1 Peter	£512	or 388.80
2 Paul & Albert	£320	or 64.80
3 Sally & Mary	£200	or 10.80
4 Michael	£125	or 1.80

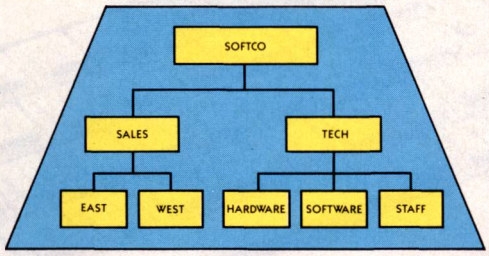
The winning entry came from P Richardson of Troon in Scotland. Well done, Mr Richardson, your prize will be with you shortly.

END

Into a world of chaos, clutter and conflict-OZ brings control!

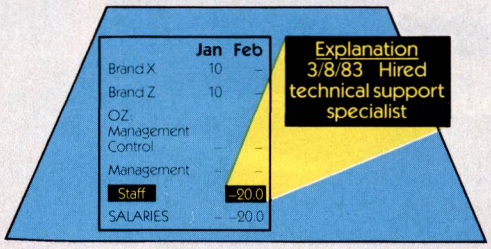
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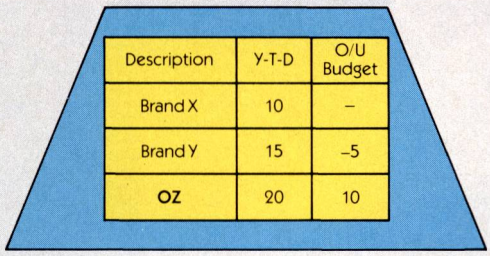
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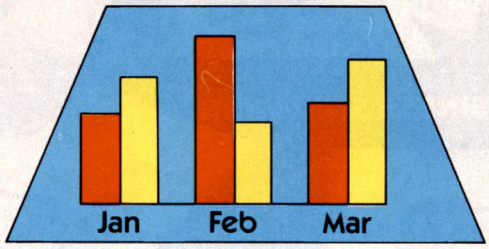
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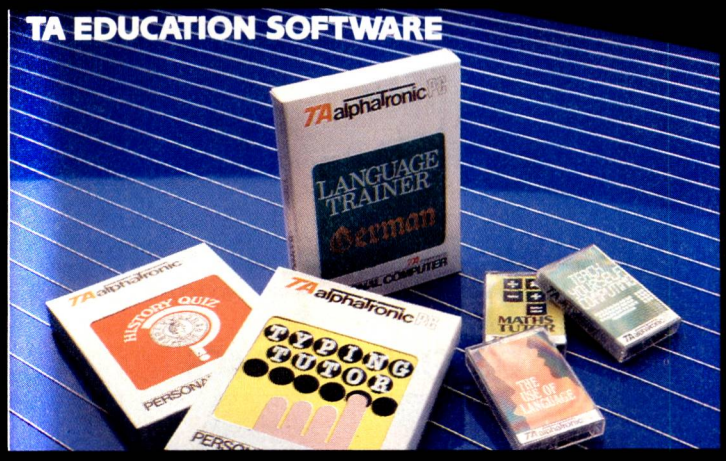
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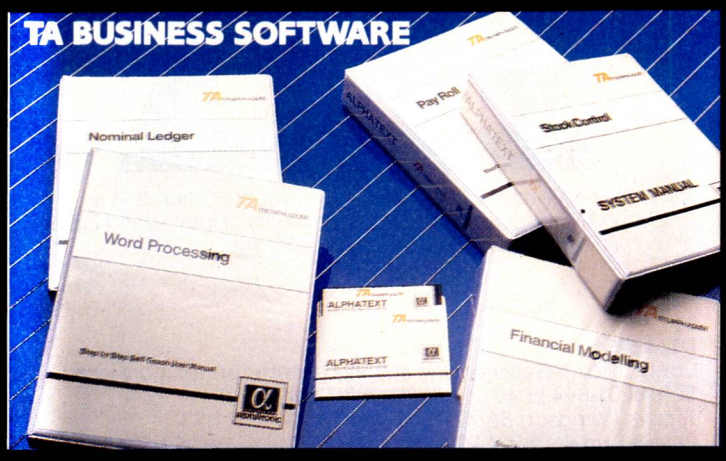
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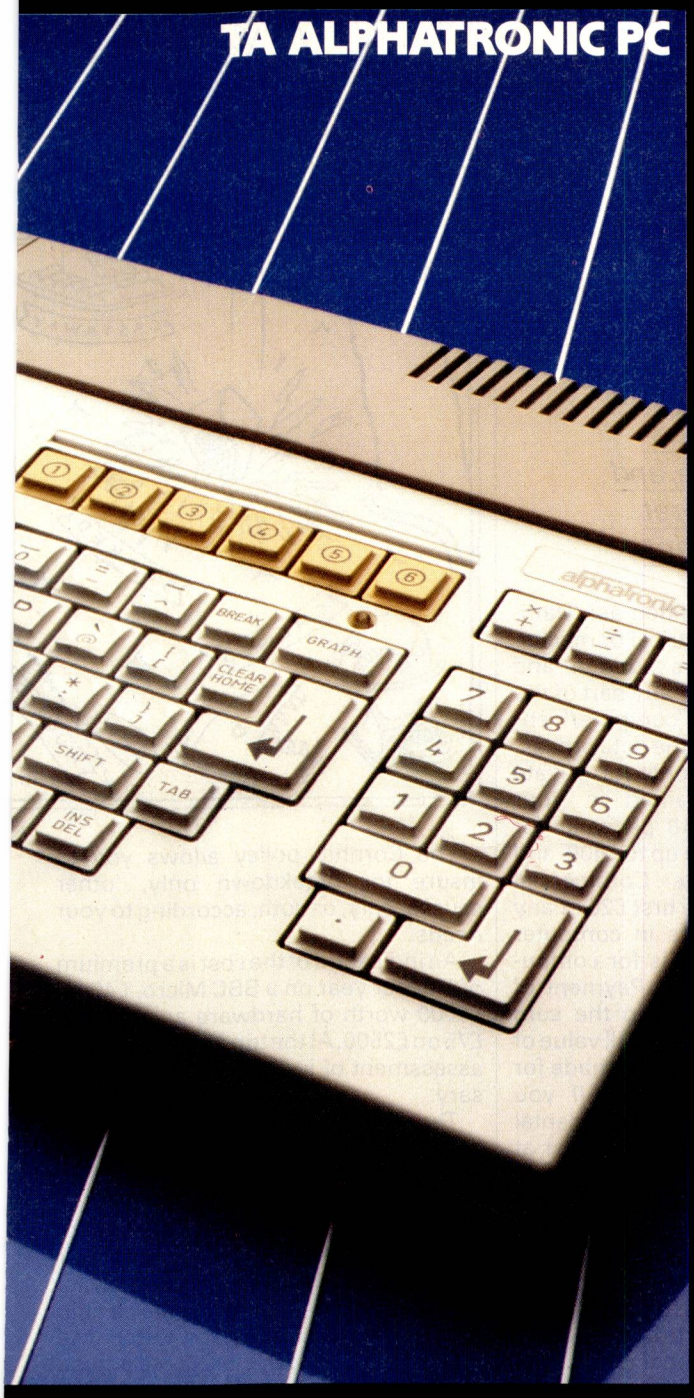
You'll benefit from the learning programs. There are cassette instruction courses on writing programs in BASIC. Other cassettes get you and your family off to a flying start into skills like typing, household budgeting, tax returns and investment management. And of course there's our own instruction and BASIC interpreter manual.

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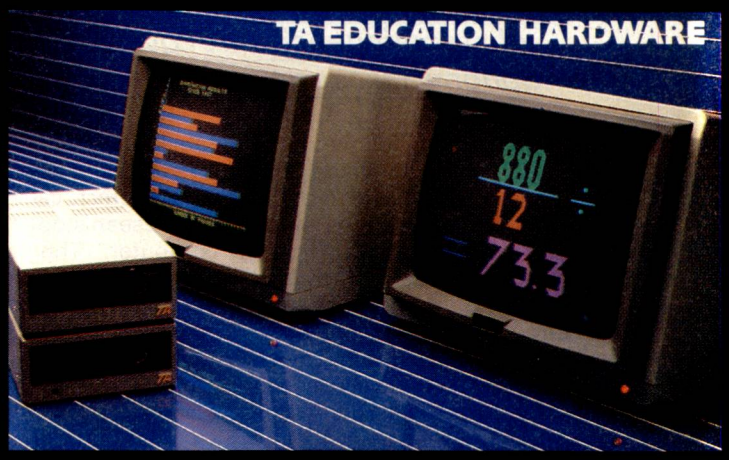
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E5

INSURANCE

Protection money

Now that you've bought your computer, whether it be for home or business use, you may be thinking about insurance. What's available, and what contingencies are covered? Margaret Spooner takes a good look at the small print.

There's an important follow-up to buying a computer — obtaining suitable insurance. Just as the type of computer you choose depends on its proposed application, the type of insurance you need depends on how and where you use the machine: whether it's an integral part of your business without which you will suffer financially; or a home computer, the absence of which will affect your leisure pursuits but not be a major disaster.

Traditionally, insurance companies geared their computer policies to large scale business needs but recently, more flexible insurance policies have become available to suit the needs of both business and home micro users.

Home computers

Let's look at the protection home users can obtain and what their special needs are. For example, what happens if you take your machine to your local computer club and it's dropped amid the jostle? A normal household contents cover will not be in force because the computer is outside your home. You may be covered by an all risks policy but these are expensive; not everyone wants to pay a heavy premium for the few occasions when their micro is away from home. There are now policies which cover these contingencies. 'The advantage of a specialised computer policy', said Geoffrey Hoodless of insurance brokers, Geoffrey Hoodless & Associates, 'is that it tends to include accidental damage and transit risks.' Cornhill Insurance has a Personal Computer Policy, and Commercial Union and Prudential Assurance both have computer policies as extensions of their household policies.

The section of Commercial Union's Key policy which deals with computers in the home provides cover against breakdown. This is defined as: 'Damage resulting from electrical or mechanical defect causing a sudden and unforeseen stoppage of any part of the computer.' The term 'computer' encompasses 'all parts of the data processing installation used only for private purposes while contained in your home.' The cost is £10 per year for computers with a value up to £400, and £2.50 per £100 thereafter. Commercial Union does not pay the first £25 of any claim (a normal excess in computer policies) and insurance is for computers valued at over £200. Payment of claims is an amount up to the sum insured, but if this is not the full value of the equipment a deduction is made for depreciation, wear and tear. If you require cover against such accidental damage as dropping the computer at your club, you need a separately underwritten clause to cover the particular conditions of use, and the premium is likely to cost £2 per £100 value.

The Cornhill Personal Computer Policy, which aims to provide flexible cover for domestic, educational and other non-business use, applies not only at your home address, but 'while temporarily removed to any other location or while in transit', at least within the UK. The policy is in two sections: a) hardware (the computer and ancillary equipment such as your cassette recorder, disk drives, printer and television screens, if they are used solely with the computer); and b) software. The hardware is covered for breakdown (except for the first £25 of the claim) and/or any other cause, such as theft, fire or accidental damage. Software, apart from the first £10 of a claim, is covered against loss or damage arising from any risk against which your hardware is insured.

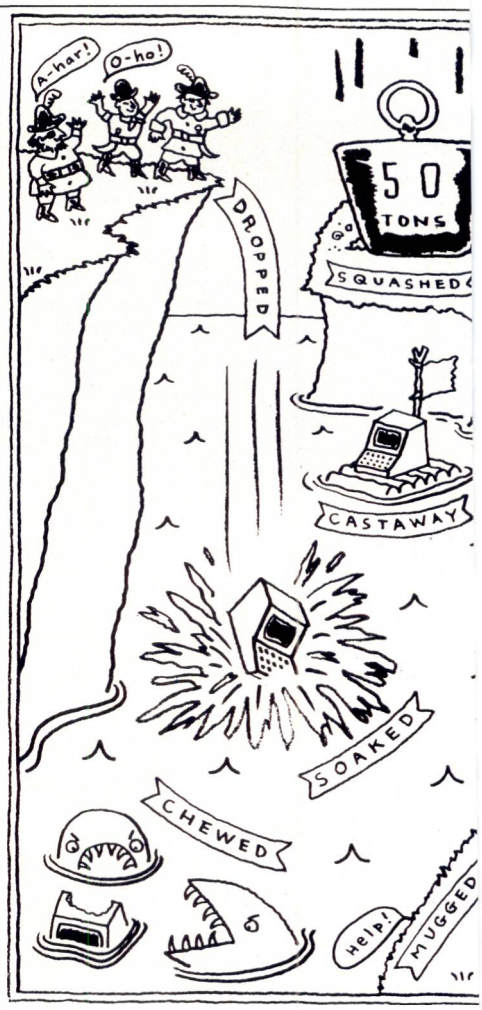


Illustration by Chris Winn

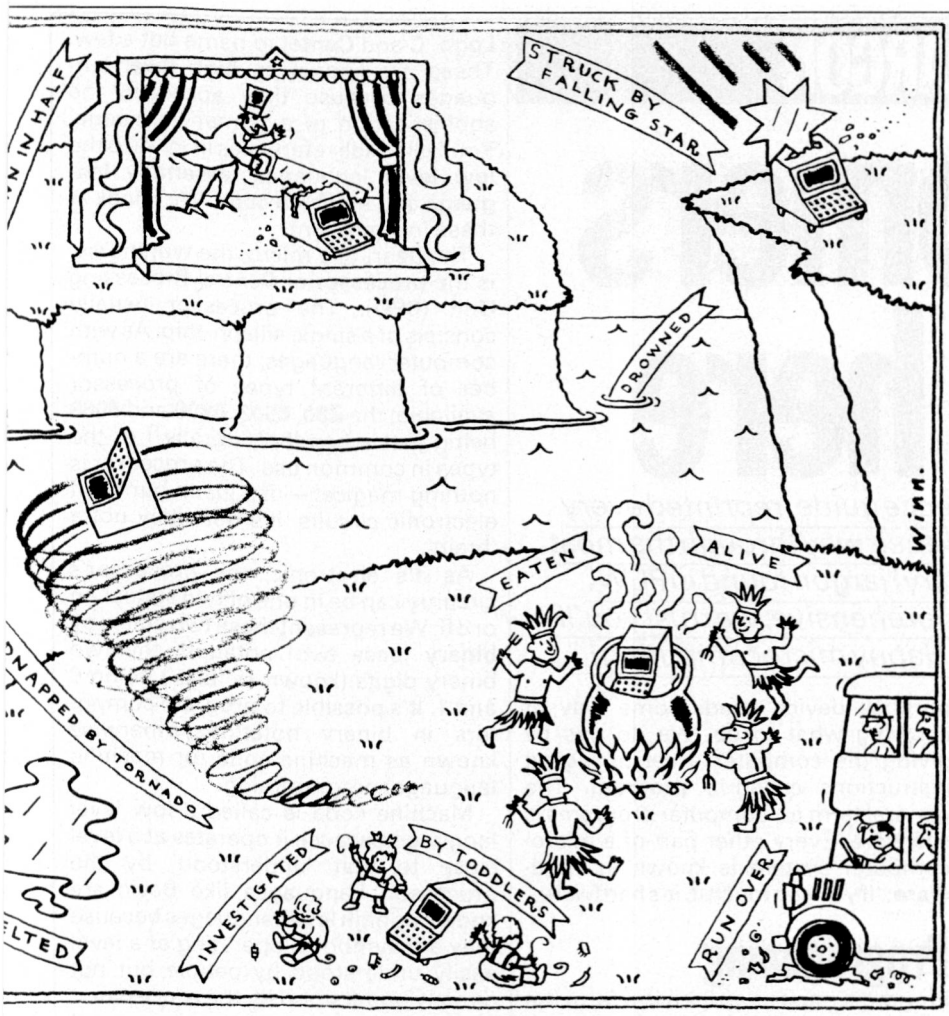
The Cornhill policy allows you to insure for breakdown only, 'other causes' only, or both, according to your needs.

An indication of the cost is a premium of £15 per year on a BBC Micro, £40 on £1000 worth of hardware and around £75 on £2500. At the top end of the scale, assessment of individual risk is necessary.

There are exclusions, of course. Colin McIntosh, assistant manager of Cornhill's engineering department, said: 'It doesn't cover wear and tear, routine replacement of circuit boards, or adjustments not involving repair or replacement of parts. For example, if a disk drive needs realignment or a chip has worked loose, it's a maintenance matter.' In some policies, these adjustments are termed 'derangement', but Cornhill prefers not to use words used in traditional policies which may cause confusion.

The fine distinction between breakdown and derangement is well illustrated in one claim mentioned by Geoffrey Hoodless. A charge of £60 was made for replacing a fuse; this was the call-out fee as opposed to the negligible cost of the fuse. If the user had breakdown cover only, he would have had to foot the bill since a new fuse is a routine replacement which is excluded. Derangement cover makes the claim valid.

Derangement caters for the type of breakdown for which there is no



obvious explanation. In one case, an intermittent fault was causing trouble. On his eighth visit, when there was still no apparent reason for the failure, the engineer asked for the usual operator to come to the machine. A buxom but short-sighted girl leant forward to view the screen, inadvertently touched the keyboard and crashed the system.

Due to of the difficulty of knowing what is or isn't excluded, Hoodless steers users towards policies which cover both derangement and breakdown, but this is more important for business users.

Policies which provide cover against derangement as well as other risks on home computers are offered by General Marine & Life Insurance Brokers. A premium of ·3% is charged on home computers for all risks anywhere in the UK with a £10 minimum premium; when breakdown and derangement cover is added, the premium on a £300 computer becomes £15, £38.20 on £1000 and £74.80 on £2500.

Business computers

A necessary clause in computer policies for business is loss of use or other consequential loss. It allows the user to hire another computer if necessary, and pays for the cost of rapidly recreating data. This usually means paying overtime or taking on extra staff temporarily, and can be the most costly part of a claim.

Peter Halsey, of Bristol-based insurance brokers Halsey & Company, cited one claim for consequential loss where the cost of remedying the breakdown was £300 against £2700 for re-entering data. 'This was the cost for a number of people working on Saturday, Sunday and evenings in order that a rush job could be completed. It was finished — not quite on time, but very soon after the deadline.'

Another claim for consequential loss arose when a user drove past a power station with disks in the boot of his car. The magnetic field surrounding the power station was strong enough to destroy the disks.

In 1981, Halsey & Company decided to specialise in the needs of computer users, and formulated its Datacover policy to cover breakdown, all risks and additional expenses. Halsey said: 'We researched the whole insurance market and, from the companies providing computer insurance, selected those giving the best terms. We have negotiated out of our policy the wear and tear clause for equipment less than five years old.' He believes the policy has been successful because: 'significant savings are achieved by comparison with the cost of a full maintenance agreement. The customer is free to choose his own repairer, and Datacover enjoys exclusive policy wordings not enjoyed elsewhere.'

The cost of insuring £3000 worth of equipment using Datacover is £131 per year, whereas maintenance contracts usually cost 10-15 per cent of the hardware value. However, maintenance services contract to answer a call within a specified number of hours. To match this service, Halsey said: 'Dealers are selling a Datacover policy to the client combined with a response retainer service.'

Halsey & Company has also created Dealercover, which is aimed at the specific needs of dealers who take equipment to exhibition halls and hotels for demonstrations. There are special Datacover rates for hardware costing less than £1000. 'It is still a Datacover policy but less sophisticated, providing all risks and breakdown insurance.' The cost for equipment up to £500 is £35.60 per year, up to £700 is £45.30.

General Marine & Life Assurance Brokers offers policies for business along similar lines to its home computer cover, with a minimum all risks premium of £25 at a rate of between ·5% and ·75%, according to risk. For breakdown, loss of use and derangement, the quote on a £3000 computer is £90-£100.

Period of remuneration

As anyone who has ever had a car accident or burglary knows, it can take some time for the claim to be settled. What if you're faced with a substantial bill? Halsey says the following sequence applies: the repairer allows 28 days for settlement of his bill; if you send the bill to Halsey & Company immediately, it will be settled within 14-21 days, so you will receive a cheque within the 28 day limit.

If a maintenance contract or warranty is in force, insurance companies only pay for the additional risks which are not part of the maintenance agreement. The cost of a business premium depends partly on whether the hardware is the subject of a maintenance contract.

In general, the cost of business insurance varies according to the risk — where the business is, whether it's a small shop or large office, and how secure the premises are. Most insurance companies regard it as a matter for individual underwriting.

Conclusion

It is essential to read the policy wording thoroughly, paying particular attention to the exclusions. Make sure that everything you need is covered and if you have any doubts, check with the insurance company and let it know exactly when, where and why you will use your equipment and which risks you wish to be covered against.

Policies can be geared to your particular needs, but as with any insurance, the greater the risk the higher the premium.

END

MICRO JARGON

Newcomers start here

This is our unique quick-reference guide, reprinted every month, to help our readers pick their way through the most important pieces of (necessary) jargon found in PCW. While it's in no way totally comprehensive, we trust you'll find it a useful introduction. Happy microcomputing!

Probably the first thing you noticed on picking up this magazine for the first time was the enormous amount of unintelligible-looking jargon. In the words of *The Hitch-hiker's Guide to the Galaxy:* Don't panic! Baffling as it may sound, the jargon does actually serve a useful purpose. It's a lot easier to say VDU, for example, than 'the screen on which the computer's output is displayed.' This guide is intended to help you find your way around some of the more common 'buzzwords' you're likely to come across in the pages of *PCW*.

For those completely new to computing, let's start with the question: What is a microcomputer? We can think of a micro as: a general-purpose device in contrast to a typewriter, which can only be used for typing; a calculator, for performing calculations; a filing cabinet, for filing information, to name just a few of its functions. A micro can do all these things and more.

If it's to be of any use, a general-purpose device needs some way of knowing what to do. We do this by giving the computer a set of logical instructions called a **program**. The general term for computer programs is **software**. Every other part of a microcomputer system is known as **hardware**: 'If you can touch it, it's hardware.'

Programming

Programs must be written in a form the micro can recognise and act on — this is achieved by writing the instructions in a **code** known as a **computer language**. There are literally hundreds of different languages around, the most popular of these being **Basic**. Basic is an acronym of **B**eginners' **A**ll-purpose **S**ymbolic **I**nstruction **C**ode. Although originally intended as a simple introductory language, Basic is now a powerful and widely used language in its own right.

Other languages you're likely to come across in *PCW* are **Forth, Pascal, Logo, C** and **Comal** to name but a few. These are known as **high level** languages because they approach the sophistication of a human language. You'll also see references in *PCW* to the **low level** languages, **assembly language** and **machine code**. We'll look at these in a moment.

The heart of a micro, the workhorse, is the **processor** or **C**entral **P**rocessing **U**nit (**CPU**). The processor usually consists of a single silicon chip. As with computer languages, there are a number of different types of processor available, the **Z80, 6502, 6800** and **8088** being just a handful (literally!) of the types in common use. The processor is nothing magical — it's just a bunch of electronic circuits. It's definitely not a 'brain'.

As it's electronic, the processor's circuitry can be in one of two states: on or off. We represent these two states by **binary** (base two) notation, the two binary digits (known as **'bits'**) being 0 and 1. It's possible to program computers in binary notation, otherwise known as machine code (or machine language) programming.

Machine code is called a low level language because it operates at a level close to that 'understood' by the processor. Languages like Basic are known as high level languages because they are symbolic, operating at a level easily understood by people but not directly understood by the processor.

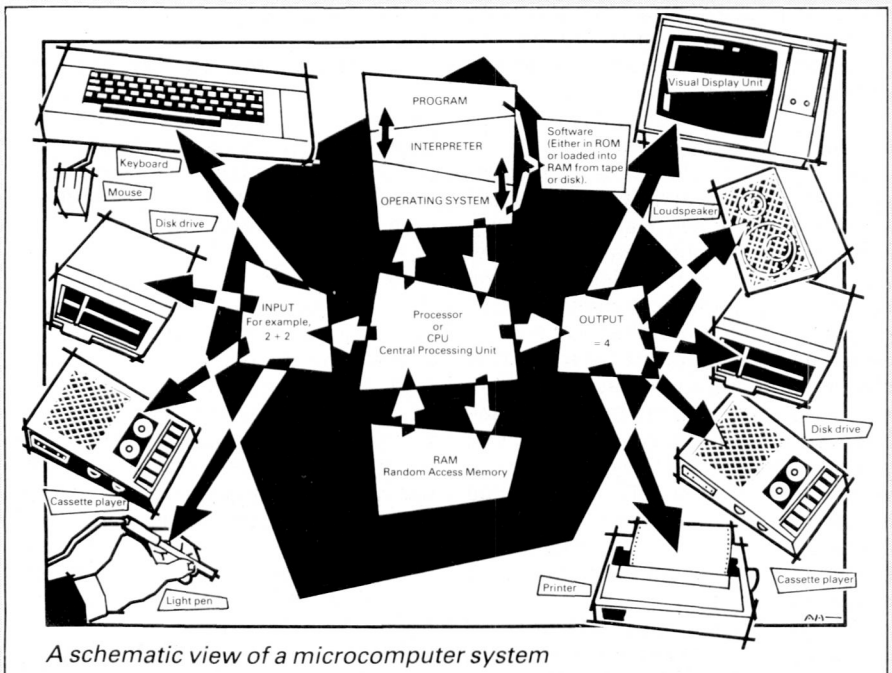
Between high level languages and machine code is a low level language known as assembly language or, colloquially, **assembler**. This is a mnemonic code using symbols which the processor can quickly convert to machine code.

Since everything has to be converted into binary form before the processor can make sense of it, we need some sort of code to represent each character to be processed by the computer. In order to simplify communication between computers, a number of standard codes have been agreed on. The most widely used of these codes is the **A**merican **S**tandard **C**ode for **I**nformation **I**nterchange, **ASCII**. This system assigns each character a decimal number which the processor can then convert to its binary equivalent.

A program written in a high level language must be converted into binary before the processor can carry out its instructions. We could of course do this manually, but since this is exactly the sort of tedious job computers were designed to do for us, it makes much more sense to write a program to do it.

There are two types of program to do this translation for us.

The first of these is a **compiler** which translates our whole program permanently into machine code. When we **compile** a program, the original high level language version is called the **source code** while the compiled copy is called the **object code**. Compiled programs are fast to run but hard to edit. If



A schematic view of a microcomputer system

Illustration by Tony Hannaford

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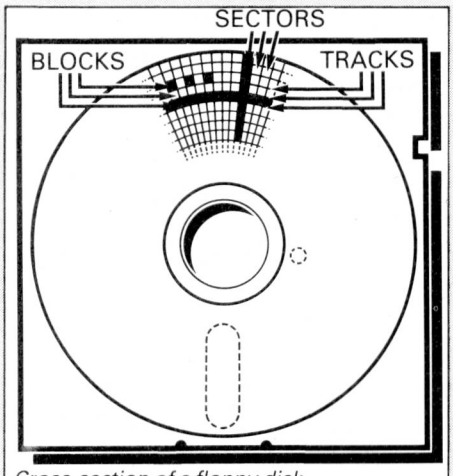
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we want to change a compiled program, we either have to edit it in machine code (extremely difficult) or we have to go back to a copy of the source code. For this reason there is a second translation program: an **interpreter.** An interpreter waits until we actually **run** (use) the program, then translates one line at a time into machine code — leaving the program in its original high level



Cross-section of a floppy disk

language. This makes it slower to run than a compiled program, but easier to edit.

There are two unusual Basic words you're likely to come across: **POKE** and **PEEK**. When you program in a high level language, you are normally unable to choose in which part of the machine's memory the processor will store things. This makes programming easier as you don't need to worry about memory locations, but slows down the program since the processor has to 'look up' addresses for you. Using the POKE command, however, you can 'poke' a value directly into a desired memory address. 'POKE 10000,56', for example, puts the value 56 into memory location 10000. PEEK allows you to examine the content of a particular memory address. If you were to follow the above poke with 'PEEK (10000)', the computer would respond by displaying the value 56. POKEing and PEEKing is normally done to increase program speed, but may also allow us to do things which could not be done through Basic.

Memory

So far, we have a processor and a program. Since a computer needs somewhere to store programs and data, it needs some kind of **memory.** There are two types of memory: **Read Only Memory (ROM)** and the badly-named **Random Access Memory (RAM).** ROM is so-called because the processor can 'read' (get things out of) its contents, but is unable to 'write to' (put things in) it.

ROM is used to store **firmware,** the name given to software permanently available on the machine. An interpreter is a typical example of firmware (stick with it: it gets easier!).

RAM differs from ROM in two important ways. Firstly, you can write to it as well as read from it. This means that the processor can use it to store both the program it is running and **data** (information). The second important difference is that RAM needs a constant power supply to retain its contents: as soon as you switch the computer off, you lose your program and data.

There is a type of RAM, known as **CMOS RAM,** which requires only a tiny amount of power to retain its contents. This is found in portable computers like the Tandy 100 and the Gavilan MC. It is usually powered by small ni-cad batteries so that programs and data are retained even when the main power is switched off. At present, CMOS RAM is extremely expensive and is not likely to be used in desktop machines for a little while yet. (CMOS stands for **C**omplementary **M**etal **O**xide **S**emiconductor).

Memory is described in terms of the number of characters we can store in it. Each character is represented by an 8 bit binary number. 8 bits make one **byte** and 1024 bytes make one **Kilobyte** or **1k**. 32k, for example, means that the computer can store about 32000 characters in its memory. If 1024 sounds like an odd number, remember that everything is based on the binary system, thus 1,2,4,8,16 . . . 1024 being the nearest binary multiple to 1000.

While we're on the subject of bits, you'll often see computers and their processors described in terms of their **bit power**: **8-bit, 16-bit, 32:16-bit** and so on. This is a means of describing how large a binary number the processor can handle in one chunk. A binary number, incidentally, is known — confusingly — as a **word**. An 8-bit processor, for example, can handle 8-bit words, that is, up to 11111111 (255 in decimal). Anything larger than this has to be broken down into manageable chunks before it can be processed.

A 16-bit machine can handle bigger chunks of data at a time. This means it can handle ('**address**') larger amounts of memory at one time. This is why most 8-bit machines have a maximum of 64k RAM while 16-bit micros usually have 128k upwards.

As 16-bit processors can handle larger words than an 8-bit machine, they ought to be twice as fast. In practice, however, there is a little more to it than that. While it may take a 16-bit machine half as long to work out that 2+2=4, the actual processing is only part of the story.

The result of the calculation has to be placed into the appropriate memory location, passed to the screen or whatever is required. The transfers to and from the processor are often made in 8-bit form; this is why you'll hear people arguing that certain processors are not 'true' 16-bit. If the problem has to be handed to the processor in 8-bit form, turned into 16-bit, calculated and then the result turned back into 8-bit for transfer elsewhere, there may be little or no saving in time over an 8-bit system.

The other factor affecting speed is that the actual processing may form only a small part of the overall operation. A word processor, for example, spends most of its time passing files to and from disk and waiting for the user to type the next character. The processing itself consumes very little time. And if you look at the Benchmarks summary (*PCW*, December 1983, pp. 238-241), you'll see some 8-bit machines beating their 16-bit rivals — even in processor-bound operations like the *PCW* Benchmarks.

Returning to the subject of RAM for a moment, a word of warning: Don't rush out with your new-found understanding to buy the machine offering you the most RAM for your money. Quite aside from the fact that the amount of RAM is by no means the only consideration when buying a micro (no matter how much manufacturers may stress it), different machines use differing amounts of RAM for things like graphics. Always check how much RAM is actually available to the user for program storage. Machines which proudly proclaim '64k' may well leave you with less than half of this in which to store Basic programs and data.

Back up storage

There are numerous forms of **permanent** or **back up storage,** but by far the most common are **floppy disk, floppy tape** and **cassette.**

Floppy disks or diskettes are circular pieces of thin plastic coated with a magnetic recording surface similar to that of tapes. The disk, which is enclosed in a protective card cover, is placed in a **disk drive.** Disk drives comprise a high-speed motor to rotate the disk and a **read/write head** to record and 'play back' programs and data.

The disk is divided into concentric rings called **tracks** (similar to the tracks on an LP) which are in turn divided into small **blocks** by spoke-like divisions called **sectors.**

There are two methods for dividing the disk into sectors. One method is called **hard sectoring**, where holes punched in the disk mark the sectors, and the other is **soft sectoring** where the sectors are marked magnetically. The reason that disks from one machine can't be read by a different make is that each manufacturer has its own way of dividing up the disk. Recently, however, manufacturers have apparently begun to acknowledge

that this situation can't go on forever, and they are working on making their disks compatible.

Since the computer needs some way of organising the disk, we have a program called a **Disk Operating System (DOS)**, usually known simply as the **Operating System (OS)**. The operating system does all the 'housekeeping' of the disks, working out where to put things, letting the user know what is on the disk, copying from one disk to another and so on. As you might expect by now, there are lots of different operating systems available, each with its own advantages and disadvantages. The three most popular OSs are **CP/M** (**C**ontrol **P**rogram for **M**icros), **MS-DOS** (**M**icro**S**oft **D**isk **O**perating **S**ystem) and **PC-DOS** (**P**ersonal **C**omputer **D**isk **O**perating **S**ystem). MS-DOS and PC-DOS, incidentally, are all but identical.

Disks can support what are known as **random access files**. That is, you can randomly choose a point in a file and the drive head will move directly to that point. You can then edit the file, and only the blocks affected will be rewritten. The rest of the file remains unchanged.

Floppy disks provide a reasonably fast and efficient form of secondary storage and are cost-effective for business machines. For home computers, however, the usual form of program and data storage is on ordinary cassette tape using a standard cassette recorder. This method of storage is slow and unreliable, but is very cheap and adequate for games, for example.

Cassettes can support only **serial access files**. That is, whenever a file is to be edited, the whole file must be written back to the tape. This makes certain applications — word processing being a prime example — extremely tedious.

Floppy tape drives are a compromise between speed and cost. They use a small continuous loop tape which, like a disk, is divided into blocks. Floppy tape drives rely on serial access files, but by rotating the tape at high speed and using the block markers, they can simulate random access files. The Sinclair Microdrive is a floppy tape drive.

Another type of disk you'll see referred to is the **hard disk**. This is an extremely efficient method of storing large amounts of data. Hard disk capacity generally starts at around 10**Mbytes** (10 million bytes) and rises to . . . well, you name it. Besides offering a much greater capacity than floppies, hard disks are more reliable and considerably faster. They are, however, much more expensive than floppy drives.

Input/output

Since computers need some way of communicating with the outside world, we need **input** and **output** devices. Input and output devices include all manner of things from hard disk units to light pens, but the minimum requirement for most applications is a typewriter-style **keyboard** for input and a TV-like **Visual Display Unit** for output. The Visual Display Unit is variously referred to as a **VDU, Cathode Ray Tube (CRT)** and **monitor**.

The various component parts of a computer system (processor, keyboard, VDU, disk drives, and so on, may all be built into a single unit or they may be separate, connected by cables.

Take this paragraph slowly and it will make sense! When a computer communicates with an outside device, be it a printer or another computer, it does so in one of two forms — **parallel** or **serial**. Parallel **input/output (I/O)** requires a number of parallel wires. Each wire carries one bit, so with eight wires we can transmit/receive information one byte at a time (8 bits = one byte, remember). Serial 1/0, in contrast, uses a single wire to transmit a series of bits one at a time (that's why it's called serial), with extra bits to mark the beginning and end of each byte.

To enable different devices to communicate with each other in this way, standards have been agreed for different **interfaces**. An interface is simply a piece of circuitry used to connect two or more devices. The most common stardard serial interface is the **RS232** (or **V24**) while the Centronics standard is popular for parallel interfaces.

Networks

When two computers want to communicate with each other over a distance, there are again two ways of doing it (nothing is ever clear-cut in the world of micros — you'll get used to it). Both methods use the public phone network. The first is known as an **acoustic coupler**. This simply plugs into your computer, and has a receptacle into which you place your telephone handset. The acoustic coupler is convenient in that you can unplug it from one computer and plug it into another one in a matter of seconds. They are generally slow, however, and prone to interference.

The alternative method is to use a **modem**. Unlike an acoustic coupler, a modem is wired into the telephone system and you should get permission for this from British Telecom.

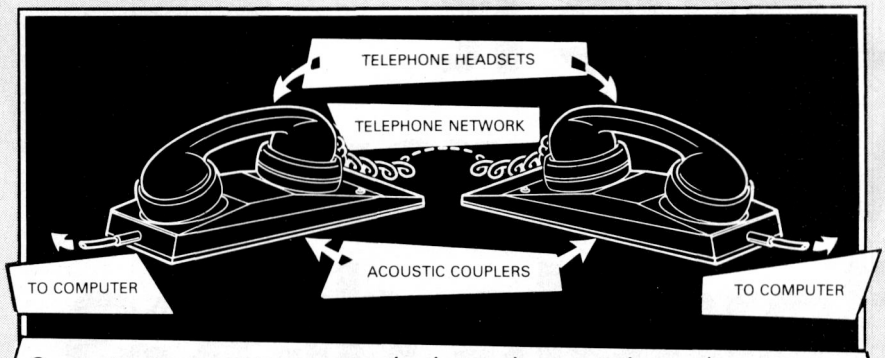
A term you'll hear used in connection with acoustic couplers and modems is **baud rate**. The baud rate is a measure of the speed at which a device can transmit and receive data. You can safely think of the baud rate as being bits-per-second, though the accurate definition is a little more complex. Therefore, a 300-baud modem can transmit/receive data at the rate of 300 bits (about 50 characters) per second.

A 1200/75 modem means that it receives at 1200 baud but transmits at 75. Most modems are 1200/75 and acoustic couplers 300/300. By way of comparison, saving programs to cassette is normally done at between 300 and 1500 baud.

Finally, communications between computers is either **full** or **half duplex**. Full duplex is when the machine receiving the data echoes it back to the machine transmitting it and says 'This is what I think you said — is that right?'. If it's wrong, the section will be transmitted again. Half duplex is where no checking is made. If you're ever unsure of which to use, start with full duplex. If everything you type appears on your display twice, then you should switch to half duplex.

Database

A database allows you to store, process and report on structured information. Most of the cheaper packages are based on a traditional card index where each card about an individual, order or item of stock is stored in a single record and a group of like records is stored in a file (corresponding to the index card box). Sophisticated packages can relate several files together, so that you can process groups of dissimilar but related records.



Computer-to-computer communications using acoustic couplers.

Spreadsheet

Spreadsheet software is useful to anyone who regularly uses a calculator. The VDU acts like a 'window' on a large sheet of numbers — neatly laid out in rows and columns, occasionally interspersed with text headings. The user is able to shift the window to the point of interest and so enter text. The rest of the calculation is displayed immediately with automatic recalculations throughout. END

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As supplied by the ACC, here's a list of User Groups throughout the UK and Eire. Any alterations or additions should be sent to ACC, c/o Rupert Steele, 17 Lawrie Park Crescent, London SE26 6HH

S Yorks Personal Computer Group. Contact: Paul Sanderson, 8 Vernon Road, Totley, Sheffield, South Yorks S17 3QE. Tel: (0742) 351895.

British TI Users Club. Contact: Philip Rowley, 2 Woodside Crescent, Clayton, Newcastle-under-Lyme, Staffordshire ST5 4BW.

Abacus. Contact: Les Ellington, 18 Underwood Close, Parkside, Stafford, Staffs. Tel: (0785) 41153.

ICPUG (Staffordshire), 57 Clough Hall Road, Kidsgrove, Stoke-on-Trent, Staffs.

Pot-Bug (BBC group). Contact: Mike Forster, 8 St Georges Prave, Hugh Lane, Burslem, Stoke-on-Trent, Staffs. Tel: (0782) 818499.

ICL Birmingham Micro-Club, c/o WBA Ecclestone, 26 Browns Lane, Tamworth, Staffs.

Tame Computer Club. Contact: Bob Overton, 57 Maitland, Glascote Heath, Tamworth, Staffs B79 8JG. Tel: (0827) 53473.

Wolverhampton Sinclair User Group, c/o Ounsdale School, Wombourne, Wolverhampton, Staffs.

Central Scotland Computer Club. Contact: James Lyon, 78 Slamannan Road, Falkirk, Stirling FK1 5NF. Tel: (0324) 22430.

Strathclyde Computer Club. Contact: B Duffy, 24 Lomond Drive, Condorrat, Cumbernauld, Strathclyde. Tel: (02367) 33800.

ICPUG (Bury St Edmunds). Contact: Alan Morris, 30 Kelso Road, Bury St Edmunds, Suffolk. Tel: (0284) 61870.

Suffolk Microcomputer Club. Contact: Adrian L Theobald, 42 Newbury Road, Ipswich, Suffolk IP4 5EX.

ZX Amateur Radio User Group. Contact: Paul Newman, 3 Red House Lane, Leiston, Suffolk IP16 4JZ.

Newmarket Home Computer Group. Contact: John Smyth, 5 New River Green, Exning, Newmarket, Suffolk. Tel: (063 877) 8100.

TRS80 Colchester User Group. Contact: E C Kilpatrick, 3a Gainsborough Street, Sudbury, Suffolk CO10 6ET. Tel: (0787) 79504.

Ashtead Computer Club. Contact: P G Palmer, 8 Corfe Close, Ashtead, Surrey. Tel: Ashtead 77418.

Ashtead User Group (Apple). Contact: M Lawrence, 15 Petters Road, Ashtead, Surrey. Tel: Ashtead 73906.

Thames Valley ACC. Contact: Brian Quarm, 25 Roundway, Camberley, Surrey GU15 1NR. Tel: Staines 51388 Ext 253 (day).

Sumps. Contact: Mike Patrick, 28 West Drive, Cheam, Surrey. Tel: (01) 642 8362.

Deaf Microcomputer Users Group. Contact: Chris Marsh, 3 Delaporte Close, Epsom, Surrey KT17 4AF.

Ewell Micro Club. Contact: Dave De Silva, 316 Kingston Road, Ewell Surrey KT19 0SU. Tel: (01) 393 1469.

Farnham Computer Club. Contact: Adam Sharp, 14 Thorn Road, Boundstone, Farnham, Surrey.

Guildford Micro Users Group. Contact: Mr M Bawtree, Royal Grammar School, Guildford, Surrey GU1 3BB. Tel: Guildford 502424.

Guilford ZX Users Group. Contact: A Bond, 54 Farnham Road, Guildford, Surrey GU2 5PE. Tel: Guildford 62035.

West Surrey Computer Club. Contact: Chris Karney, c/o Paddock Room, Green Man, Burpham, Guildford, Surrey. Tel: (0483) 68121 ext 497.

Kingston Computer Club. Contact: Clive Robinson, c/o Kingston Library, Kingston, Surrey. Tel: (01) 398 3580 (before 8am).

ZX80/ZX81 Users Club. Contact: David Blagden, PO Box 159, Kingston-upon-Thames, Surrey KT2 5UQ.

TI 99/4 User Group. Contact: P M Dicks, 157 Bishopsford Road, Morden, Surrey SM4. Tel: (01) 640 7503.

Croydon Micro Computer Club. Contact: Paul Chick, 107 Selsdon Park Road, Selsdon, South Croydon, Surrey. Tel: (01) 657 8127.

NILUG. Contact: Robert B Poate, 53 Kingswood Avenue, Sanderstead, South Croydon, Surrey CR2 9DQ.

CBBS-London. Contact: P Goldmann, PO Box 100a, Surbiton, Surrey KT5 8HY.

Sutton Library Computer Club. Contact: David Wilkins, 22 Chestnut Court, Mulgrave Road, Sutton, Surrey SM2 6LR. Tel: (01) 642 3102 (evenings).

ACE. Contact: A P Miles, 8 Cosdach Avenue, Wallington, Surrey SM6 9RA. Tel: (01) 647 1713.

Wallington Computer Club. Contact: Doug Mynett, 15 Sandy Lane South, Wallington, Surrey. Tel: (01) 647 2857.

Elmbridge Computer Club. Contact: Hilary Osmend, 29 Esher Avenue, Walton-on-Thames, Surrey KT12 3SZ.

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Worcester Park Computer Club, Windsor Road Library, Worcester Park, Surrey. Tel: (01) 337 1609.

Bognor Computer Group. Contact: Mike Beach, 48 Hillsboro Road, Bognor Regis, Sussex.

Jupiter Ace Users Club, Remsoft, 18 George Street, Brighton, Sussex BN2 1HR. Tel: (0273) 602354.

Newbrain User Group Brighton. Contact: J Hudson, 6 Swanborough Place, Whitehawk, Brighton, Sussex.

Tandy Model 100 Users Club, Remsoft, 18 George Street, Brighton, Sussex BN2 1RH. Tel: (0273) 602354.

CVGC Video Games Club. Contact: G Bond, 7 Swift Lane, Langley Green, Crawley, Sussex.

PET User Group (Crawley). Contact: Richard Dyer, 33 Parham Road, Ifield, Crawley, Sussex RH11 0ET.

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Eastbourne Computer Club. Contact: R L Cooke, 22 Selwyn Road, Eastbourne, Sussex. Tel: (0323) 51437.

Brighton Area ACC. Contact: G M Dinnage, Flat 3, 29 St Aubyns, Hove, Sussex.

Brighton & Hove Computer Club. Contact: J Smith, 29 St Aubyns, Hove, Sussex BN3 2TH.

West Sussex Micro Club. Contact: J M Clarke, 31 Hyde Heath Court, Pound Hill, Sussex. Tel: (0293) 884207.

Worthing & Dist Micro Club. Contact: B J Thomas, 11 Gannon Road, Worthing, Sussex BN11 2DT. Tel: (0903) 36785.

Swansea & Southwest Wales ACC. Contact: Paul Griffiths, 1 Prescelli Road, Penlan, Swansea SA5 8AF. Tel: (0792) 583897.

Kingsway ACC. Contact: C Macleod, Flat 3a, 101 Peddie Street, Dundee, Tayside. Tel: (0382) 819021 (college).

NPCS. Contact: Pete Scargill, 21 Percy Park, Tynemouth, Newcastle-upon-Tyne, Tyne & Wear. Tel: (0632) 573905.

NE RML 380Z Users Group. Contact: M Hatfield, Computer Unit, The Polytechnic, Newcastle-upon-Tyne, Tyne & Wear NE1 8ST. Tel: (0632) 26002 ext 268 (office).

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Balsall Heath Computer Club. Contact: Dennis Pain, 12 Cannon

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Salisbury BBC User Group. Contact: Dr J A Lack, The River House, Coombe Bissett, Salisbury, Wiltshire SP5 4LX. Tel: Coombe Bissett 303.

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ICPUG (Stourport-on-Severn). Contact: M J Merriman, 12 York Street, Stourport-on-Severn, Worcs.

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Amateur Radio & Computer Club. Contact: Officer I/C, Royal Air Force, Gutersloh, BFPO 47.

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Forum-80 London. Contact: Leon Jay. Tel: (01) 286 6207.

Forum-80 Wembley. Contact: Victor Saleh. Tel: (01) 902 2546.

Met Police ACC. Contact: S Farley. Tel: (01) 725 2428.

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Kemnay Computer Club. Contact: S J Stubbs, 15 The Glebe, Kemnay, Inverurie, Aberdeenshire. Tel: Kemnay 3070.

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Brunel Computer Club. Contact: Mr R Sampson, 4 The Coots, Stockwood, Avon.

Tangerine Homebrew. Contact: A C L Coates, 35 Mogg Street, St Werburghs, Bristol, Avon BS2 9UB.

Brunel Tech Computing Club. Contact: S W Rabone, 18 Castle Road, Worle, Weston-Super-Mare, Avon BS22 GJW. Tel: (0934) 513068.

Tangerine Users Group. Contact: Bob Green. 1 Marlborough Drive, Worle, Avon BS22 0DQ. Tel: (0934) 21315.

ICPUG (Ayr). Contact: John Shankland, 2 Strathdoon Place, Ayr, Ayrshire.

ICPUG (Kilmarnock). Contact: John Smith, 19 Brewlands Road, Symington, Kilmarnock, Ayrshire KA1 5RW. Tel: (0563) 83047.

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6502 Users Club. Contact: Walter Wallenborn, 21 Argyll Avenue, Luton, Bedfordshire LU3 1EG. Tel: (0582) 2697.

Cosmac Users Club. Contact: James Cunningham, 7 Harrowden Court, Harrowden Road, Luton, Bedfordshire LU2 0SR. Tel: (0582) 423934.

Chiltern Home Computer Club. Contact: Stephen Betts, 42 Walace Drive, Eaton Bray, Beds LU6 2DF. Tel: (0525) 220922.

Flitwick Computer Club. Contact: J Rodger, 5 Longleat Close, Flitwick, Beds MK45 1SX. Tel: (0525) 712011

Dragons Den. Contact: D Buckingham, 83 Neville Road, Limbury, Luton, Beds.

Luton Computer Club. Contact: J P Fletcher, 1 Trowbridge Gardens, Luton, Beds LU2 7JY.

Bangor Computer Club. Contact: Derek Blanc, c/o Queens University, Belfast, Northern Ireland.

77/68 Users Group. 40 Bartholomew Street, Newbury, Berks. Tel: (0635) 30505

Decus UK & Ireland. Contact: Tracey Pardoe, DECUS, PO Box 53, Reading, Berks RG2 0TW.

ICPUG (Slough). Contact: Brian Jones, Dept of Maths & Computing, Slough College, Slough, Berks. Tel: Slough 34585 ext 81.

LASERBUG. Contact: Paul Barbour, 10 Dawley Ride, Colnbrook, Slough, Berks SL3 0QH. Tel: (02812) 3064.

Plessey Taplow Micro Club. Contact: B M Stephens, Taplow Court, Taplow, Berks. Tel: Maidenhead 23351.

Nascom Thames Valley UG. Contact: Mike Rothery, 37 Eton Wick Road, Eton Wick, Windsor, Berks. Tel: Windsor 56106.

Berkley Nuclear Labs. Contact: Neil Walker, CEGB, 53 Woolfridge Ride, Alveston, Bristol BS12 2PR. Tel: (0454) 414262.

BAUD. Contact: Geoff Smythe, Datalink Micro Systems Ltd, 10 Waring House, Redcliffe Hill, Bristol BS1 6TB. Tel: (0272) 213427.

Int. Nascon Micro Club. Contact: 80 Oakfield Corner, Sycamore Road,

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PDP8 Users Group. Contact: Nigel Dunn, 21 Campion Road, Widmer End, High Wycombe, Buckinghamshire. Tel: (0494) 714483.

Aylesbury Computer Club. Contact: Ken Knight, 22 Mount Street, Aylesbury, Bucks HP20 2SE. Tel: (0296) 5181.

Chiltern Microcomputer Club. Contact: W Tibbitts, Ellwood, Deanway, Chalfont St Giles, Bucks.

Gerrards Cross Computer Club. Contact: The Secretary, 59 Dukes Wood Drive, Gerrards Cross, Bucks.

FX500-P Users Association. Contact: Max Francis, 38 Grymsdyke, Great Missenden, Bucks HP16 0LP.

British Airways Computer Club. Contact: Colin Seymour, 36 Hunters Hill, High Wycombe, Bucks HP13 7EW.

Wycombe Area Micro Society. Contact: K Arnold, 32 The Pastures, High Wycombe, Bucks.

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Apple Group. Contact: Steve Proffitt, The Granary, Hill Farm Road, Marlow Bottom, Bucks. Tel: (01) 759 5511 ext 7298 (day).

Nat TRS-80 & Genie Users Group. Contact: Brian Pain, 24 Oxford Street, Stony Stratford, Milton Keynes, Bucks. Tel: (0908) 564271.

80-NET. Contact: Leon Heller and Brian Pain, 8 Morris Walk, Newport Pagnell, Bucks MK16 8QD. Tel: (0908) 566660.

Milton Keynes Micro Users Group. Contact: Leon Heller, 8 Morris Walk, Newport Pagnell, Bucks, MK16 8QD. Tel: (0908) 613004.

Dragon 32 Users Group Slough. Contact: P R Griffin, 1 Garrard Road, Slough, Bucks. Tel: Slough 35268.

Haverhill Microcomputer Club. Contact: Andrew Holliman, 5 Trinity Close, Balsham, Cambs CB1 6DW. Tel: West Wratting 583.

Bottisham Acorn Users Group. Contact: P M Rank, 27 Bell Road, Bottisham, Cambridge, Cambs CB5 9DF.

Cambridge Microcomputer Club. Contact: Derek Tripp, 3 Spurgeons Avenue, Waterbeach, Cambridge, Cambs CB5 9NU. Tel: (0233) 861804.

Chesterton Computer Club. Contact: Mrs G Turner, 56 Union Lane, Chesterton, Cambridge, Cambs CB4 1QB.

Peterborough Personal Comp Club. Contact: Andrew Pike, 920 Bourges Boulevard, Peterborough, Cambs PE1 2AN. Tel: (0733) 44342 (after 5pm).

Canadian Sorcerer User Group. Contact: Maurice Dow, 84 Camberley Crescent, Brampton, Ontario, Canada L6V 3L4. Tel: (416) 451 9452.

Cardiff BBC Micro Club. Contact: Geoff Barker, c/o Dept Applied Science, University College, Newport Road, Cardiff. Tel: Penarth 701023.

Guernsey Micro Users Club. Contact: Tony Thorne, Summerfield House, Vale, Guernsey, Channel Islands. Tel: (0481) 44955.

Jersey Computer Association. Contact: Michael Murphy, PO Box 441, St Helier, Jersey, Channel Islands. Tel: (0534) 78399 (working hours),

Altrincham Computer Enthusiasts. Contact: Martin Hickling, 39 Barrington Road, Altrincham, Cheshire WA14 1HZ. Tel: (061) 941 4547.

South Trafford Micro Club. Contact: Ian White, 16 Leicester Avenue, Timperley, Altrincham, Cheshire WA15 6HR. Tel: (061) 969 2080.

ICI Micro Users Group. Contact: Keith Heron, 32, Norfolk Road, Congleton, Cheshire. Tel: Congleton 932 5499.

Crewe & Nantwich Club. Contact: Bram Knight, c/o The Oakley Centre, West Street, Crewe, Cheshire. Tel: Nantwich 623375.

Holmes Chapel Micro Club. Contact: Margaret Baker, 1 Helton Close, Holmes Chapel, Crewe, Cheshire. Tel: (0477) 34238.

Ellesmere Port Micro Group. Contact: G Corcoran, c/o St Pauls Church Hall, Ellesmere Port, Cheshire. Tel: (051) 327 3912.

Kinder Peek Computer Club. Contact: G M Flanagan, 11 Sundown Close, New Mills Stockport, Cheshire SK12 3DH. Tel: New Mills 44051.

Software Exchange Club. Contact: P Redford, 53 Cavendish Road, Hazel Grove, Stockport, Cheshire.

MCC (Mid-Cheshire Computer Club). Contact: Dave Clare, Winsford Main Library, Winsford, Cheshire. Tel: Winsford 51374.

Manchester Computer Club. Contact: David Wade, 28 Hazel Road, Altrincham, Cheshire WA14 1JL. Tel: (061) 941 2486.

Alsager Computer Club. Contact: M Smith, 4 Mill Hill Drive, Sandbach, Cheshire. Tel: Sandbach 2929.

Cleveland Micro Users Group. Contact: J Telford, 13 Weston Crescent, Norton, Cleveland.

Stockton Amateur Computer Club. 60 Croft Road, Eaglescliffe, Stockton-on-Tees, Cleveland TS16 0DY. Tel: (0642) 784819.

Colwyn Computer Club. Contact: D Bevan, c/o 20 Abergele Road, Colwyn Bay, Clwyd LL29 7PA.

Clwyd 80 Computer Club. Contact: Allan Jones, The Island, 1 High Street, Connahs Quay, Deeside, Clwyd CH5 4DA. Tel: (0244) 816893.

Clwyd '80 Computer Club. Contact: Allan Jones, Deeside Community Centre, Queensferry, Deeside, Clwyd, Wales.

Abergele Computer Club. Contact: W F Jones, 77 Millbank Road, Rhyl, Clwyd N Wales.

ICPUG (Rhyl). Contact: Frank Jones, 77 Millbank Road, Rhyl, Clwyd. Tel: (0745) 54820.

ICPUG (Clwyd). Contact: John Poole, 6 Ridgeway Close, Connah's Quay, Clwyd CH5 4LZ.

ICPUG (Carrickfergus). Contact: David Bolton, 19 Carrickburn Road, Carrickfergus, Co Antrim, Northern Ireland.

North Down Micro Users Club. Contact: A Robson, 12 Sinclair Road, Bangor, Co Down BT19 1PF. Tel: (0247) 67060.

Computer Education Soc Ireland. Contact: Dermot McCarthy, 7 St Kevins Park, Kilmacud, Blackrock, Co Dublin.

TI 99 4A Users Club. Contact: Mrs Ann Flynn, 53 Georgian Close, North Road, Drogheda, Co Louth, Eire.

DENSPET, Rock House, Ballycrog, Westport, Co Mayo, Eire.

Cork Amateur Computer Club. Contact: T Moriarty, 'Tiger Bay', Rochestown, Douglas, Cork, Eire. Tel: (021) 293651 (home) (021) 8824.

Penwith Computer Club. Contact: S Ericsson Zenith, Dragon Gate, 77 St Johns Street, Hayle, Cornwall. Tel: (0736) 754845.

6809 User Group. Contact: W Gibbons, 9 St Thomas' Hill, Launceston, Cornwall PL15 8DL.

St Austell Dragon UG. Contact: R M Starkie, 48 Old Roselyn Road, Middleway, Par, Cornwall. Tel: Par 4922.

Cornwall Area Computer Club. Contact: M F Grove, 35 Causeway Head, Penzance, Cornwall.

St Austell Computer Club. Contact: N G Day, 2 Glendale Close, St Austell, Cornwall PL25 3DD.

ICPUG (Derbyshire & District). Contact: Raymond Davies, 105 Normanton Road, Derby DE1 2GG. Tel: (0332) 41025 (day) (0332) 5140.

Derby Microcomputer Society. Contact: Mike Riordan, 172 Blagreaves Road, Littleover, Derby, Derbyshire. Tel: (0332) 769440.

Glossop Computer Club. Contact: John Dearn, 2 Spinney Close, Glossop, Derbyshire.

National Colour Genie Users Club. Lowe Computers Ltd, Chesterfield Road, Bentley Bridge, Matlock, Derbyshire DE4 5LE. Tel: (0629) 4995/4057.

Exeter & District ACC. Contact: Simon Williams, Sheepwash, Beeworthy, Devon.

Brixham Dragon Owners Club. Contact: Ian Chipperfield, 22 Brookdale Court, Brixham, Devon. Tel: Brixham 59224.

Torbay Computer Users Club. Contact: J D Parker, 41 Gibson Road, Whiterock, Paignton, Devon TQ4 7AQ. Tel: Churston 843964.

Plymouth & District ACC. Contact: Stuart Bell, 31 Victoria Place, Plymouth, Devon PL2 1BY. Tel: (0752) 559192.

ICPUG (Devon). Contact: Matthew Stibbe, The Lawn, Lower Woodfield Road, Torquay, Devon.

Totnes & S Devon Computer Club. Contact: Frank Watson or Andrew Page, Dart Inst Community Studies, Dart, Totnes, Devon TQ9 6JE. Tel: (0803) 862271.

Bournemouth Area Computer Club. Contact: Peter Hibbs, 54 Runnymede Avenue, Bournemouth, Dorset BH11 9SE. Tel: Bournemouth 576547.

Topic. Contact: David Washford, 1 Alexandra Road, Bournemouth, Dorset BH6 5JA. Tel: (0202) 423064 (eves) (0202) 67.

Bournemouth BBC Users Group. Contact: Norman Carey, 26 Felton Road, Parkstone, Poole, Dorset. Tel: Poole 749612.

East Dorset Computer Club. Contact: P Yeandle, Poole College of FE, North Road, Poole, Dorset. Tel: (0202) 295511 ext 262.

ICPUG (Bournemouth & Poole). Contact: Douglas M Shave, 97 Canford Cliffs Road, Poole, Dorset BH13 7EP.

FORTH Users Group. Contact: David Husband, 2 Gorleston Road, Branksome, Poole, Dorset BH12 1NW. Tel: (0202) 764724.

Purbeck Computer Users Club, 31 North Street, Wareham, Dorset BH20 1AD.

Irish CP/M Users Group. Contact: Doug Notley, Gardner House, Ballsbridge, Dublin 4. Tel: Dublin 686411.

Dumfries Computer Club. Contact: Donald Shamash, Underwood Farm, Ringford, Kirkudbright.

ICPUG (Northeast—Durham). Contact: Jim Cocallis, 20 Worcester Road, Newton Hall Estate, Durham. Tel: (0385) 67045.

Darlington Computer Club. Contact: L Boxell, 8 Vane Terrace,

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Darlington, Durham DL3 7AT. Tel: (0325) 67766.

Durham Computer Club. Contact: L Boxell, 8 Vane Terrace, Darlington, Durham. Tel: (0325) 67766.

ICPUG (Llandyssul). Contact: F J Townsend, The Hill, Rhydowen, Llandyssul, Dyfed SA44 4QD. Tel: (05455) 5291.

Milford Central Computer Club. Contact: Harry Evans, Milford Central School, Prioryville, Milford Haven, Dyfed. Tel: (043 784) 571.

ICPUG (Dyfed). Contact: Simon Kniveton, Penpompren Hall, Talybont, Dyfed. Tel: Talybout 303.

Natwest Personal Computer Soc. Contact: P J Moore, Nat West Bank plc, Montrose House, 412 Eastern Avenue, Ilford, Essex IG2 6NQ. Tel: (01) 554 9699.

Genius Computer Club, 30 Webber House, North Street, Barking, Essex.

ICPUG (Basildon). Contact: Walter Green, 151 The Hatherley, Basildon, Essex.

Roundacre Micro Computer Users Club. Contact: Mrs L Daden, c/o Roundacre Youth House, Laindon Link, Basildon, Essex. Tel: Basildon 285119.

Brentwood ACC. Contact: R L Sadler, 18 Wanescot Road, Essex M15 9HD. Proposed new club.

Canvey Computer Club. Contact: Dean Williams, 17 Mornington Road, Canvey Island, Essex SS8 8AT.

ICPUG (Chelmsford). Contact: A G Surridge, 97 Shelley Road, Chelmsford, Essex.

Springfield Computer Club. Contact: Stephen Cousins, 1 Aldeburgh Way, Springfied, Chelmsford, Essex CM1 5PB. Tel: (0245) 50155.

Colchester Microprocessor Group, Information Centre, University of Essex, Colchester, Essex.

Colchester Sinclair User Group. Contact: Richard Lawn, 102 Prettygate Road, Colchester, Essex. Tel: Colchester 61066.

Stanway School Computer Club. Contact: G Floyd, c/o Physics Dept, Stanway School, Stanway, Colchester, Essex.

Colchester Sinclair Users Group. Contact: R Lown, c/o 102 Prettygate Road, Colchester, Essex. Tel: Colchester 561066.

Great Dunmow Computer Club. Contact: T Coombo, 4 Daliroyil House, Daliroyil Avenue, Great Dunmow, Essex CM6 1HQ.

Compukit User Club. Contact: Adrian Waters, 117 Haynes Road, Hornchurch, Essex RM11 2HX. Tel: Hornchurch 40490.

Sharp MZ80K User Group. Contact: Joe Seet, 16 Elmhurst Drive, Hornchurch, Essex RM11 1PE. Tel: (04024) 42905.

East London ACC. Contact: Fred Linger, 82 The Drive, Ilford, Essex IG1 3JA. Tel: (01) 554 3288.

ICPUG (Essex). Contact: Carol Taylor, 101 Courtlands Avenue, Cranbrook, Ilford, Essex. Tel: (01) 554 5246.

ICPUG National, Membership Secretary, 30 Brancaster Road, Newbury Park, Ilford, Essex IG2 7EP.

Dragon Independent Owners Ass. Contact: Doug Bourne, School House, Nevern Road, Rayleigh, Essex.

UK Atari Computer Owners Club, PO Box 3, Rayleigh, Essex.

UK 101 User Group. Contact: Adrian Waters, 9 Moss Lane, Romford, Essex RM1 2QB. Tel: Romford 64954.

Tilbury & District Users Club. Contact: John Mayhew, c/o Tilbury Community Centre, Tilbury, Essex. Tel: Tilbury 2424.

Colchester Computer Society. Contact: A H Potten, 14 Foxmead, Rivenhall, Witham, Essex CM8 3HD. Tel: Witham 516335.

North & Mid Essex BBC Users Group. Contact: C A Purkiss, 12 Palm Close, Witham, Essex CM8 2PJ.

Romford Club. Contact: D Norden, 138c Church Road, Harold Wood, Romford, Essex.

SE Essex Computer Society. Contact: Robin Knight, 128 Little Wakering Road, Little Wakering, Southend-on-Sea, Essex. Tel: (0702) 218456.

Fife Computer Users Club. Contact: Murray Simpson, 31 Tom Steward Lane, St Andrews, Fife KY16 8YB. Tel: (0334) 72485.

St Andrews Computer Club. Contact: Paul Ives, Dept of Computational Science, North Haugh, St Andrews, Fife KY16 9SX.

ICPUG (Glasgow). Contact: A J Quin, Dept of Environment Studies, Glasgow College of Building, 60 North Hanover Street, Glasgow G1 2BP. Tel: (041 332) 9969.

Nat Eng Lab Computer Club. Contact: J W Bruce, c/o National Engineering Laboratory, East Kilbride, Glasgow G7 0QU. Tel: East Kilbride 20222.

ICPUG (Newton Mearns). Contact: Dr Jim MacBrayne, 27 Paidmyre Crescent, Newton Mears, Glasgow. Tel: (041) 639 5696.

GCHQ BBC Micro User Group. Contact: D W Adam, 16 Court Road, Prestbury, Cheltenham, Glos.

Cheltenham ACC. Contact: M Hughes, 36 Riverview Way, Cheltenham, Glos. Tel: (0240) 75213.

ICPUG (Cheltenham). Contact: Mrs Alison Schofield, 78 Hesters Way Road, Cheltenham, Glos. Tel: (0242) 580789/27588.

Heathkit User Group. Contact: John Smithson, Heath (Gloucester) Ltd, Bristol Road, Gloucester, Glos GL2 6EE. Tel: (0452) 29451.

ICPUG (Gloucester & Bristol). Contact: Mrs Janet Rich, Rose Cottage, 20 Old Court, Springhill, Glos GL11 5PF. Tel: (0453) 47708.

9900 Users Group. Contact: Chris Cadogan, Dept of Computer Science, University of Manchester, Manchester, Greater Manchester M13 9PL.

Bolton Computer Club. Contact: David Atherton, 16 Douglas Street, Atherton, Manchester, Greater Manchester M29 9FP. Tel: (0942) 876210.

DAI UK User Group. Contact: Dave Atherton, 16 Douglas Street, Atherton, Manchester, Greater Manchester M29 9FB. Tel: (0942) 876210.

Manchester Acorn User Group. Contact: John Ashurst, 192 Verdure Close, Failsworth, Manchester, Greater Manchester. Tel: (061) 681 4962.

T199 Club (Manchester). Contact: T Grimshaw, 21 Allingham Street, Longsight, Manchester, Greater Manchester. Tel: (061) 224 0374.

Manchester Sinclair Users Group. Contact: Tony Krampf, 14 Meller Road, Longsight, Manchester, Greater Manchester. Tel: (061) 225 6997.

Small Business Computer Users Club. Contact: K Wadsworth, North Manchester, Greater Manchester. Tel: (061) 740 7232 (after 5pm).

Gwent Amateur Computer Club. Contact: Rothery Harris, 16 Alanbrook Avenue, Newport, Gwent NP7 6QJ. Tel: (0633) 852924.

Risca Computer Club. Contact: R N Gibbs, 153 Holly Road, Ty Sign, Risca, Newport, Gwent NP1 7HZ. Tel: Risca 612487.

Pontypool Computer Club. Contact: Graham Loveridge, c/o The Settlement, Rockhill Road, Pontypool, Gwent. Tel: Pontypool 2827.

Vernham Computer Club. Contact: Peter Terry, 21 Shepherds Rise, Vernham Dean, Andover, Hants. Tel: (0264) 87238.

USCD System Users Society. Contact: John Ash, Dicoll Data Systems Ltd, Bond Close, Kingsland Estate, Basingstoke, Hants RG24 0QB.

Southampton ACC. Contact: Paul Blitz, 24 Chigwell Solent Close, Chandlers Ford, Eastleigh, Hants. Tel: (04215) 69050.

ICPUG (Hampshire Area). Contact: Ron Geere, 109 York Road, Farnborough, Hants.

6502 Users Club SR. Contact: Steve Cole, 70 Sydney Road, Gosport, Hants.

CBM Computer Club Gosport. Contact: Brian Cox, Bury House, Bury Road, Gosport, Hants. Tel: Fairham 280530.

Fareham & Portsmouth ACC. Contact: Alan J Smith, c/o 7 Francis Close, Lee-on-Solent, Gosport, Hants PO13 8HB. Tel: (0705) 550907.

ICPUG (South Hants). Contact: Tony Cooke, 7 Russell Way, Petersfield, Hants GU31 4LD.

Southampton Atari Users Group. Contact: David Fitch, 24 Avenue Road, Southampton, Hants. Tel: (0703) 25804.

Portsmouth CO-OP Computer Club. Contact: Adrian May, 27 Victoria Road North, Southsea, Hants. Tel: (0705) 820339.

RAF Odiham Computer Club, c/o Officer I/C, Royal Air Force, Odiham, Nr Basingstoke, Hants.

Chiltern CP/M Users Group. Contact: Ken Hirst, 40 Moors Walk, Welwyn Garden City, Herts AL7 2AJ. Tel: Welwyn Garden City 28723.

Harpenden Micro Group. Contact: R S Welch, 7 Tylers Road, Harpenden, Herts AL5 5RT. Tel: (05827) 3398.

PDP11 Users Group. Contact: Pete Harris, 119 Carpenter Way, Potters Bar, Herts EN6 5QB. Tel: (0707) 52091.

Sawbridgeworth Computer Club. Contact: Daren White, 82 White Post Field, Sawbridgeworth, Herts.

Beebug. Contact: D Graham or S Williams, Dept 1, PO Box 50, St Albans Herts.

ICBUG (N Herts). Contact: B Grainger, 73 Minehead Way, Stevenage, Herts SG1 2HZ. Tel: (0438) 727925.

BASUG. Contact: John Sharp, PO Box 174, Watford, Herts WD2 6NF. Tel: (09273) 75093.

BASUG South, PO Box 174, Watford, Herts WD2 6NF.

Harrow Computer Group. Contact: Bazyle Butcher, 16 St Peter's Close, Bushey Heath, Watford, Herts WD2 3LG. Tel: (01) 950 7068.

Basic Users Group (BUG). Contact: D Colthorpe, c/o Campus West Library, The Campus, Welwyn Garden City, Herts. Tel: (07073) 30082.

West Herts 80 User Group. Contact: John Byfield, 'Moonrakers', The Rutts, Bushey Heath, Herts. Tel: (01) 950 1041.

Forum 80 Users Group. Contact:

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Frederick Brown, 421 Endike Lane, Hull, Humber HU6 8AG. Tel: (0482) 859169.

Hull & District Users Group. Contact: R V Souter, 25 Carr Lane, Willerby, Hull, Humber HU10 56JP. Tel: (0482) 654117.

Scunthorpe Micro Soc. Contact: G Hinch, 21 Old Crosby, Scunthorpe, Humber DN15 8PU. Tel: (0724) 61076.

Grimsby Computer Club. Contact: Jenson Lee, 29 Park View, Cleethorpes, Humberside. Tel: (0472) 42559 (day).

Hull Atari Users Group. Contact: Harvey Kong Til, 546 Holderness Road, Hull, Humberside HU9 3ES. Tel: Hull 7911094. Proposed new group.

Sky & Lochalsh Computer Society. Contact: C J Manvell, 25 Breacais Isol, Isle of Skye, Inner Hebrides IV42 8QA. Proposed new club.

Inverness Personal Computer Club. Contact: Gyl Mackenzie, 38 Ardconnel Street, Inverness, Invernesshire IV2 3EX. Tel: (0463) 220922.

Isle of Wight TRS80 Club. Contact: M Collins, 11 Star Street, Ryde, Isle of Wight. Tel: (0983) 614589.

Compucolour Users Group (UK). Contact: Bill Donkin, 19 Harwood Avenue, Bromley, Kent BR1 3DX. Tel: (01) 460 2626 (eves).

North Kent ACC. Contact: Kevin Viney, 43B Hilldrop Road, Sundridge Park, Bromley, Kent. Tel: (01) 290 6338.

Medway Acorn User Group. Contact: Clem Rutter, c/o St John Fisher School, Ordnance Street, Chatham, Kent. Tel: (0634) 42811 (day) (0634) 3734.

MACRO. Contact: L G Mason, 21 The Beeches, Walderslade, Chatham, Kent ME5 0NS. Tel: (0634) 63036 (P Cameron).

CP/M User Group (UK). Contact: Mrs D P Fordred, 72 Mill Road, Hawley, Dartford, Kent DA2 7RZ. Tel: (0322) 22669.

Gravesend Computer Club, c/o The Extra Tuition Centre, 39 The Terrace, Gravesend, Kent DA12 2BA. Tel: (0474) 50677.

ICPUG (Maidstone). Contact: Ron Moseley, Rosemont, Weavering, Maidstone, Kent. Tel: (0622) 37643.

Orpington Computer User Club. Contact: R A Pyatt, 23 Arundel Drive, Orpington, Kent BR6 9JF. Tel: Orpington 20281.

NPCUA, The Secretary, 11 Spratling Street, Manston, Ramsgate, Kent.

ICPUG (South East). Contact: Mick Ryan, 164 Chesterfield Drive, Sevenoaks, Kent TN13 2EH. Tel: (0732) 453530.

Sevenoaks School Computer Club. Contact: G. Sommerhoff, Technical Centre, Sevenoaks School, Sevenoaks, Kent. Tel: Sevenoaks 456490.

Silica Atari Users Club. Contact: Richard Hawes, 1-4 The Mews, Hatherley Road, Sidcup, Kent DA14 4DX. Tel: (01) 301 1111.

Tonbridge & Tunbridge Wells ACC. Contact: Ray Szatkowski, 1 Cromer Street, Tonbridge, Kent. Tel: (0732) 355960.

ICPUG (SE-Canterbury). Contact: J Bickerstaff, 48 Martin Down Lane, Whitstable, Kent CT5 4PR. Tel: (0227) 272702.

East Kent Micro Users Club. Contact: L S Fisher, 21 Manwood Avenue, St Stephens, Canterbury, Kent CT2 7AH. Tel: Canterbury 65948.

Stonehaven Computer Club. Contact: Ross Martin, Belmont House, Belmont Brae, Stonehaven, Kincardineshire.

Motherwell College Computer Club. Contact: M Singh, Dept of Elec Engineering, Dalziell Drive, Motherwell, Lanark ML2 1DD.

Lancaster & Morecambe Computer Club. Contact: Sarah Blackler, 17 Belle Vue Terrace, Greaves Road, Lancs. Tel: (0524) 33553.

Blackburn Micro Computer Club. Contact: Roger Longworth, 12 Shap Close, Accrington, Lancs.

ICPUG (Manchester Area). Contact: David Jowett, 197 Victoria Road, Thornton Cleveleys, Lancs FY5 3ST. Tel: (0253) 869108.

North Lancashire User Group. Contact: John Robinson, 12 Harold Avenue, Blackpool, Lancs.

TRS-80 Northwest Group. Contact: Melvyn Franklin, 40 Cowlees, Westhoughton, Bolton, Lancs BL5 3EG. Tel: (0942) 812843.

Burnley Computer Club. Contact: Clive Tallon, 27 Basnett Street, Burnley, Lancs BB10 3EQ. Tel: (0282) 25103 (eves) or 34683.

ICPUG (Burnley). Contact: John Ingham, 72 Ardwick Street, Burnley, Lancs.

Micro-Contact. Contact: Peter Paton, 176 Todmorden Road, Burnley, Lancs BB11 3EU. Tel: (0282) 53241.

Chorley Computer Club. Contact: Chris Hicks, 131 Market Street, Chorley, Lancs. Tel: (02572) 78376.

Ribble Valley Computer Club. Contact: Ian Thornton-Bryar, 25 Southfield Drive, West Bradford, Clitheroe, Lancs BB7 4TU. Tel: (0200) 25933.

Lancaster Computer Club. Contact: B Sheldan, 375 Lancaster Road, Torrisholme, Morecambe, Lancs.

South Chadderton Computer Club. Contact: J Jakeman, 26 Mardle Street, Dorker, Oldham, Lancs. Tel: (061) 682 6120.

Preston BBC Micro User Group. Contact: D Coulter, 8 Briar Grove, Ingol, Preston, Lancs. Tel: Preston 725793.

Manchester ACE. Contact: Martin Davies, c/o The Ellesmere, Worsley Road, Worsley, Lancs. Tel: Bolton 700757.

ICPUG (Liverpool). Contact: Tony Bond, 27 Ince Road, Liverpool, Lancs L23 4UE. Tel: (051) 924 1505.

Leicester Microcomputing Club. Contact: Chris Clarke, c/o Leicester University, Leicester, Leics. Tel: Leicester 673988.

Hawker Siddeley Computer Club. Contact: R W Wrathall, 6 Naseby Drive, Loughborough, Leics LE11 0WU.

LAMS, Hosegrove Computer Science Dept, Loughborough University, Loughborough, Leics.

Lincolnshire Micro Society. Contact: Eric Booth, Senior Common Room, Bishop Grosseteste College, Newport, Lincoln. Tel: (0522) 27347.

Lincoln Computer Club. Contact: Jeffrey Joy, Glengiel, 23 Cross O'Cliff Hill, Lincs LN5 8PN. Tel: Lincoln 28252.

The Boston Computer Club. Contact: M P Moran, 'Sunhorme', Witham Bank West, Boston, Lincs PE21 8RD.

Ithaca Audio S100 Users Group. Contact: Dave Weaver, 41 Dore Avenue, North Hykeham, Lincoln, Lincs LN6 8LN.

Skegness Computer Club. Contact: Reg Potter, 118 Beresford Avenue, Skegness, Lincs. Tel: (0754) 3594.

Merseyside Users Group. Contact: Alan Pope, Paal Enterprise, 37 Stuart Road, Crosby, Liverpool L23 0QE.

ACC. Contact: Rupert Steele, 17 Lawrie Park Crescent, London SE26 6HH. Tel: (01) 778 6824.

Apple Music Synthesis Group. Contact: Dr David Ellis, 22 Lennox Gardens, London SW1.

COMP-80 Users Group. Contact: Philip Probetts, 50 Cromwell Road, Wimbledon, London SW19 8LZ. Tel: 01-540 3713.

Imperial College Micro Club. Contact: Tim Panton, c/o IC Union Office, Prince Consort Road, London SW7 2BB.

ITN Computer Club. Contact: Jim Cartwright, c/o ITN House, Wells Street, London. Tel: (01) 637 2424.

Lambeth Computer Club. Contact: Robert J Baker, 32 Hetherington Road, London SW4 7NX.

Medical Micro Users Group. Contact: P J V Dixon, MEDICOM, 1-2 Hanover Street, London W1.

Microtanic Computer Club. Contact: David Price, 46a Bickersteth Road, Tooting, London SW17 9SQ.

North London Hobby Computer Club, Polytechnic of North London, Holloway Road, London N7. Tel: (01) 607 2789 ext 2161.

OSI UK User Group. Contact: Richard Elen, 12 Bennerley Road, London SW11 6DS.

Paddington Computer Club. Contact: Peter Hill, c/o Paddington College, 25 Paddington Green, London W2. Tel: (01) 723 5762.

Queens Crescent Computer Club. Contact: Lucas Fowler, 47 Woodsome Road, London NW5 1SA. Tel: (01) 485 7730.

Sirius User Group. Contact: Edward Hasted, 12 Chesterfield Street, London W1X 7HF. Tel: (01) 403 3800 (office).

SOBAT Computer Club (Leyton). Contact: T Kayani, 12 Calderon House, London E11 4EU. Tel: (01) 556 5423 (weekends).

Society of Genealogists. Contact: David Hawgood, 26 Cloister Road, London W3 0DE. Tel: (01) 993 2897.

South East London Micro Club. Contact: Peter Phillips, 61 Craigerne Road, London SE3. Tel: (01) 853 5829.

Triton User Group. Contact: Nigel Stride, Transam Ltd, 12 Chapel Street, London NW1. Tel: (01) 402 8137.

TRS-80 Users Group London. Contact: J Wellsman, 292 Caledonian Road, London N1. Tel: (01) 607 0157.

BTHQ Microcomputer Club. Contact: Vernon Quaintance, British Telecom Enterprises, Merlin/SE 2.1.1, Rm G17, 23 Howland Street, London W1P 6HQ. Tel: (01) 726 4176.

West London Personal Computer Club. Contact: Victor Szwed, 11 Grasmere Avenue, Acton, London W3 6JT. Tel: (01) 992 6462.

Brent/Barnet Users Group. Contact: Joseph Fox, 4 Harman Close, Barnet, London NW2 2EA.

PET Users Education Group. Contact: Dr Chris Smith, Dept of Physiology, Queen Elizabeth College, Campden Hill Road, London W8 7AH.

Millfield Computer Club. Contact: Alan Gregory, Millfield House, Edmonton, London N18. Tel: (01) 803 0136.

London School Computer Users Club, Burlington Danes School, Dane Building, DuCane Road, Hammersmith, London W12 UTY.

Forth Interest Group UK. Contact: K C Goldie-Morrison, 15 St Albans Mansion, Kensington Court Place,

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N London BBC Micro Users Group. Contact: Ric Keyworth, 'The Penthouse', 46 Kilburn High Road, London NW6 5UL. Tel: (01) 734 9235 (7am-3pm Mon-Fri).

Oric-1 User Group. Contact: Edmund Boncrah, 14a Vicars Hill, Ladywell, London SE13 7JH. Tel: (01) 690 5408 (eves/weekends). Proposed new club.

St Thomas Hospital Micro Club. Contact: Sebastian Till, Dept of Medicine, St Thomas Hospital, Lambeth Palace Road, London SE1.

Southgate Micro Club. Contact: Mr K Pretorious, 15 The Vineries, Reservoir Road, Oakwood, London N14 4BH. Tel: (01) 882 2282.

Wandsworth Computer Club. Contact: C Verrier, 1 Nicosia Road, Wandsworth, London SW18 3RN.

Powertran Users Club. Contact: P L Probetts, 50 Cromwell Road, Wimbledon, London SW19 8LZ. Tel: (01) 540 3713.

Edinburgh Home Computer Club. Contact: I Robertson, c/o Claremont Hotel, Edinburgh, Lothian. Tel: (031) 441 2361.

SACS (Scottish Amateur Computer Society). Contact: Mike Anthony, 46 Moredun Park Gardens, Edinburgh, Lothian EH17 7JR. Tel: (031) 337 5611.

Scottish Dragon Club. Contact: D J Anderson, Top Flat, 1 Walker Street, Edinburgh, Lothian EH3 7JY. Tel: (031) 225 5285.

Scottish TRS-80 Users Group. Contact: Dick Mackie, 72 Morningside Drive, Edinburgh, Lothian EH10 5NO. Tel: (031) 447 6651.

BBC User Group S Manchester. Contact: Philip Harrison, 34 Holwood Drive, Manchester M16 8WS.

Hardware Exchange. Contact: D Edwards, PO Box 13, Birkenhead, Merseyside LS42 4RL.

MBUG. Contact: N Kelly, c/o Computer Club, Science & Mathematics Dept, Birkenhead Tech College, Merseyside. Tel: (051) 525 2934.

Formby Computer Club. Contact: Edward Crennel, c/o Our Lady's School, School Lane, Formby, Merseyside. Tel: (07048) 70839.

TRS-80 Level 1 User Group. Contact: N Rushton, 123 Roughwood Drive, Northwood, Kirby, Merseyside L33 9UG.

European Sorcerer Club. Contact: Colin Morle, 32 Watchyard Lane, Formby, Liverpool, Merseyside L37 3UJ. Tel: (07048) 72137.

Liverpool BBC & Atom Group. Contact: Nik Kelly, 56 Queens Drive, Walton, Liverpool, Merseyside L4 6SH. Tel: (051) 525 2934.

Liverpool ZX Users Club. Contact: Keith Archer, 17 Sweeting Street, Liverpool, Merseyside L2 4TE. Tel: (051) 236 6109.

Merseyside Nascom Users Group. Contact: T Searle, 14 Hawkeshead Close, Maghull, Liverpool, Merseyside L31 9BT.

Merseyside TRS-80 Users Group. Contact: Peter Tootill, 101 Swanside Road, Liverpool, Merseyside L14 7NL. Tel: (051) 220 9733.

UK DOSPLUS User Group. Contact: Peter Tootill, 101 Swanside Road, Liverpool, Merseyside L14 7NL. Tel: (051) 220 9733.

Merseyside Micro Group. Contact: Fred Shaw, 14 Albany Avenue, Eccleson Park, Prescot, Merseyside L34 2QW. Tel: (051) 426 5436.

Southport Computer Club. Contact: Ian Britstone, 28 Weld Road, Southport, Merseyside. Tel: (0704) 64524.

UK Pilot user Group. Contact: Alec Wood, Wirral Grammar School, Crosslane, Bebington, Wirral, Merseyside LG3 3AQ.

Wirral Computer Club. Contact: Gary Metcalfe, 24 Marlston Avenue, Irby, Wirral, Merseyside.

Wirral TRS-80 & Genie User Group. Contact: J E Thomason, 66 Sandbrook Lane, Moreton, Wirral, Merseyside L46 0QH. Tel: (051) 678 0435.

Pencoed ACC. Contact: Brian Pugh, 7 Duffryn, Pencoed, Bridgend, Mid Glamorgan CF35 6JL.

Computer Club, 6 Lewis Street, Church Village, Pontypridd, Mid Glamorgan. Tel: Newton Llantwit 206305.

TRS-80 Medical and Lab Users. Contact: Dr N Robinson, The Residency, Northwick Park Hospital, Harrow, Middlesex.

ORAC Computer Club. Contact: John Grigg, 4 Syon Lane, Isleworth, Middlesex TW7 5BT. Tel: (01) 560 2405.

Staines and Stanwell Computer Club. Contact: S Powell, Stanwell School, Stanwell School, Stanwell, Middlesex. Tel: Ash 50460.

Sunbury Computer Club. Contact: S N Taylor, 8 Priory Close, Sunbury-on-Thames, Middlesex TW16 5AB. Tel: Sunbury 86649.

Richmond Computer Club. Contact: Bob Forster, 18a The Barons, St Margarets, Twickenham, Middlesex. Tel: (01) 892 1873 (after 7pm).

Brigadier Computer Club. Contact: Steve Ward, 28 Brodie Road, Enfield, Middx EN2 0EU. Tel: (01) 363 3786.

Micromodeller User Association. Contact: Phillip Matthews, Philip Morris House, 21 High Street, Feltham, Middx TW13 4AD. Tel: (01) 751 6388.

68 Microgroup. Contact: Jim Anderson, 41 Pebworth Road, Harrow, Middx. Tel: (01) 422 4724.

Pascal User Group (PUG). Contact: Nick Hughes, PO Box 52, Pinner, Middx HA5 3FE. Tel: (01) 866 3816.

Educational Users Group TRS-80. Contact: Dave Futcher, Beaconsfield School, Beaconsfield Road, Southall, Middx. Tel: (01) 574 3506.

ICPUG (Teddington). Contact: G Squibb, 108 Teddington Park Road, Teddington, Middx. Tel: (01) 997 2346.

RAF Kinloss. Contact: Steve Barthorpe, 18 Trenchard Crescent, Kinloss, Forres, Moray IV36 0UP.

RAF Lossiemouth Computer Club. Contact: Flt Lt A W Gransden, OIC Computer Club, Jaguar Software Team, RAF Lossiemouth, Moray IV31 6SD. Tel: (034381) 2121 ext 411.

ICPUG (Cromer). Contact: J Blair, 7 Beach Road, Cromer, Norfolk.

NOGATUG. Contact: P A Golder, 6 North Avenue, Swanton Morley, Dereham, Norfolk. Tel: Swanton Morley 491.

Dereham & Dist Computer Club. Contact: Mrs Fran Cook, c/o Middle School, Westfield Road, East Dereham, Norfolk. Tel: Dereham 677320.

ICPUG (Kings Lynn). Contact: Peter Petts, Bramley Hale, Wretton Kings Lynn, Norfolk PE33 9QS. Tel: Stoke Ferry 500692.

Spectrum Users Group. Contact: M Osborne, 8 Elvington, Kings Lynn, Norfolk.

Atari User Group. Contact: Ken Ward, 45 Coleburn Road, Lakenham, Norwich, Norfolk NR1 2NZ. Tel: Norwich 661149. Proposed new club.

Norwich BBC Micro Users Group. Contact: Paul Beverly, Churchill Road, Norwich, Norfolk.

York Computer Club. Contact: K Thomas, Green Lea, Ripon Road, Harrogate, North Yorkshire HG1 2BY. Tel: (0904) 38239.

RAF Personal Computer Association. Contact: Sqn Ldr J E Jeffrey, RAF Linton-on-Ouse, York, North Yorks YO6 2AJ.

Wellingborough BBC User Group. Contact: R Houghton, 49 Addington Road, Irthlingborough, Northampton.

Corby Universal Micro Club. Contact: Peter Wilson, 26 North Cape Walk, Corby, Northants. Tel: Great Oakley 742622.

ICPUG (Northampton). Contact: Peter Ashby, 215 Lincoln Way, Corby, Northants. Tel: (05363) 4442.

Northants Computer Users Group. Contact: Simon Clark, 83 Watling Street West, Towcester, Northants NN12 7AG. Tel: (0327) 52191.

ICPUG (Northumberland). Contact: Graham J Saunders, Starling House, 22 Front Street, Guide Post, Northumberland. Tel: (0670) 823242.

East Anglia Computer User Group. Contact: Mike Marriage, 88 St Benedicts Street, Norwich NR2 4AB. Tel: (0603) 29652.

ZX Spectrum Club. Contact: D Beattie, 63 Kingsly Crescent, Sawley, Long Eaton, Nottingham NG10 3DA.

E Midlands TRS-80 Group. Contact: Mike Costello, 17 Langbank Avenue, Rise Park, Notts NG5 5BU. Tel: Nottingham 751753.

Nottingham BBC Micro Group. Contact: J Day, 8 Warkton Close, Chilwell, Notts NG9 5FR. Tel: (0602) 225660.

Eastwood Micro Computer Club. Contact: Ted Ryan, 15 Queens Square, Eastwood, Nottingham, Notts NG16 3BJ. Tel: Langley Mill 65011.

Nottingham Microcomputer Club. Contact: D Harvey, 68 Roseleigh Avenue, Nottingham, Notts. Tel: (0602) 608491.

National Colour Genie Users Group. Contact: Geoffrey Hillier, 5a Gregory Street, Lenton, Nottingham, Notts NG7 2LR. Tel: Nottingham 783938.

Nottingham Micro Club. Contact: D Harvey, 68 Roseleigh Avenue, Nottingham, Notts NG9 5FR. Tel: (0602) 684191.

Ashfield Computer Club. Contact: Derrick Daines, c/o 18 Cuttings Avenue, Sutton-in-Ashfield, Notts. Tel: Mansfield 553198.

Worksop Computer Group. Contact: Mr Andrews, c/o Worksop Library, Lecture Room, Worksop, Notts. Tel: Worksop 487327.

British LOGO User Group. Contact: Pam Valley, c/o Shell Centre for Mathematics, University of Nottingham, Notts.

USR/Group/UK. Contact: A J Lazzerinin, Plexus Computers Inc, Langley House, Langley Mill, Notts NG16 4AN. Tel: (07737) 66141.

UCSD Pascal UK Users Group. Contact: Malcolm Harper, Oxford University Computing Lab, Programming Research Group, 45 Banbury Road, Oxford OX2 6PE.

Research Machines Nat User Group. Contact: c/o Clare Moat, RML, Mill Street, Osney, Oxford OX2 0BW. Tel: (0865) 49866.

Microsoc, c/o University Marshall,

USER GROUP INDEX

University Offices, Oxford University, Wellington Square, Oxford OX1 2JD.

South Oxford Computer Club. Contact: Mike Magnay, Wantage Road, Rowstock, Didcot, Oxfordshire OX11 0JU. Tel: (0235) 834402.

Bicester Computer Club. Contact: P Chandler, 19 Wellington Close, Bicester Close, Bicester, Oxon OX6 7TQ. Tel: Bicester 41017.

ICPUG (Bloxham). Contact: John Temple, 'Kirabanda', Rose Bank, Bloxham, Oxon.

Amateur Radio SIG. Contact: Peter Whittle, 49 Bartlemas Road, Oxford, Oxon OX4 1XW.

OPeCC. Contact: Sebastian Linfoot, Flat 10, Pembroke Court, Rectory Road, Oxford, Oxon OX4 1BY.

ICPUG (Witney). Contact: Ian Blyth, 40 Wilmot Close, Witney, Oxon. Tel: Witney 5171.

Peebles Computer Club. Contact: Kenneth Robson, Traquair, Innerliethen, Tweedale, Peebles EH44 6PJ.

Perth Amateur Computer Soc. Contact: Alastair MacPherson, 154 Oakband Road, Perth PH1 1HA. Tel: (0738) 29633.

Newtown Computer Club. Contact: J Dale, 12 Poplar Road, Newtown, Powys. Tel: (0686) 28715.

Small Processor User Group. Contact: Roger Knight, Dept of Meteorology, University of Reading, Earley Gate, Whitenights, Reading, Berks RG6 2AY.

Bishopton Computer Club. Contact: Alasdair Law, 10 Dunglass Road, Bishopton, Renfrewshire. Tel: Bishopton 3137.

Barnsley CO-OP Computer Club. Contact: James Bridson, c/o 39 Keresforth Hall Road, Barnsley, S Yorks S70 6NF. Tel: Barnsley 41753.

ICPUG (Barnsley). Contact: Bob Wood, 13 Ward Green, Barnsley, S Yorks. Tel: (0246) 811585.

81 Club. Contact: Mike Hayes, 54 Oakley Place, Grangetown, Cardiff, S Glamorgan. Tel: Cardiff 371732.

Transducer Club. Contact: D Stockqueler, 66 Waterloo Road, Penylan, Cardiff, S Glamorgan. Tel: (0222) 495374.

Llantwit Major Computer Club. Contact: Douglas Mountain, 16 Denbigh Drive, Llantwit Major, S Glamorgan CF69 GQ.

Doncaster Amateur Computer Society. Contact: John Wilkinson, 316 Bawtry Road, Doncaster, S Yorks.

Ludlow & District Micro Club. Contact: Edward Collier, 26 St John's Road, Ludlow, Salop. Tel: Ludlow 4692.

Shrewsbury Micro Club. Contact: V Ives, 6 Bramley Close, Severn Meadows, Shrewsbury, Salop SY1 2TP.

The Sound Computer Club. Contact: Alan Kyres, 6 South Lochside, Lerwick, Shetland ZE1 0RA. Tel: (05959) 4687.

Telford Computer Club. Contact: H D Briggs, 53 Gilpin Road, Admaston, Telford, Shropshire TF5 0BG. Tel: Telford 595959.

Ohio Scientific UK User Group. Contact: Tom Graves, 19a West End, Street, Somerset BA16 0LQ. Tel: (0458) 45359.

Sharp User Club. Contact: Paul Chappell, Computer Centre, Yeovil College, Yeovil, Somerset BA21 4AE.

Yeovil Computer Club. Contact: D G Carrington, 2 Romsey Road, Yeovil, Somerset BA21 5XN.

S Yorks Personal Computer Group. Contact: Paul Sanderson, 8 Vernon Road, Totley, Sheffield, South Yorks S17 3QE. Tel: (0742) 351895.

TRANSACTION FILE

Readers will be pleased to know that, due to our clever layout ideas, the Transaction File is up-to-date and waiting cut down considerably. Ads are accepted only on the form below for a flat fee of £2.50. Please don't specify issues as we can't oblige. Ads cannot be repeated unless separate forms are sent in. We will only accept entries from non-commercial readers. Thank you for cooperating.

● NEWBRAIN AD 32k. Some software, tape recorder and all leads necessary, £200 ono. Tel: Kegworth 3465.

● NEC PC8001. Plus high resolution colour monitor. Original cost over £1,000, must sell, hence only £500 ono. Condition as new. A. Pettitt, 2, Caburn View, Firle, Nr. Lewes, Sussex. Tel: (079) 159-492.

● 64k NEW DATAMINI MIRCO. Two Teac drives, 80 col, CPM compatible, Apple programs, for use monitor or PV, £695. Tel: Collier (01) 937 7805 (eves).

● WESTERN DYNEX. 5Mb fixed, 5Mb removable, hard disk, interface and software to allow up to 4 TRS-80 Model II's to access simultaneously, £750. 14in disk packs also available. Tel: 031 553 2662.

● TRS-80 MONEL 2. 64k, integral VDU, 8in disk drive. Good condition, bargain at £750. Also expansion 1 drive unit, £450 ono. 132-col dot matrix parallel printer + cable, £350. Tel: (0620) 860589.

● MICROLINE 83A PRINTER. Liquidated stock, and only one year old. Bargain for £250, (list price £600). Tel: 0249 76601.

● LYNX. 48k. As new. Manual. £140 ono. Tel: (01) 262 7666.

● APPLE III 256k. Second disc drive, Writer Visicalc III, Quickfile III, 20 discs, dust covers, all as new, £1,250. Tel: Bishop's Stortford (0279) 726000.

● NEC, dot matrix printer. PC-8023B-C Letter quality. Used 3 months only £295. Tel: 0702 345903.

● TRS-80 Model 1 Level 2. 16k, with green screen monitor. All as new. Plus cassette leads, software and programming books, £150. Tel: Milton Keynes 78884.

● COMMODORE PET, 3016. (16k RAM), green screen, cassette and 3022 tractor printer. Reasonable offers. Tel: Alan Sharples (0908) 583278.

● COMMODORE PET. 32k, complete with software, C2N, dust cover, and manuals. Boxed, unused and still under guarantee. Cost new £500+, wanted £330. All offers considered. Tel: Earlswood 2143 after 6pm.

● APPLE 2E. Two disk drives, monitor and stand, 80 column card, unused Multiplan, Quickfile, Accountancy, Flight Simulator games, etc. Cost £2,300 10 months ago. First £900. Tel: Sheffield 369000.

● COMMODORE 64k. Expansion board with manuals, £150. Crown Ranier daisy wheel printer with interface, £650. Tel: (073) 085 494 after 8pm.

● ACORN ATOM, 12 + 12k, FP, ROM, PSU, and loads. Copy manual, £90 ono. Tel: 0382 41151 after 6pm.

● COMMODORE BUSINESS SYSTEM. Comprising; 8032 computer, 8050 duel disc drive, and 8027 daisy wheel printer, £1,100. Tel: (0223) 314517 after 7pm.

● TANDY MODEL III. 48k, 2 disk drives, complete with manuals, plus editor/assembler and Super-Scripsit WP. Excellent condition, £999 (buyer collects). Tel: (01) 570 8335.

● COMMODORE 64. With cassette unit, programmers guide, practicalc spreadsheet and bank account software. All pruchased December 1983. Vertually unused. Company computer forces sale, £215 ovno. Tel: (021) 472 0037 (John).

● ATARI 600XL. Plus cassette recorder. Brand new plus lots of software, games, cassettes, cartridges, manual, books, and listings. Full 1 year guarantee, worth £300, accept £200 ono. Tel: John (01) 579 4367.

● TRS-80. Model I, Level II. 16k + 32k, expansion interface, monitor, new 80 track disc drive, LDOS 5.14 (latest), manuals. Lots of software, including games, utilities etc. Will seperate, moving, hence £550. Tel: 01-947 8442 (eves).

● ATARI 800. 48k, disc drive, cassette and joystick. Software worth over £200. £500 ono. Also JVC colour monitor £100. May split. Tel: (0203) 340076, Coventry Mr. R. Collins.

● COMMODORE 64 + 1530 Datassette (C2N). + Books + three cassettes. Brand new guarantee from 3/4/84. Worth £260, asking £220. Set-up to try. Tel: Lewis, Brighton (0273) 506356 anytime.

● SEIKOSHA GP100A, graphics printer. Centronics interface. As new condition, £140. Tel: (01) 935 5832.

● SHARP MZ80B. Plus P6 printer. In as new condition. Software leads and manuals. Best offer accepted. Tel: Coventry 22258, daytime or Kenilworth 52660 eve.

● VIC20. Cassette recorder, mother board, memory and basic, expansion cartridges, printer, word processor, cassette. 8 games cartridges, games software worth £200. Total worth £800, £1,100 ono. Tel: 0992 57896, Hertford, after six.

● BBC Micro. 32k, 1.2 OS, 12 months old. Over £70 worth of games, including many Acornsoft. Comes with manual, leads and original packaging. £300 ono. Tel: London 01-579 2101 after 6.

● EPSON MX80FT3 printer. Friction tractor, RS232, 2k buffer, paper roll attachment. Excellent condition, £275. Tel: (Romford) 48836.

● WANTED. TRS-80 MODEL III. ROM commented book for £15 plus p&p. Tel: Roy (0794) 390319 after 6pm.

● TRS-80, 32k, interface, monitor, 3 double density disk drives, software including Visicalc and a full disk editor assembler. Excellent condition, £550 ono. Tel: (01) 997 7578 (after 6pm).

● APPLE II+, 48k, 2 disk drives, Hitachi 9in monitor, OKI Microline 80 printer, 16k RAM card, Mountain hardware clock card, 14in colour TV (Sony), large amount software, manuals, books, disks £1,000. Tel: Southampton 737853.

● APPLE II Europlus. 80k, CPM compatible, vgc home system with disk drive, IV-INI, selection of disks, Monitor III, stand, paddles, colour language, centronics, RAM cards, leads, manuals £750. Tel: (08052) 2979 after 5pm.

● TRS-80, Model-I, 48k, single drive system, Quick-Printer, disk and tape software; Scripsit, Versafile, Assembler, Utilities and games plus accessories £400. Tel: Roy (0794) 390319 after 6pm.

● APPLE II Europlus, 2 disk drives, language card, 2 serial cards, X80 card, SuperTerm 80 col card, Rompus card, Pascal CPM etc. Programs, disks, books, etc. £1,750 ono. Tel: (01) 892 0448.

● BBCB. D/Density 712k/348 files/drive View screen dump ROM, Mitsubishi 2x712k drives PSU, Kaga Hi-Res green monitor. £800. Almost new. David Law, Glasgow 332 5412.

● PET 2001. New ROM-superchip, toolkit, trendcom, 100 thermal printer £220. PET 2001, old ROM, extra keyboard, (both with software), £120. (old ROM needs repair). Tel: Epsom (78) 29850. C. Farmer.

● BBC model A. 32k; OS1.2, leads, manual, Acornsoft, Forth tape, and book, magazines. Excellent condition. Hardly used, £265. Plus postage or buyer collects. Tel: (0968) 77487 eve. (Edinburgh area).

● EPSON HX20. Executive, built in printer, and micro cassette drive. Ecalc correspondent and calculator progs, in ROM. All in briefcase. Three months old, hardly used, £450 ono. Bristol. Tel: (0272) 8484 87.

● COMPUCOLOR II, 32k, computer. Including 13in colour monitor, deluxe. 117 key keyboard, reversable disk drive, silent 700 Texas thermol printer, Aplifier software manuals, and cables, £800. Tel: Leicester 879722.

● WORKSHOP clearance. Hundreds of chips including RAM, Eprom, and CPU. Also equipment paper, tape reader, Teletype mechanism, etc. Large SAE for lists Mr. Harris 62 Gloucester Road, Trowbridge, Wilts BA14 0AE.

● APPLE II+. 48K; colour TV/monitor, disk drive, + controller integer, card, colour card, joystick, disks, and 243 games and adventures, including Decathlon Odyssey, Scramble, Swashbuckler and Threshold. All for £870. Tel: (01) 937 1100.

● TELETYPE ASR33. Complete with stand, tape reader, and punch. 8-bit serial ASCII at 110 baud. Ideal, cheap but reliable Printer. Only £65. Tel: Fleet (02514) 20946.

● SWOP my Mercedes for your micro, + screen, + drives, + printer, + software. Also consider BBC, Epson, etc. Cash each way. Tel: (0787) 277860 (Suffolk).

● SANYO CDD 3125NB colour monitor. One month old, as new. Complete with lead and original packing. Full guarantee £160 ono. Tel: (01) 589 4448 before 6pm and ask for Michael.

● APPLE II. 64k. 6 months old, with manuals, disk-drive, controller card, joystick, TV modulator, (colour and sound) and many exciting games, £700. Apply T. Wong, 40 Evelyn Gardens, South Kensington, London, SW7 3BJ.

● BBC Model A. 32k, +6522 via upgrades. All leads + manual, + two books. Many Acornsoft games inc. Defender, Snapper, Killa, Gorilla, etc. Boxed, £270. Tel: (01) 743 6259.

● BBC model B. Zenith monitor + cassette recorder, manual, mags, all leads, 1.2 O.S. Hardly used, excellent condition, £435 ono. Tel: Shahram after 6.30am. (01) 485 4343, 66 Malden Road, London NW5.

● APPLE II compatible. ITT2020 48k, Palcard diskette. Teco monitor, Centronics 737II printer, Dos Applewriter Go-Between £650 ono. Tel: Roy (01) 348 0138, eve after 6.30pm or weekends.

● WANTED: Gemini Multiboard, cards, keyboard etc. Also software: CPM2.2, MBasic, Comal etc. Send full details to 77 Hightown Road, Cleckheaton, West Yorkshire with lowest prices.

● SHARP MZ80K. 48k; Good condition, in original box, Basic manual, many programs, including Sharpsoft, Wordstar, Highlight, Bridge and Arcades, £250. Buyer collects. Tel: (01) 435 8062, eve.

● SHARP MZ80B, 64k RAM, personal computer manuals, Basic tape plus extras including conversion tape from MZ-80K Basic. Worth over £900, selling for £600 ono. Will deliver 50 miles. Tel: 0992 (466240) eve only.

● TANDY TRS-80, Line printer with tractor feed. Cat. No. 26-1152, 6 years old £45. Tel: Boston (0205) 60757.

● VIC 20 software for sale £130 worth. Sell for £45 ono. May split or swap. Titles include Skramble, Alien, Blitz, Cosmaids, Caterpilla, Music Synthesiser, + many others. P. Simpson, 11 Egremont Street,

TRANSACTION FILE

Millom, Cumbria.

● COMMODORE 3032. With 3040 dual disk drive, cartridge tape unit, 3020 tractor printer and business and games software, £1,000 ono. Offers invited for Computhink dual disk drives. Tel: (0525) 405167.

● HEWLETT Packard HP-85A. Two tapes plus standard pack. All manuals. As new, £1,200. Tel: (0401) 50963 after 6pm.

● TANDY TRS80. Colour computer 16k. As new. Plus software, books £80. Reason for sale upgrade. Also Fuller keyboard for ZX81, £15. Tel: Cirencester (0285) 860370.

● TORCH Z80 disk pack. (Z80A processor, 2x400k drives, perfect software). For BBC 'B'. Unwanted present, scarcely used. Worth £840, for £600 ono. Tel: (01) 626 4577 ext 214 (daytime only), Contact Mark Pearce.

● SHARP MZ80K, (48k), + MZ80I/O + MZ 80P3. Superb condition with original boxes. Includes manuals, cables, assorted games, languages, toolkit, and user notes. Will split, £520. Tel: South Benfleet (03745) 56940 after 6pm.

● ACT Sirius. 128k, 1.2MB storage, 1 month old, CPM86, MSDOS. £1,000 software including Wordstar, etc. Also Digital Decwriter printer, 132-col. All still under guarantee, complete system for only £2,000 +. Tel: 992-8249.

● NEWBRAIN AD computer. As new, £175. Tel: (05827) 60624.

● SHARP MZ80A, 48k. Built-in monitor and cassette, many games and programs, two manuals, Fourth and Basic languages. Dust cover, as new £300. Can deliver 50 miles. Tel: Rotherham (0709) 540336.

● SHARP PC1500. Complete with CE-150 printer and cassette interface. Also CE-15s, RS232 and parallel interface unit. As new £225 ono. Tel: Leeds 573378.

● APPLE II + DBase II, £80. Set of 4 copy programs £25. Videx 80 column card £45. All with manual. Tel: Orpington 23903 John, eves.

● TRS80, 48k L11, Monitor, tapedeck, ROM'A', utility, manual, books, 14 games, 5 utilities, inc assembler. Carrying cases. Offer nearest £200. Newcastle Upon Tyne. Tel: (091) 747477 after 6pm. Delivery or meet up to 100 miles.

● APPLE Silentype printer with interface. As new £150, 80 column card for Apple II £50. Apple 16k language card £50. Software bundle £50. Tel: (0582) 603992.

● SHARP MZ80A. Including dust cover, some software, and books £275. Tel: (0795) 874370 or 01-928 7594 aks for John Boschen.

● SHARP MZ80K. Super imported software. Great M/C games, many arcade classics, enquiries to John Parkes, Flat 7, "Wellmead", Wellwood Road, Goodmayes, Ilford, Essex, IG3 8TX.

● TRS-80 MKI Level II, 48k. Expansion interface +2 disc drives, VDU, also tape recorder and programmes £650 ono. Tel: Leek (0538) 385957. Mick Dunn, 1 Edgehill Road, Leek, Staffs.

● MICROLINE 80 printer. Friction, traction, roll paper. Manual, vgc, £180 ono. Tel: Scarborough 863737 (eve). Interface for Video Genie if required.

● ATOM 12k RAM, + FP ROM, + utility. ROM, +PSU +VIA, + sockets, + cables, + Forth compiler, + RTTY software, + modem, software, £195. Tel: Pangbourne (07357) 2119.

● VIDECOM terminal. 6 page video RAM. Tilt and swivel 15in screen, detached keyboard, 20 function keys, RS232 main and printer ports, inverse, flashing, half intensity video etc £250. Tel: Lodge Hill (66) 46255.

● NINE INCH DOT matrix printer, tractor and friction feed. Hardly used, boxed £250. Osborne 1 portable, 2x100k floppies, 64k RAM and screen, CPM Wordstar, Supercalc, and Basic £800. Tel: 0329 45977.

● GEMINI multiboard GM811. CPV card GM812, IVC card GM821, keyboard, in case with cable GM802. 64k RAM card, Gemzad assembler on cassette. All as new. Offers around £400. Tel: Wensleydale 23459.

● TANDY 100 portable computer, 24k. As new with Amdek DXY plotter. Total new £1,300, accept £695. T. Taylor, 24 Sutton Mead, Chelmer Village, Essex. Tel: eve (0245) 469207 day (0245) 356218.

● ROLAND DG100 plotter. As new. £299. Hewlett Packard HP75 computer £395. T. Taylor, 24 Sutton Mead, Chelmer Village, Essex. Tel: eve (0245) 469207 day (0245) 356218.

● HP-41CV. In mint condition complete with manuals £150 ono. Also ZX-81 with Memotech keyboard and RAMpack, joystick and interface and plenty of software £100 ono. Tel: 01-554 0037.

● NASCOM II. With 48k RAM board, I/O board, graphics, sound, and cased. Many spare bits. Software: Pascal, Chess, Zeap, Toolkit and many games including adventure. Offers around £400. Mike Lancaster (Oxford) 736011.

● OMNIS information management system for Sirius 1, £200. Tel: Southampton (0703) 774777.

● VIDEO GENIE I, EG3003, with b/w metal cased monitor, colour and sound boards, desk, joystick ports, books, abundant software and mags, £220 ono. Tel: (01) 643 7391.

● SHARP PC1500; pocket computer. 8kRAM, and printer, "Easi-file" Tape. All boxed as new. £220. May split. Tel: Morecambe (0524) 415510.

● WANTED: Newbrain disk drives and controller etc, etc. Michael Woodhouse, Brent. Tel: Pelham 027978 228 eve preferred.

● SHARP MZ-80K. 48k, perfect condition, Basic, manual, software, £230. Sinclair ZX-81 + 16k RAM. 200+ programs on cassettes, power supply, manual and leads £30. John Whelan, Tel: 01-794 0500 ext 3056 (days).

● PET 4032. Cassette, Paper Tiger graphics printer. Also Cortex hardware/software package allows use as Asynchronous mainframe terminal. Lots of software business, compilers, assembler, utilities, education, games, £500. Tel: (0634) 53556.

● HP41CV. Programmable computer 8k. For user, including manuals, boxed and etc. £105. Card reader plus manual etc, boxed, £95. Ask Graham, Tel: 01-890 5498 Middx.

● SHARP MZ80B, Epson FX80, 2x340k disks, CP/M, Wordstar, Pascal, FDos, Basic, Games, dust covers, and manuals. Worth £2,600+, accept £1,900. Write: Winbos, 102 Sherwood Street, Reading, Berks. Tel: 0734 584497.

● MZ80K. Floppy disks +10 box, + printer, + hires graphics, +2/4 MGHZ, + hundreds of programs, Wordpro, Calc, Database, + books, + mags. + 30 disks + box of listing paper. A bargain at £800 ono. Tel: Godstone 843679.

● RML 380Z + software £350 ono. Weston. Tel: Rayleigh (0268) 742128.

● SHARP MZ80A. 2 months old + programs £250. Tel: Waterloo Ville (07014) 54936.

● COMMODORE 3032 computer. 3040 disk drives, 3022 tractor printer, + Visicalc, Toolkit, Petaid (database), Sales Purchase and Nominal Ledgers. Also C2N cassette, and games disk. £850. Tel: 084421 5145, buyer collects.

● OSBORNE I. Single density, CP/M, CBasic, MBasic, Wordstar, Mailmerge, Supercalc. For quick sale £700. No offers. Tel: 084421 5145, buyer collects.

● APPLE II+ 2 drives, 16k, Videx 80-column, Z-80, cards daisywheel printer, NEC monitor. many programs including PFS, Incredible Jack, Home Accountant, Word Processors, and more. Many games. £1,500. Tel: 01-740 6569 eve.

● SUPERB Pertec PCC2000 computer. 8in disks, 12-slot card cage, Wordstar, Datastar, Mailmerge, all ledgers, MBasic, Fortran, Cobol. Would you believe £850? If you want, Centronics printer only £450. Terry (03644) 3868 (office).

● SHARP PC1500. 7.5k RAM, and cassette interface with printer and case £210 ono. Tel: Wakefield 378906 after 6.30pm.

● SHARP PC-1500. Brand new, in original box £80 ono. Tel: (021) 449 4164 (keep trying!).

● COMMODORE 4016. Large screen VDU. Immaculate. 2 years old. Cassette recorder, toolkit, ROM. Over 60 games, other software all on cassette. Very large quantity documentation. Dust cover. Offers £300. Glossop 63176.

● CBM 3032. Two CN2 cassette decks, 3022 printer, all manuals, leads etc. All in excellent condition, hobby use only, £325. Delivery 100 mile radius from Newcastle. Tel: Calder 0670 352716 (9-6).

● Tandy DMP200 printer. 6 months old, 160cps, numerous print styles including, wordprocessor quality. Serial and Centronics interfaces, tractor and friction feed, £250 ono. Tel: Laurence, Hatfield (07072) 65466 eve.

● HEWLETT PACKARD HP-85. In excellent condition, 32k RAM with Advanced Programming, Matrix, Assembler ROMS, Standard Pac, all manuals +21 cartridges. Offers around £1,250. Newman, 55 Grange Road, Edinburgh. Tel: (031) 667 4989.

● SHARP MZ-80A, 48k. 800ks, software, games, educational, business, home finance, dustcover, cassettes holders. All very good condition. System worth £1000+. Will sell for £350 ono. Tel: Hindhead 5024.

● NEWBRAIN model "A". Beginners' manual and tape, 9 full C15s, handbook, PSU, all leads, various useful technical notes. £180. Tel: Jonathan Reckless, (0636) 72156, Newark, Notts, after 5pm.

● SHARP MZ-80K. 48k, with Z80A CPU. 2/4Mg Htz switchable. Extended Basics, Compiled Basic, Zen Assembler, Wordpro, Calc 3.1, Spreadsheet, Deansoft, Database, + many more, user notes, £280 ono. Tel: Minter, Maidenhead (0628) 75816.

● BBC MODEL B. O/S. 1.2, with £50 worth of software. First offer over £300. Call at 64 Knolton Way, Slough after 5pm.

● BRAND new unused Toshiba P1350 printer. Unwanted prize, still boxed, fully guaranteed. 100 cps letter quality, 192 cps draft. Retail price £1,495. Bargain at £1,245. Superb machine. Tel: Jonathan (025671) 2723 3277.

● WANTED: APPLE II. 48k Europlus. Must be less than £250. Any condition considered but condition must be reflected in price. Send full details to Mr Gooding, 544 Coldhams Lane, Cambridge CB1 3JL.

● APPLE II Europlus. 48k. Twin Dos 3.5 disk drives, language card, 12in Hitachi B/W monitor. Silentype printer, Pascal language system. Manuals, Books, software. Immaculate condition. £1000 ono. Tel: (0783) 862896 (eves).

● SHARP MZ80K. 48k with Quantum hi-res + integral monitor/cassette. Large quantity software, listings, manuals, books. Quick sale preferred, offers £250+, ex. cond. Tel: Michael, 01-889 1090 eve (London N11). Delivery possible.

● NASCOM2. With 48k RAM card, Gemini EPROM/ROM card. All factory built and tested. Zeap, Nasdis, Naspen, Pascal, Hullforth etc, with manuals. System cased, £300 ono. Tel: (0698) 887473 after 6pm.

● PAPER TIGER 560 matrix printer. 155 cps, 132 col, width. Virtually unused. Excellent printer. One box paper included. Only £170. Please tel: 01-546 9944 (day) or Burgh Heath (07373) 53668 (eve).

● NEWBRAIN AD, + Sharp. 12in green screen monitor, manuals, printer lead, some software including Database and games. All mint, boxed, unused. Best genuine offer secures. Tel: 01-554 3661.

● NEWBRAIN AD. 32k RAM accepts TV or monitor. Includes power supply and all leads, + beginners guide. Full working order, £110. Tel: Huw (01) 888 0226.

● APPLE II and SIRIUS I software. Word Star, Accounting and Stock Control packages, Systematic International. All new and unregistered. Tel: 01-546 9944 for details.

● MEMOTECH MTX512, 64k computer. Almost unused. Software and leads included, £260, or WHY? BBC, Hobbit fast tape system, tapes, ROM, £85. Portable television, damaged case, g.w.o, £20. Tel: Stalham (0692) 82063.

● SHARP MZ80K. 48k RAM. Built in monitor and cassette deck. 4 Basics + many games, utilities, user-notes, and manuals. 1 year old, as new, £260 ono. Tel: Edinburgh (031) 337 4256.

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● SHARP MZ80B 64k; Twin disks, printer, I/O, expanded hi-res, disk Basic, compiler, Fdos, Chess, manuals. Offers around £900. Tel: Jeremy Turner (01) 609 4209. During office hours; weekends. London, delivery possible.

● TORCH Z80. 2nd processor, upgrade for BBC micro. Complete with perfect software package, ideal for business use, unused. £300 delivered. Tel: (031) 346 0591. After 6pm.

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● SPECTRUM 48k. Excellent condition, includes loads of software. All wires and cables included. Also all manuals. Great bargain at £150. Tel: (01) 455 0765 ask for Darren (after school/weekends).

● SPECTRUM 48k. Excellent condition, boxed + network NW900, computer cassette recorder. All under guarantee, (Spectrum for 11 months), +£65 worth of software including Valhalla. Worth £252, sell £40 cash. Tel: (01) 641 4512. After 5.00 pm weekdays.

● SHARP MZ-80 software. Excellent games and adventures. The Dragonslayer £4.50, The Zarwian Disaster £4.50, or £8 for both. No postage. Eric Hallsworth, 26 Frankwell Street, Tywyn,Gwynedd LL36 9EW.

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Please find enclosed my cheque/PO for £2.50 for the following Transaction File ad.

ACC NEWS

Rupert Steele provides some helpful advice on how to set up a local computer club.

I thought it would be useful this month to give some advice on setting up local computer clubs, so here are some points gathered from established clubs and the experience of the ACC.

Setting up a club

Before you set up a club, it is worth double checking that there isn't one already in your area. Some Computer Towns and clubs either restrict their advertising deliberately while they build their foundations, or else they just aren't much good at publicity. If you do find another club nearby, it may well be better to join rather than strike out on your own. Otherwise there's a risk (if there are not enough people in the area) that you'll end up with two mediocre clubs rather than one potentially good one.

Consult the ACC's clubs database, a selection of recent computer magazines and local computer shops in order to find details of nearby clubs. Experience suggests that an area about the size of a parliamentary constituency or a medium-sized town is about right for supporting a local computer club. However, with the advent of the various cheap 'off-the shelf' computers, it is becoming possible to start computer clubs in rather smaller areas. For example, there are a number of computer clubs at people's places of work, and a number of machine specific local groups in highly populated areas. Note also that Computer Towns often co-exist with clubs, as the former cater for beginners, and that seasonal university or college clubs can often supplement and enhance a local group.

Before you do anything, you will need to have a group of people to provide help. Apart from your friends, one good source is neighbouring clubs to see what they do. You may meet one or two people who could form a 'steering committee' with you to help get the thing off the ground. Providing you are diplomatic about it, and don't seem to be poaching their members, a neighbouring club may give you substantial support. Perhaps you could invite somebody to come and speak at one of your early meetings.

Club objectives

Once you have a steering committee, decide what kind of club you want. Is it just a meeting place, a source of free computing facilities or a teaching centre? Businessmen and children require more organisation and support than hobbyists; ideally, you will have separate groups for these, but this will have to wait until you have a few more people around to help. You should also decide at this point whether the club should be part of the national hobbyist movement and affiliated to the Association of Computer Clubs (ACC). If so, contact me at the address below with details of your club.

The next requirement is a meeting place. Aim for somewhere free or not too expensive, or you may end up with a £10 membership fee just to pay for the venue. Start by trying your technical college: the best person to approach is the head of the Electrical or computing department. Don't forget that colleges are closed for half the year! Or try community centres, church halls, libraries, schools or a pub. Libraries are popular with Computer Towns, but you may run into problems of noise disturbing other users. Perhaps one of your potential members owns a computer shop with spacious premises — it's worth a try.

Once the meeting place is established think about publicity. Be cautious: although it may seem attractive to go for a splash in the local paper(s), the result may be 200 or more people with little or no knowledge of computers (who will not appreciate the fact that you cannot instantly mend all their ZX81s). So, build up your capability and expertise. Inform the ACC and the major computing magazines. Contact local libraries, computer shops (to attract enthusiasts) and local newspapers. Control the rate of your publicity so that you have a steady flow of new recruits.

People are greatly influenced by the first meeting they attend, and expect to be given the answer to all their (computing!) desires. You'll always have the problem of trying to appeal to all tastes simultaneously, so provide variety, not only between meetings, but within them. Local shops will often be prepared to give a presentation of their wares, but mostly you will have to rely on the more knowledgeable of your club members for lectures.

Structure

With a few active members, try and formalise the set-up of the club. You may already have co-opted people to supplement those on the steering committee, but you should aim, as soon as possible, to hold your first Annual General Meeting (AGM) at which a constitution will be adopted and a committee formally elected. Also at the AGM, you may wish to put a club budget to the members for approval. A useful exercise is to estimate the costs per year of running the club, the target number of members and the necessary subscription. Presenting such a budget to the club for approval will both ensure that you have thought it out properly, and give the members a sense of participation.

The officers that you require are chairman, secretary and treasurer, but a membership secretary is also necessary to handle membership records, and to distribute meeting lists to the membership.

If you require a bank account, you'll have to fill out a 'mandate' form (obtainable from your bank), and a photocopy of the completed form should be attached to the minute book. The bank will require a copy of the club's constitution although this is not always necessary. The bank will want you to specify the signatories on the account: a common arrangement is two out of three officers (for example, treasurer, secretary and chairman).

Finally, you may wish to take out insurance on behalf of the club. It is advisable to have 'public liability' insurance to cover claims resulting from injury or damage resulting from club activities; otherwise individual members and committee members could be personally liable. Some form of equipment insurance may also be desirable. The ACC can help your club with insurance, should you wish to take it out.

Good luck, and *don't forget to tell the ACC!*

Insurance deal

The ACC is presently negotiating an insurance deal to be available to all affiliated computer clubs. It hopes soon to announce FREE public liability cover for affiliated computer clubs, with very cheap equipment cover as an optional extra. The affiliation fee is £6 per annum. Full details of the cover will be given as soon as details are finalised.

To contact the ACC about your local club, or to enquire about the new insurance schemes, write to: Rupert Steele, 17 Lawrie Park Crescent, London, SE26 6HH or call (01) 370 0601 day or evening.

END

CTUK

Interested in setting up a Computer Town? Why not write to Surya for guidelines.

If you're new to computers, and would like some help and support from more experienced hobbyists, then Computer Towns are a good place to start. And if there is no Computer Town near you, why not start one of your own? All you need are a few interested people, a place to meet and a notice to advertise the meetings. A set of guidelines to assist people setting up Computer Towns is available by sending an A4 sae to Surya at *PCW*.

COMPUTER TOWN UK! CONTACTS

Ray Skinner
22 Colsterdale Close
High Grange
Billingham
Cleveland

Keith Taylor
Carter Hydraulic Works
Thornbury
Bradford BD3 8HG

Chris Woodford
31 Hopley Road
Anslow
Burton-on-Trent
Staffordshire

Alan Hooley
21 Brammay Drive
Tottington
Bury BL8 3HS

Peter J Kiff
2 Ranelagh Grove
St Peter's in Thanet
Broadstairs
Kent CT10 2TE

John Byfield
Moonrakers
The Rutts
Bushey Heath
Herts WD2 1LH

Peter Earthy
46 High Street
Church Stretton
Shropshire SY6 6BX

Brigitte Gordon
18 Purbright Crescent
New Addington
Croydon CR0 0RT

Vernon Gifford
111 Selhurst Road
Croydon
London SE25 6LH

Derek Moody
2 Victoria Terrace
Dorchester
Dorset DT1 1LS

Peter Herring
Ordnance Road Library
Ordnance Road
Enfield
Middx

John Stephen Bone
2 Claremont Place
Gateshead
Tyne & Wear NE8 1TL

B J Candy
9 Oakwood Drive
Gloucester GI3 3JF

Mike Sones
Gayton Library
Gayton Road
Harrow
Middx

John Barton
Ashford Main Library
Church Road
Ashford
Kent

Andrew Holyer
10 Masons Road
Mannings Heath
Horsham
Sussex RH13 6JP

Robin Bradbeer
Polytechnic of
North London
Holloway Road
London N7

Ted Ellerton
25 Beachdale
Winchmore Hill
London N21

John Mileham
RACS
147 Powis Street
London SE18 6JN

Vernon Quaintance
50 Beatrice Avenue
Norbury
London SW16 4UN

J G Batch
Central Library
Clapham Road
Lowestoft NR32 1DR

Brian Taylor
22 Millbrook
Leybourne
Nr Maidstone
Kent ME19 5QJ

JO Dale
12 Poplar Road
Newtown
Powys SY16 2QS

Andrew Stoneman
135 Birchdale Avenue
Newcastle-Upon-Tyne

E N Ryan
15 Queens Square
Eastwood
Nottingham NG16 3BJ

Derek Knight or
Bob Carter
Rayners Lane Library
Imperial Drive
Rayners Lane
Middx

Patrick Colley
52 Queensway
Caversham Park
Village
Reading
Berks RG4 0SI

Bill Gibbings
2 Longholme Road
Retford
Notts DN22 6TU

Chris Cooper
110 Church Road
Hanwell
London W7

J M A Kilburn
(Headmaster)
Shawfield Norden
Community Middle
School
Shawfield Lane
Norden
Rochdale L12 7QR

Philip Joy
130 Rush Green Road
Romford
Essex

R Shipton
17 Woodlands Avenue
Eastcote
Ruislip
Middx

Paul Maddison
Gardenways
Chilworth
Southampton SO1 7JH

Roger Shears
181 Woodmill Lane
Bitterne Park
Southampton SO2 4PY

Richard Powell
22 Downham Court
South Shields
Tyne & Wear

Mike Perry, Steve
Collas or Dave Lee
The Library
Ealing Road
Wembley
Middx HA0 4BR

Alan Potten
14 Foxmede
Rivenhall End
Witham
Essex

Alan Sutcliffe
4 Binfield Road
Wokingham
Berks RG11 1SL

Peter Stone or
P Strangman
Computing and Maths
Dept
The Polytechnic
Wulfruna Street
Wolverhampton
WV1 1LY

Tony Cartmell
54 Foregate Street
Worcester WR1 1DX

Martin Haugh
Hayes Library
Golden Crescent
Hayes
Middx

R L Saunders
14 St Nicholas Mount
Hemel Hempstead
Herts

Computer Town UK! is a rapidly expanding network of computer literacy centres where members of the public are given free access to all sorts of computer equipment. This is courtesy of those willing to offer time/resources. You can find a Computer Town anywhere—they're often in libraries or schools. The aim is to make micros enjoyable and non-threatening, so axe-grinding of any sort is banned. Guidelines are available for those interested in starting up their own 'Towns. Write to: Margaret Spooner, Computer Town UK!, PCW, 62 Oxford Street, London W1A 2HG. Remember to enclose an A4 SAE for your reply. Please don't ring for information as Computer Town UK! is entirely a spare time activity.

BENCHMARKS

A listing of the Benchmarks used when evaluating micros is given below. An explanation can be found in the December '83 issue.

```
100 REM Benchmark 1
110 PRINT "S"
120 FOR K=1 TO 1000
130 NEXT K
140 PRINT "E"
150 END
```

```
100 REM Benchmark 2
110 PRINT "S"
120 K=0
130 K=K+1
140 IF K<1000 THEN 130
150 PRINT "E"
160 END
```

```
100 REM Benchmark 3
110 PRINT "S"
120 K=0
130 K=K+1
140 A=K/K*K+K-K
150 IF K<1000 THEN 130
160 PRINT "E"
170 END
```

```
100 REM Benchmark 4
110 PRINT "S"
120 K=0
130 K=K+1
140 A=K/2*3+4-5
150 K<1000 THEN 130
160 PRINT "E"
170 END
```

```
100 REM Benchmark 5
110 PRINT "S"
120 K=0
130 K=K+1
140 A=K/2*3+4-5
150 GOSUB 190
160 IF K<1000 THEN 130
170 PRINT "E"
180 END
190 RETURN
```

```
100 REM Benchmark 6
110 PRINT "S"
120 K=0
130 DIM M(5)
140 K=K+1
150 A=K/2*3+4-5
160 GOSUB 220
170 FOR L=1 TO 5
180 NEXT L
190 IF K<1000 THEN 140
200 PRINT "E"
210 END
220 RETURN
```

```
100 REM Benchmark 7
110 PRINT "S"
120 K=0
130 DIM M(5)
140 K=K+1
150 A=K/2*3+4-5
160 GOSUB 230
170 FOR L=1 TO 5
180 M(L)=A
190 NEXT L
200 IF K<1000 THEN 140
210 PRINT "E"
220 END
230 RETURN
```

```
100 REM Benchmark 8
110 PRINT "S"
120 K=0
130 K=K+1
140 A=K^2
150 B=LOG(K)
160 C=SIN(K)
170 IF K<1000 THEN 130
180 PRINT "E"
190 END
```

DIARY DATA

Readers are strongly advised to check details with exhibition organisers before making arrangements to avoid wasted journeys due to cancellations, printers' errors, etc.

Atlanta (USA)	COMDEX. Contact: Interface Group, Inc, 300 First Ave, Needham, MAO 2194	22-25 May
Plymouth	(Guildhall). S W Business Computer Fair. Contact: Business Computer Fairs, (0202) 513829	24-25 May
Paris	International Exbn on Robotics, CAD/CAM Automation - 1, Engineering in Automated Production. Contact: Sepic (1) 359 1030	22-29 May Not 27
London	(Kensington Exbn Centre), Digital Equipment Hardware & Software Exbn. Contact: CGP Ltd, (01) 582 9256	30 May-1 June
London	(Cunard Int Hotel), Video Disk & Digital Optical Disk Conf & Exbn. Contact: Meckler Communications (01)240 0856	31 May-1 June
London	(Earls Court), Software Show. Contact: Reed Exbns, (01) 643 8040	5-7 June
London	(Novotel), International Commodore Computer Show. Contact: D & CS Marketing, (0753) 29742	7-9 June
London	(Wembley Conf Centre), IBM Computer User Show. Contact: Online Conf Ltd, (01) 868 4466	12-14 June
Poole	(Arts Centre), Dorset Business Computer Fair. Contact: Business Computer Fairs, (0202) 513829	14-15 June
London	(Earls Court), Computer Fair. Contact: Reed Exbns, (01) 643 8040	14-17 June
Los Angeles	BYTE Computer Show. Contact: Interface Group, Inc, 300 First Ave, Needham, MAO 2194	14-17 June
Manchester	(Belle Vue), Compec North. Contact: Reed Exbns, (01) 643 8040	19-21 June
London	(Royal Lancaster), National Conference & Exbn on Computers in Personnel. Contact: Peter Mirrington Exbns, (0277) 232030	26-28 June
Las Vegas	National Computer Conference & Exbn. Contact: American Federation of Information Processing Societies, Inc 1815 N Lynn St, Arlington, VA22209	9-12 July

MICROMART

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PROGRAMS

We regret that we are unable to accept any further program submissions for the time being. We have been inundated with programs, and simply cannot handle any more at the moment.
Apologies to those of you who have submitted programs and are awaiting a response. Processing submissions takes time, but all programs submitted to date will be acknowledged. Thanks for your patience!

This month's programs selection offers an even balance of games and utilities. Program of the Month is a powerful disk recovery program for the BBC Micro — a tool which no disk-based BBC owner should be without.

'Word' is a conversion of the BBC text editor published in the December issue. With a little work, it can be adapted to run on any of the Sharp machines (well, perhaps not the pocket ones!). 'Brackets' is a simple but invaluable listings utility for the Commodore 64, providing an end to all those unreadable Commodore control codes. 'Function keys' provides Atari owners with 10 programmable function keys — without hardware mods!

'Martian attack' is an arcade-style game for a 48k Spectrum. 'Stockmarket' is a new twist on an old theme. Running on the Atari micros, it's a version of the popular investment game but with the added plus of a real-time element. Finally, 'Bigwriter' is a simple utility for an unexpanded Jupiter Ace.

Games
Scientific/mathematic
Business
Toolkit/utilities
Educational/Computer Aided Learning



Program of the Month
BBC Sected
by R Nurse and S James

'Sected' is an abbreviation for sector editor. It provides similar features to 'Disk Doctor' for a disk-based BBC Model B and can be used with both 40-and 80-track drives.

Sected allows the user to examine and/or modify a disk, sector-by-sector, in either hexadecimal or ASCII modes. Its prime use is to recover corrupted disks by modifying the corrupted sectors. I found it every bit as useful and powerful as many commercial packages.

When the program is run, you will be prompted for the drive to be used; for single-drive systems, this will normally be drive 0. You are then asked for the start track and sector — that is, the first sector you want to examine. To look at the disk directory, for example, you would enter 0 for both track and sector.

The screen format (see screendump) comprises 16 lines of 16 columns: a total of 256 bytes, or one sector. The drive number, track and sector are shown at the top of the screen — together with a 'Loaded' message if the sector loads without error, or a 'Load error' if the sector is physically damaged.

To modify the sector, use the cursor keys to move to the desired location. By entering a two-digit hexadecimal value the existing value can be overwritten. For those more familiar with ASCII, press SHIFT-FO and enter a character. The ASCII value of the character is then written to the cursor position, and the cursor moves one position to the right.

If you have modified a sector, and wish to save the changes, press the TAB key to save the edited sector to disk before loading a new sector. To move to a new sector, press SHIFT and the right or left cursor key. To move to a new track, press CTRL and the right or left cursor key.

To 'fill' an area of the disk with a character, move the cursor to the start of the area to be filled and press SHIFT + F1. You will then be prompted to move the cursor to the end of the area to be filled and press SHIFT + F1 again. Next, enter a hex value if you are in hex mode, or press a key if you are in ASCII mode, and then TAB to save the sector to disk. RETURN then loads the sector again if you want to continue working on it.

To dump a sector to a printer, press SHIFT + F2. This option assumes an 80-column (or wider) printer and assumes automatic line-feeds. If your printer does not perform automatic line-feeds on carriage returns, add in a new line as follows:

65 × FX 6,0

Finally, to exit the program press ESCAPE. You will be asked if you wish to save the current sector (y/n) and then returned to Basic.

PROGRAMS

```
   10 REM ************************************************
   20 REM *                                              *
   30 REM *           SECTED - Disc Sector Editor        *
   40 REM *           (C) R.Nurse & S.James 1984         *
   50 REM *                                              *
   60 REM ************************************************
   70 *FX226,200
   80 MODE3
   90 VDU23;8202;0;0;0;
  100 VDU23,224,0,16,32,64,255,64,32,16
  110 VDU23,225,0,8,4,2,255,2,4,8
  120 *FX4,1
  130 stmem%=&900:endmem%=stmem%+&FF
  140 PROCmc
  150 ONERRORGOTO170
  160
  170 CLS
  180 PRINTTAB(30)"DISC SECTOR EDITOR"
  190 PRINTTAB(30)"------------------"
  200 PRINT'TAB(25)"(C) R.Nurse & S.James 1984"
  210 !&71=stmem%:?&73=0:?&74=0:?&75=3:REM Set up OSWORD block
  220 ntrack%=40:REM No.tracks
  230 INPUT''"   Drive No.:"dr$
  240 dr%=EVALdr$:IFdr%<0 GOTO170
  250 ?&70=dr%
  260 PRINT" Track(0-";ntrack%-1");";:INPUT""tr$
  270 track%=EVALtr$
  280 IFtrack%<0 ORtrack%>(ntrack%-1) GOTO170
  290 INPUTTAB(1)"Sector(0-9):"se$
  300 sect%=EVALse$
  310 IFsect%<0 ORsect%>9 GOTO170
  320 PROCload(track%,sect%)
  330 *FX15,1
  340 xx%=5:yy%=2:ascii%=0:no%=0
  350 CLS:Mode$="Hex  ":PROCscprint
  360 PRINTTAB(0,18)"Commands:"
  370 PRINT"TAB  - Save this sector onto disc";SPC(5);"RETURN";SPC(4);"-Reload t
his sector from disc"
  380 PRINT"SHIFT f0  -Change mode (Ascii-Hex)";SPC(4);"SHIFT f1  -Fill part of
current sector"
  390 PRINT"CTRL  ";CHR$224;",";CHR$225;" -Back,forwards a track";SPC(6);"SHIFT
";CHR$224;",";CHR$225;" -Back,forwards a sector"
  400 PRINT"SHIFT f2  -Print sector on printer"
  410 ONERROR GOTO1660
  420 REPEAT:PROCmove:UNTIL0
  430 END
  440
  450 REM Check any keys pressed,move cursor
  460 DEFPROCmove
  470 key%=INKEY(0):IFkey%=-1ENDPROC
  480 xm%=0:ym%=0
  490 IFkey%=9 PROCsave(track%,sect%):ENDPROC
  500 IFkey%=13 PROCload(track%,sect%):PROCscprint:ENDPROC
  510 IFkey%=200 PROCswapmode:ENDPROC
  520 IFkey%=201 PROCfillsect:ENDPROC
  530 IFkey%=202 PROCprinter:ENDPROC
  540 IFINKEY(-1) ANDkey%=136 PROCsect(-1):ENDPROC
  550 IFINKEY(-1) ANDkey%=137 PROCsect(1):ENDPROC
  560 IFINKEY(-2) ANDkey%=136 PROCtrack(-1):ENDPROC
  570 IFINKEY(-2) ANDkey%=137 PROCtrack(1):ENDPROC
  580 IFkey%=136 xm%=-3
  590 IFkey%=137 xm%=3
  600 IFkey%=139 ym%=-1
  610 IFkey%=138 ym%=1
  620 IFkey%<127 ANDascii% PROCvalput(key%):xm%=3:GOTO640
  630 IFkey%>47 ANDkey%<58 ORkey%>64 ANDkey%<71 ANDascii%=0 PROChexin:ENDPROC
  640 IFxm%=0 IFym%=0 ENDPROC
  650 IFxx%+xm%<3 xm%=45:ym%=-1
  660 IFxx%+xm%>50 xm%=-45:ym%=1
  670 IFyy%+ym%<2 ym%=15
  680 IFyy%+ym%>17 ym%=-15
  690 PRINTTAB(xx%,yy%)" "
  700 xx%=xx%+xm%:yy%=yy%+ym%
  710 PRINTTAB(xx%,yy%)">"
  720 ENDPROC
  730
  740 REM Input Hex Number
  750 DEFFNinput
  760 XX%=POS:YY%=VPOS
  770 I$="":REPEAT
  780 II%=GET:IFII%=127 A$=LEFT$(A$,LENA$-1)
  790 IFII%=13GOTO830
  800 IFII%=38GOTO820
  810 IFII%<48ORII%>70 VDU7:GOTO780
  820 I$=I$+CHR$II%:PRINTTAB(XX%,YY%)I$" "
  830 UNTILII%=13 ORLENI$=2
  840 IFI$="" GOTO760
  850 =I$
  860
  870 REM Put value (V%) into sector at present position of cursor
  880 DEFPROCvalput(V%)
  890 row%=FNrow(yy%):col%=FNcol(xx%)
  900 val$=STR$~V%:IFLENval$<2 val$="0"+val$
  910 IFV%<32 OR V%>126 AS$="." ELSEAS$=CHR$V%
  920 PRINTTAB(xx%+1,yy%)val$TAB(55+col%,yy%)AS$
  930 ?(stmem%+row%*16+col%)=V%
  940 ENDPROC
  950
  960 REM Save present sector onto disk
  970 DEFPROCsave(track%,sect%)
  980 ?&76=&4B
  990 A%=&7F:X%=&70:Y%=0:CALL&FFF1
 1000 ENDPROC
 1010
 1020 REM Swap between Hex & Ascii Modes
 1030 DEFPROCswapmode
 1040 IFMode$="Hex  " Mode$="Ascii" ELSE Mode$="Hex  "
 1050 PRINTTAB(30,0)Mode$
 1060 ascii%=1-ascii%
 1070 ENDPROC
 1080
 1170 REM Put Hex number into sector
 1180 DEFPROChexin
 1190 v%=?(stmem%+FNrow(yy%)*16+FNcol(xx%))
 1200 hex$=STR$~(v% MOD16)+CHR$key%
 1210 PROCvalput(EVAL("&"+hex$))
 1220 ENDPROC
 1230
 1240 REM Move to new sector
 1250 DEFPROCsect(D%)
 1260 IFno%PRINTTAB(0,23)STRING$(50," "):no%=0:REM Cancel fill
 1270 sect%=sect%+D%
 1280 PRINTTAB(40,0)STRING$(10," ")
```


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PROGRAMS

```
1290 IFsect%>9 sect%=0:PROCtrack(1):ENDPROC
1300 IFsect%<0 sect%=9:PROCtrack(-1):ENDPROC
1310 PROCload(track%,sect%)
1320 PROCscprint
1330 *FX15,1
1340 ENDPROC
1350
1360 REM Move to new track
1370 DEFPROCtrack(D%)
1380 PRINTTAB(40,0)STRING$(10," ")
1390 IFno% PRINTTAB(0,23)STRING$(50," "):no%=0
1400 track%=track%+D%
1410 IFtrack%>ntrack%-1 track%=0
1420 IFtrack%<0 track%=ntrack%-1
1430 PROCload(track%,sect%):PROCscprint
1440 *FX15,1
1450 ENDPROC
1460
1470 REM Load track,sector
1480 DEFPROCload(TT%,SS%)
1490 ?&76=&53:?&77=TT%:?&78=SS%:?&79=&21
1500 A%=&7F:X%=&70:Y%=0:CALL&FFF1
1510 ENDPROC
1520
1530 REM Display present sector
1540 DEFPROCscprint
1550 VDU30
1560 IF?&7A<>0 Err$="Load Error":VDU7 ELSE Err$="Loaded     "
1570 PRINTTAB(5,0)"Track:";?&77" "TAB(15,0)"Sector:";?&78" "TAB(25,0)"Mode:"Mod
e$
1580 IF?&7A COLOUR0:COLOUR129
1590 PRINTTAB(40,0)Err$;CHR$20;TAB(55,0)"0123456789ABCDEF"
1600 PRINTSTRING$(80,"=");
1610 CALLdump%
1620 PRINTTAB(xx%,yy%)">"
1630 ENDPROC
1640
1650 REM Error Detected
1660 *FX4
1670 IFERR<>17MODE7:CLS:REPORT:PRINTERL:END
1680 PRINTTAB(0,23)STRING$(45," ")
1690 COLOUR129:COLOUR0:PRINTTAB(0,23)"Save Sector?":VDU20
1700 A$=GET$:IFA$="Y"PROCsave(track%,sect%)
1710 END
1720
1730 REM Machine Code for printing sector contents to screen
1740 DEFPROCmc
1750 DIM dump% 200
1760 FORT%=0TO2STEP2:P%=dump%
1770 [OPTT%:LDY#0
1780 .loop JSR num:JSR row:JSR chars:CPY#0:BNE loop:RTS
1790 .row LDX#0:JSR spc:.rl LDA stmem%,Y:JSR hex:JSR spc:INY:INX:CPX#16:BNE rl:
JSR spc:RTS
1800 .num JSR spc:TYA:JSR hex:JSR spc:LDA#58:JSR &FFEE:RTS
1810 .chars TYA:SEC:SBC#16:TAY
1820 LDX#0:.cl LDA stmem%,Y:CMP#32:BCC nprint:CMP#127:BCS nprint:.cont JSR &FFE
E:INY:INX:CPX#16:BNE cl:JSR &FFE7:RTS
1830 .nprint LDA#46:JMP cont
1840 .hex PHA:LSRA:LSRA:LSRA:LSRA:JSR hexnyb:PLA:AND#15:JSR hexnyb:RTS
1850 .hexnyb CMP#10:BCC hexny1:CLC:ADC#7
1860 .hexny1 CLC:ADC#48:JSR &FFEE:RTS
1870 .spc LDA#32:JSR &FFEE:RTS
1880 ]:NEXT
1890 ENDPROC
1900
1910 REM Fill part of present sector
1920 DEFPROCfillsect
1930 pos%=FNrow(yy%)*16+FNcol(xx%)
1940 COLOUR129:COLOUR0:PRINTTAB(0,23);:IFno%=0 PRINTTAB(0,23)"Move cursor to ot
her point,then press SHIFT f1":no%=no%+1:p1%=pos%+stmem%:VDU20:ENDPROC
1950 p2%=pos%+stmem%
1960 VDU20:PRINTSTRING$(50," ")
1970 IFMode$="Ascii" CH$="Character" ELSECH$="Value"
1980 COLOUR129:COLOUR0:PRINTTAB(0,23)CH$" to fill with:";
1990 IFMode$<>"Ascii" val%=EVAL("&"+FNinput) ELSEREPEATC%=GET:UNTILC%<127:val%=
C%
2000 VDU20:PRINTTAB(0,23)STRING$(30," ")
2010 IFp1%=p2% ?p1%=val%:GOTO2040
2020 FORT%=p1% TOp2% STEP SGN(p2%-p1%)
2030 ?T%=val%:NEXT
2040 no%=0:PROCscprint
2050 PRINTTAB(0,23)STRING$(20," ")
2060 ENDPROC
2070
2080 REM Print sector on printer
2090 DEFPROCprinter
2100 *FX3,10
2110 IF?&7A Err$="Load Error" ELSE Err$="Loaded"
2120 PRINT'TAB(5)"Track:";?&77" ";TAB(15)"Sector:";?&78" ";TAB(25)"Mode:"Mode$;
TAB(40)Err$;TAB(55)"0123456789ABCDEF"
2130 PRINTSTRING$(80,"=");
2140 CALLdump%
2150 VDU3:*FX3,0
2160 ENDPROC
2170
2180 DEFFNcol(XX%) =(XX%-3)DIV3
2190 DEFFNrow(YY%) =YY%-2
2200
2210 REM ** END OF LISTING **
```

```
   Track:27  Sector:5  Mode:Hex      Loaded        0123456789ABCDEF
================================================================================
00 :)00 00 AA 05 DB 0D 00 B4 1D F1 0A 33 30 29 22 44  ...........30)"D
10 : 49 53 43 20 53 45 43 54 4F 52 20 45 44 49 54 4F  ISC SECTOR EDITO
20 : 52 22 0D 00 BE 1D F1 0A 33 30 29 22 2D 2D 2D 2D  R".......30)"----
30 : 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 22 0D  ----------".
40 : 00 C8 26 F1 27 0A 32 35 29 22 28 43 29 20 52 2E  ..&.'.25)"(C) R.
50 : 4E 75 72 73 65 20 26 20 53 2E 4A 61 6D 65 73 20  Nurse & S.James
60 : 31 39 38 34 22 0D 00 D2 3A 21 26 37 31 3D 73 74  1984"....:!&71=st
70 : 6D 65 6D 25 3A 3F 26 37 33 3D 3D 3A 3F 26 37 34  mem%:?&73=0:?&74
80 : 3D 3A 3A 3F 26 37 35 3D 33 3A F4 20 53 65 74 20  =0:?&75=3:. Set
90 : 75 70 20 4F 53 57 4F 52 44 20 62 6C 6F 63 6B 0D  up OSWORD block.
A0 : 00 DC 1A 6E 74 72 61 63 6B 25 3D 34 30 3A F4 20  ...ntrack%=40:.
B0 : 4E 6F 2E 74 72 61 63 6B 73 0D 00 E6 19 E8 27 27  No.tracks.....''
C0 : 22 20 20 20 44 72 69 76 65 20 4E 6F 2E 3A 22 64  "  Drive No.:"d
D0 : 72 24 0D 00 F8 19 64 72 25 3D A0 64 72 24 3A E7  r$....dr%=.dr$:.
E0 : 64 72 25 3C 30 20 E5 8D 74 6A A0 0D 00 FA 8C 3F  dr%(0 ..tj@....?
F0 : 26 37 30 3D 64 72 25 0D 01 04 26 F1 22 20 54 72  &70=dr%....&." Tr
```

PROGRAMS

```
Commands:
TAB  - Save this sector onto disc     RETURN    -Reload this sector from disc
SHIFT f0 -Change mode (Ascii-Hex)     SHIFT f1  -Fill part of current sector
CTRL ←,→ -Back,forwards a track       SHIFT ←,→ -Back,forwards a sector
SHIFT f2 -Print sector on printer
```

Example of screen display during use

Sharp Word

by Maurice Webb and David Sandy

As promised in the December 1983 issue, here is a Sharp conversion of BBC 'Word'—the text editor. Running under Basic SP-5510 with the Apollo Bas Mod V3 on the MZ-80K, it is written to enable easy conversion to any Sharp machine.

The program is menu-driven, and offers the same facilities as the BBC program published last year. After selecting menu option 1, you can enter text. Control characters are preceded by a backslash ('/'). The four control characters available in text input mode are:

'/n' — force a newline
'/m' — return to menu
'/v' — edit mode
'/p' — paragraph indent

For instructions, select option 7 (Help) from the main menu. You can call these instructions at any time by '/M' (to return to the menu) followed by '7'.

```
10 REM ********************************
20 REM *                              *
30 REM *          Just Words          *
40 REM *                              *
50 REM *        by Maurice Webb       *
60 REM *         & David Sandy        *
70 REM *                              *
80 REM *                    c 1984    *
90 REM ********************************
100 REM
110 REM Initialize
120 REM
130 CLS
140 DIM ST$(250)
150 CN=0:LL=80:LN=1:SC=1:TP=1
160 LN$=""
170 SP$=STRING$(" ",80)
180 GN=FALSE:DT=FALSE:ST=FALSE
190 FS=FALSE:ND=FALSE:PR=FALSE
200 SK=FALSE:WR=TRUE
210 PROC TITLE
220 PROC MENU
230 END
240 REM Menu selection control
250 REM
260 DEF PROC MENU
270 CLS
280 PRINT"■■Options available"
290 PRINT"■■■■■■■■■■■■■■■■"
300 PRINT TAB(7);"■■<1> Input Text"
310 PRINT TAB(7);"■<2> View Text"
320 PRINT TAB(7);"■<3> Save Text"
330 PRINT TAB(7);"■<4> Load Text"
340 PRINT TAB(7);"■<5> Copy to printer"
350 PRINT TAB(7);"■<6> Finish Program"
360 PRINT TAB(7);"■<7> Help !"
370 PRINT"■■■                Option number  ?"
380 GET OPT
390 IF OPT=1 THEN PROC TEXTIN
400 IF OPT=2 THEN PROC EDITTEXT
410 IF OPT=3 THEN PROC TAPEIT:GOTO 220
420 IF OPT=4 THEN PROC LOADTEXT:GOTO 220
430 IF OPT=5 THEN PROC PRINTIT:GOTO 220
440 IF OPT=6 THEN CLS:BEEP:FS=TRUE:END
450 IF OPT=7 THEN PROC HELP
460 IF OPT<7 THEN 380
470 IF FS=TRUE THEN END
480 RET
490 REM Store text in array
500 REM
510 DEF PROC TEXTIN
520 CLS:BEEP
530 REPEAT
540 PRINT"■■■■■■■■■■■■■■■■
```

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PROGRAMS

```
680 IF ST=TRUE PROC MESSAGE
690 RET
700 REM Input 1 line of text + checks
710 REM
720 DEF PROC INPUT
730 PRINT"Word count ";CN
740 CURSOR 0,21
750 FILL VDU+20*40,41,95
760 FILL VDU+21*40,81,0
770 PRINT"_ ";
780 LN$=""
790 REPEAT
800 IN=INKEY
810 IF IN=168 THEN IN=44
820 IF IN=185 THEN IN=46
830 IF IN=17 OR IN=20 THEN IN=20:GOTO 870
840 IF IN<32 OR FS=TRUE THEN 930
850 IF IN=96 OR IN=97 OR IN=102 THEN 930
860 IF IN=98 OR IN=99 THEN PROC CASE:GOTO 930
870 PRINT CHR$(IN);"_ ";
880 IF IN=47 OR IN=178 THEN PROC CONTROL:GOTO 920
890 IF IN=20 THEN PROC BACKSPACE:GOTO 930
900 IF IN=32 THEN PROC COUNT
910 LN$=LN$+CHR$(IN)
920 IF PR=TRUE THEN PRINT"                    _ ";:PR=FALSE:LN$="
930 UNTIL CSRV=23 OR FS=TRUE
940 RET
950 REM Back 1 space
960 REM
970 DEF PROC BACKSPACE
980 IF CSRV=20 THEN CURSOR 39,21:PRINT" ":BEEP:RET
990 LN$=LEFT$(LN$,LEN(LN$)-1)
1000 RET
1010 REM Store text array and display
1020 REM
1030 DEF PROC STORE
1040 ST$(LN)=LN$
1050 CURSOR 25,0:PRINT "Total lines ";TP
1060 CURSOR 0,SC:PRINT LN$
1070 LN=LN+1:SC=SC+2:TP=LN
1080 IF LN>250 THEN ST=TRUE
1090 IF SC<21 THEN RET
1100 SC=1:CLS:RET
1110 REM Check for control characters
1120 REM
1130 DEF PROC CONTROL
1140 GET A$:IF A$="" THEN 1140
1150 IF A$="N" OR A$="n" THEN PROC NEWLIN:RET
1160 IF A$="M" OR A$="m" THEN PROC MENU:RET
1170 IF A$="U" OR A$="u" THEN PROC EDITTEXT:RET
1180 IF A$="P" OR A$="p" THEN PR=TRUE:RET
1190 REM Newline Routine
1200 REM
1210 DEF PROC NEWLIN
1220 NZ=80-LEN(LN$)
1230 LN$=LN$+STRING$(" ",NZ)
1240 CURSOR 0,23
1250 RET
1260 REM Screen edit entry
1270 REM
1280 DEF PROC EDITTEXT
1290 BEEP
1300 REPEAT
1310 PROC EDIT
1320 PRINT ST$(LN)
1330 IF B$="J" THEN PROC CONT
1340 IF B$="S" THEN PROC SCREENEDIT
1350 IF B$="R" THEN PROC RECOUNT
1360 UNTIL B$="M"
1370 IF B$="M" THEN PROC MENU:RET
1380 RET
1390 REM Delete, Insert, Menu control
1400 REM
1410 DEF PROC EDIT
1420 CLS:BT=1
1430 REPEAT
1440 CLS:CURSOR 0,1
1450 FOR LN=BT TO BT+9
1460 PRINT ST$(LN)
1470 NEXT
1480 BT=BT+10
1490 PRINT"Word count ";CN+1;"        Total lines ";TP-1
1500 CURSOR 4,22
1510 PRINT "<SPACE> stops any key continues"
1520 GET S$:IF S$="" THEN 1520
1530 UNTIL S$=" " OR BT>TP
1540 CURSOR 0,22
1550 PRINT"Re-count, Justify, Menu or Screen-Edit ?"
1560 REPEAT
1570 GET B$:IF B$="" THEN 1570
1580 UNTIL B$="M" OR B$="R" OR B$="J" OR B$="S"
1590 CLS:BEEP
1600 RET
1610 REM Justifier control
1620 REM
1630 DEF PROC CONT
1640 LN=1:CURSOR 0,1
1650 REPEAT
1660 PR=FALSE:JS$=ST$(LN)
1670 IF LEFT$(JS$,12)="            " THEN GN=TRUE
1680 IF ST$(LN+1)="" OR LEFT$(ST$(LN+1),2)="  " THEN PR=TRUE
1690 IF PR=TRUE THEN PROC JUST:GOTO 1720
```

PROGRAMS

```
1700 IF GN=TRUE THEN PROC JUST:GOTO 1720
1710 JS$=JS$+ST$(LN+1):PROC JUST
1720 ST$(LN)=JS$:PRINT JS$;
1730 LN=LN+1
1740 UNTIL LN=TP+1
1750 RET
1760 REM Justify
1770 REM
1780 DEF PROC JUST
1790 IF IG=TRUE THEN IG=FALSE:RET
1800 IF LEN(JS$)<LL THEN RET
1810 K=LEN(JS$)
1820 REPEAT
1830 REPEAT
1840 K=K-1
1850 UNTIL MID$(JS$,K,1)=" "
1860 UNTIL LEN(LEFT$(JS$,K))<=LL
1870 IF PR=TRUE THEN PROC ADJUST:ST$(LN+1)=""
1880 ST$(LN+1)=RIGHT$(JS$,LEN(JS$)-K)
1890 JS$=LEFT$(JS$,K)
1900 IF LEN(JS$)=LL THEN RET
1910 IF LEFT$(JS$,1)=" " THEN UD=FALSE ELSE UD=NOT UDOWN
1920 IF UD=TRUE THEN PROC UP:RET
1930 PROC DOWN:RET
1940 REM Insert spaces from left
1950 REM
1960 DEF PROC UP
1970 REPEAT
1980 K=0:A=LEN(JS$)
1990 REPEAT
2000 REPEAT
2010 K=K+1
2020 UNTIL MID$(JS$,K,1)=" " OR K>=A
2030 IF K>=A THEN 2070
2040 JS$=LEFT$(JS$,K)+" "+RIGHT$(JS$,A-K)
2050 A=LEN(JS$)
2060 K=K+1
2070 UNTIL A=LL OR K>A
2080 UNTIL A=LL
2090 RET
2100 REM Start from right side
2110 REM
2120 DEF PROC DOWN
2130 REPEAT
2140 K=LEN(JS$)
2150 REPEAT
2160 K=K-1
2170 REPEAT:K=K-1:UNTIL MID$(JS$,K,1)=" " OR K=12
2180 IF K>12 THEN JS$=LEFT$(JS$,K)+" "+ RIGHT$(JS$,LEN(JS$)-K)
2190 A=LEN(JS$)
2200 UNTIL A=LL OR K<=12
2210 UNTIL A=LL
2220 RET
2230 REM Move array up one
2240 REM
2250 DEF PROC ADJUST
2260 LOCAL T
2270 FOR T=TP TO LN+1 STEP -1
2280 ST$(T+1)=ST$(T)
2290 TP=TP+1
2300 NEXT T
2310 RET
2320 REM Sharp case select
2330 REM
2340 DEF PROC CASE
2350 IF IN=98 THEN GREEN:POKE 4464,0:RET
2360 IF IN=99 THEN RED:POKE 4464,1:RET
2370 REM Clean out the array
2380 REM
2390 DEF PROC NEW
2400 LOCAL N
2410 FOR N=1TOTP
2420 ST$(N)=""
2430 NEXT
2440 TP=1:CN=0:SC=1:LN=1
2450 RET
2460 REM Recall text from array
2470 REM
2480 DEF PROC OLD
2490 PRINT:SC=1
2500 FOR LN=1 TO TP
2510 CURSOR 0,SC:PRINT ST$(LN)
2520 WAIT .2:SC=SC+2
2530 IF SC=>20 THEN 2570
2540 NEXT
2550 SC=CSRU-1:LN=LN-1:TP=LN
2560 RET
2570 SC=1:CLS:FILL VDU+20*40,40,95:GOTO 2540
2580 REM Save array to tape
2590 REM
2600 DEF PROC TAPEIT
2610 P1=1:BEEP
2620 FILL VDU+21*40,40,0
2630 WOPEN"TEXT"
2640 PRINT"8"
2650 FOR VA=1TOTP
2660 PRINT/T ST$(VA)
2670 PROC VIEW
2680 NEXT
2690 PRINT/T "¥"
2700 CLOSE
2710 CLS
```


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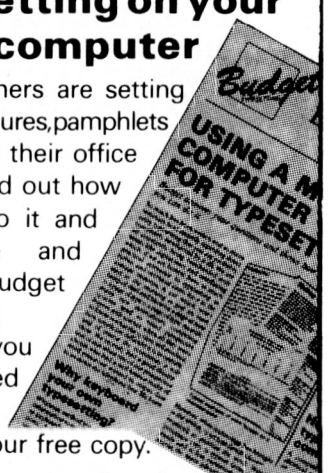
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PROGRAMS

```
2720 RET
2730 REM Load array from tape
2740 REM
2750 DEF PROC LOADTEXT
2760 P1=1:BEEP
2770 FILL VDU+21*40,40,0
2780 ROPEN "TEXT"
2790 PRINT"■"
2800 FOR VA=1 TO 250
2810 INPUT#T ST$(VA)
2820 IF ST$(VA)="¥"THEN ST$(VA)="":GOTO 2860
2830 PROC VIEW
2840 TP=VA
2850 NEXT
2860 CLOSE
2870 WAIT 2:CLS
2880 RET
2890 REM Send text to printer
2900 REM
2910 DEF PROC PRINTIT
2920 P1=1:BEEP
2930 PRINT"■■■■■■■■■■■■  Turn on printer and press any key"
2940 GET D$:IF D$="" THEN 2940
2950 CLS
2960 FOR VA=1 TO TP
2970 PRINT#P ST$(VA)
2980 PROC VIEW
2990 NEXT
3000 CLS
3010 RET
3020 REM Count words after editing
3030 REM
3040 DEF PROC RECOUNT
3050 LOCAL G,C
3060 G=1:CN=0:WR=TRUE:CLS
3070 REPEAT
3080 CURSOR 13,12:PRINT"Please wait !"
3090 FOR C=1TOLL
3100 IF MID$(ST$(G),C,1)=" "AND WR=FALSE THEN PROC COUNT:WR=TRUE
3110 IF MID$(ST$(G),C,1)<>" " THEN WR=FALSE
3120 NEXT
3130 G=G+1
3140 UNTIL G>=TP
3150 PRINT"■Word count ";CN+1
3160 RET
3170 REM Word count
3180 REM
3190 DEF PROC COUNT
3200 CN=CN+1
3210 CH=CSRH
3220 CV=CSRV
3230 PRINT"■Word count ";CN+1
3240 CURSOR CH,CV
3250 RET
3260 REM Print array in pages
3270 REM
3280 DEF PROC VIEW
3290 CURSOR 0,P1:PRINTST$(VA)
3300 P1=P1+2
3310 IF P1=21 THEN P1=1:CLS
3320 RET
3330 REM Screen-Editor
3340 REM
3350 DEF PROC SCREENEDIT
3360 CLS:PRINT "Screen - Editor                ";TP-1;" Lines"
3370 FILL VDU+1*40,40,116
3380 CURSOR 0,22
3390 INPUT "Line number ";SL
3400 IF SL<=0 THEN SL=1:GOTO 3390
3410 IF SL>=TP THEN SL=TP-1:GOTO 3390
3420 PRINT"■Screen - Editor      Line";SL;" out of";TP-1
3430 IF SL<=0 THEN SL=1:GOTO 3660
3440 IF SL>=TP THEN SL=TP-1:GOTO 3660
3450 FILL VDU+1*40,40,116
3460 IF SL>=4 THEN CURSOR 0,2:GOTO 3500
3470 IF SL=1 THEN 3530
3480 IF SL=2 THEN CURSOR 0,6:PRINT ST$(1):GOTO 3530
3490 IF SL=3 THEN CURSOR 0,4:PRINT ST$(1)
     :CURSOR 0,6:PRINT ST$(2):GOTO 3530
3500 FOR S=SL-3 TO SL-1
3510 PRINT ST$(S);
3520 NEXT S
3530 FILL VDU+8*40,40,62
3540 CURSOR 0,10
3550 PRINT ST$(SL)
3560 FILL VDU+13*40,40,54
3570 CURSOR 0,14
3580 FOR S=SL+1 TO SL+3
3590 PRINT ST$(S);
3600 NEXT S
3610 FILL VDU+20*40,40,95
3620 CURSOR 0,21
3630 PRINT TAB(4);"/View, /Menu, /Delete, /Insert,"
3640 PRINT TAB(6);"Scroll,   <> Replaces line"
3650 PRINT TAB(8);"any other key continues"
3660 GET S$:IF S$="" THEN 3660
3670 FILL VDU+21*40,120,0
3680 IF S$="/" THEN 3730
3690 IF S$="■" THEN SL=SL+1:GOTO 3420
3700 IF S$="■" THEN SL=SL-1:GOTO 3420
3710 CURSOR 0,21
3720 PROC CHANGELINE:ST$(SL)=LN$:GOTO 3420
```

PROGRAMS

```
3730 GET B$:IF B$="" THEN 3730
3740 IF B$="/" THEN 3730
3750 IF B$="D" THEN PROC CLOSEUP:GOTO 3420
3760 IF B$="U" THEN RET
3770 IF B$="I" THEN PROC OPENUP:GOTO 3420
3780 IF B$="M" THEN PROC MENU
3790 GOTO 3730
3800 RET
3810 REM Insert spaces
3820 REM
3830 DEF PROC SERT
3840 IF PS>LN THEN PROC EXTRASPC:RET
3850 IF LN>TP THEN RET
3860 ST$(LN)=LEFT$(ST$(LN),PS)+IN$+RIGHT$(ST$(LN),(LG-PS))
3870 IF LEN(ST$(LN))<=L THEN RET
3880 REPEAT
3890 IF LEFT$(ST$(LN+1),2)="  " THEN PROC ADJUST:ST$(LN+1)=""
3900 SL=LEN(ST$(LN-L))
3910 ST$(LN+1)=RIGHT$(ST$(LN),SL+ST$(LN+1))
3920 ST$(LN)=LEFT$(ST$(LN),L)
3930 LN=LN+1
3940 UNTIL LEN(ST$(LN))<=L
3950 RET
3960 DEF PROC EXTRASPCE
3970 ST$(LN)=ST$(LN)+MID$(SP$,LEN(ST$(LN)),(PS-LEN(ST$(LN))))+NS$
3980 RET
3990 REM Edit selected line
4000 REM
4010 DEF PROC CHANGELINE
4020 PRINT"_■";
4030 LN$="":DT=FALSE
4040 REPEAT
4050 IN=INKEYR
4060 IF IN=168 THEN IN=44
4070 IF IN=185 THEN IN=46
4080 IF IN=19 OR IN=20 THEN IN=20:GOTO 4120
4090 IF IN<32 THEN 4160
4100 IF IN=96 OR IN=97 OR IN=102 THEN 4160
4110 IF IN=98 OR IN=99 THEN PROC CASE:GOTO 4160
4120 PRINTCHR$(IN);"_ ■■";
4130 IF IN=47 OR IN=178 THEN DT=TRUE:GOTO 4160
4140 IF IN=20 THEN PROC BACKSPACE:GOTO 4160
4150 LN$=LN$+CHR$(IN)
4160 UNTIL CSRV=23 OR FS=TRUE OR DT=TRUE
4170 RET
4180 REM Eliminate blank line
4190 REM
4200 DEF PROC CLOSEUP
4210 FOR CU=SL TO TP
4220 ST$(CU)=ST$(CU+1)
4230 NEXT CU
4240 TP=TP-1
4250 RET
4260 REM Insert new line
4270 REM
4280 DEF PROC OPENUP
4290 FOR OU=TP TO SL STEP-1
4300 ST$(OU)=ST$(OU-1)
4310 NEXT OU
4320 ST$(SL)=SP$:TP=TP+1
4330 RET
4340 REM Memory full message
4350 REM
4360 DEF PROC MESSAGE
4370 BEEP
4380 PRINT"■■■■■■■■■■   The array is completely full"
4390 PRINT"■Please dump text to tape or printer"
4400 PRINT"■          and start again."
4410 FOR DL=1TO2000:NEXT
4420 PRINT"■■■■■■■■■■■■     Press any key to continue"
4430 ST=FALSE
4440 GET D$:IF D$="" THEN 4440
4450 RET
4460 REM Instructions for use.
4470 REM
4480 DEF PROC HELP
4490 BEEP
4500 PRINT"■■                  Just-Words■■■■■■■■■■■■
```

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PROGRAMS

```
4760 PRINT TAB(10);"/I = Insert line"
4770 PRINT TAB(6);"Scrolling by Up/Down cursor"
4780 PRINT TAB(8);"■■To Warm-Start  RUN 220"
4790 PRINT TAB(6);"■■<Press any key to continue>"
4800 GET H$:IF H$="" THEN 4800
4810 BEEP
4820 PROC MENU
4830 REM Title
4840 REM ─────
4850 DEF PROC TITLE
4860 PRINT"■■■■ ▒▒▒▒  ▒  ▒  ▒▒▒▒  ▒▒▒▒"
4870 PRINT"      ▒    ▒  ▒  ▒     ▒"
4880 PRINT"      ▒    ▒  ▒  ▒     ▒"
4890 PRINT"      ▒    ▒  ▒  ▒▒▒▒  ▒"
4900 PRINT"      ▒    ▒  ▒  ▒     ▒"
4910 PRINT"    ▒ ▒    ▒  ▒  ▒     ▒"
4920 PRINT"    ▒▒▒    ▒  ▒  ▒▒▒▒  ▒"
4930 PRINT"■■■  ▒  ▒  ▒▒▒▒  ▒▒▒▒  ▒▒▒▒"
4940 PRINT"    ▒  ▒  ▒  ▒  ▒  ▒  ▒"
4950 PRINT"    ▒  ▒  ▒  ▒  ▒  ▒  ▒"
4960 PRINT"    ▒  ▒  ▒  ▒  ▒  ▒  ▒▒▒▒"
4970 PRINT"    ▒  ▒  ▒  ▒  ▒  ▒  ▒"
4980 PRINT"    ▒  ▒  ▒  ▒  ▒  ▒  ▒"
4990 PRINT"    ▒▒▒▒  ▒▒▒▒  ▒  ▒  ▒▒▒▒"
5000 PRINT TAB(13);"■■■Copyright 1984"
5010 WAIT 1:BEEP
5020 RET
5030 END
```

Atari Function keys

by Paul Lay

'Function keys' provides programmable function keys on Atari micros. 16k is required on cassette-based systems and 32k for disk machines.

On the Atari, CTRL, SHIFT and any other key pressed simultaneously is normally ignored. This program modifies the keyboard interrupt routine to trap CTRL-SHIFT-key combinations and the deferred vertical blank interrupt routine, to allow these combinations to be used. The net result is that CTRL + SHIFT + a numeric key (0-9) can now be treated as a programmable function key.

To run the program, select KEYBOARD for input, then choose the key you wish to define and enter the string to be assigned to the key. Note that any control characters will be displayed, so the 'cursor down' character, for example, will appear rather than the cursor moving down a line. When the function key is used, however, the control characters will have their usual effect. Note that the RETURN key, when pressed, will be displayed as an 'E' over an 'L' but will be interpreted as a RETURN.

Each key can be assigned up to 113 characters. The emulator occupies locations 1536 to 1704 inclusive of RAM page 6. The code for the function keys is placed 38 pages below RAMTOP; this allows a GRAPHICS 8 screen to be used.

```
10 REM ********************************
20 REM *                              *
30 REM *  PROGRAMMABLE FUNCTION       *
40 REM *                              *
50 REM *  KEY EMULATOR / EDITOR       *
60 REM *                              *
70 REM *    (C) 1984 Paul Lay         *
80 REM *                              *
90 REM ********************************
100 REM
110 REM Machine Code For Emulator
120 REM
130 DATA 32,64,21,72,169,0,141,12
140 DATA 0,169,6,141,13,0,173,106
150 DATA 0,56,233,38,141,205,0,169
160 DATA 0,141,204,0,160,125,162,6
170 DATA 169,7,32,92,228,160,51,162
180 DATA 6,120,140,8,2,142,9,2
190 DATA 88,104,96,138,72,173,204,0
200 DATA 208,63,173,9,210,162,9,221
210 DATA 149,6,240,8,202,16,248,104
220 DATA 170,76,190,255,169,0,141,138
```

PROGRAMS

```
230 DATA 6,141,139,6,138,72,162,7
240 DATA 14,139,6,10,144,3,238,139
250 DATA 6,202,208,244,141,138,6,173
260 DATA 139,6,24,109,205,0,141,139
270 DATA 6,104,170,189,159,6,141,204
280 DATA 0,104,170,104,64,173,252,2
290 DATA 201,255,208,14,174,204,0,240
300 DATA 9,189,0,122,141,252,2,206
310 DATA 204,0,76,98,228,223,222,218
320 DATA 216,221,219,243,245,240,242
330 DATA 0,0,0,0,0,0,0,0,0,0
340 FOR A=1536 TO 1704:READ B
350 POKE A,B:NEXT A:A=USR(1540)
360 REM
370 REM Emulator now executing
380 REM so run editor
390 REM
400 DIM CODE$(1280),SIZE(10),FN$(15),IN$
(15)
410 FOR F=0 TO 9:SIZE(F)=0:NEXT F
420 GRAPHICS 0:OPEN #1,12,0,"E"
430 TRAP 430:? CHR$(125):POKE 16,64:POKE
 53774,64:CLOSE #3
440 POKE 752,1:POSITION 10,2
450 ? "FUNCION KEY EDITOR"
460 POSITION 10,3
470 ? "__________________"
480 POSITION 15,4:? "MAIN MENU"
490 POSITION 15,5:? "_________"
500 POSITION 9,7
510 ? "Enter Functions From"
520 POSITION 15,10:? "KEYBOARD"
530 POSITION 15,13:? "CASSETTE"
540 POSITION 15,16:? "DISKETTE"
550 POSITION 7,20
560 ? " SELECT  to choose option"
570 POSITION 10,22
580 ? " START  when ready"
590 A=0:B=1
600 COLOR 160:Z=A:GOSUB 1850
610 COLOR 32:Z=B:GOSUB 1850:B=A
620 C=PEEK(53279):IF C=6 THEN 660
630 IF C<>5 THEN 620
640 A=A+1:IF A>2 THEN A=0
650 FOR F=152 TO 0 STEP -8:SOUND 0,F,10,
14:NEXT F:GOTO 600
660 FOR F=254 TO 0 STEP -2:SOUND 0,F,8,1
4:NEXT F:SOUND 0,0,0,0
670 ? CHR$(125):POSITION 12,2
680 ? "_____________":POSITION 12,1
690 M=256*PEEK(205):POKE 752,0
700 ON A+1 GOTO 710,1510,1770
710 ? "KEYBOARD ENTRY":POKE 764,255
720 ? :? :? "Enter KEY Number >";
730 INPUT #1,N:N=INT(N)
740 IF N<0 OR N>9 THEN 670
750 ? :? "Use  OPTION  To FINISH"
760 ? :? "Use  START  To DELETE"
770 ? :? " KEY ";CHR$(176+N);CHR$(160)
780 ? :POKE 766,1:OPEN #2,4,0,"K"
```


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PROGRAMS

```
790 C=0
800 POKE 764,255
810 CH=PEEK(764):CN=PEEK(53279)
820 IF CN=6 THEN 950
830 IF CN=3 THEN 980
840 IF CH=255 THEN 810
850 C=C+1:IF C<=113 THEN 880
860 POKE 766,0:? CHR$(253);
870 POKE 766,1:C=113:GOTO 800
880 CODE$(128*N+C,128*N+C)=CHR$(CH)
890 IF CH=12 THEN ? CHR$(27);:FOR F=50 T
O 0 STEP -1:SOUND 0,F,10,14:NEXT F:GOTO
800
900 IF CH=39 THEN ? CHR$(210);:GOTO 800
910 IF CH=60 THEN ? CHR$(236);:GOTO 800
920 IF CH=124 THEN ? CHR$(213);:GOTO 800
930 IF CH=188 THEN ? CHR$(195);:GOTO 800
940 GET #2,B:? CHR$(B);:GOTO 800
950 POKE 766,0:? CHR$(126);
960 POKE 766,1:C=C-(C>0)
970 FOR F=200 TO 250:SOUND 0,F,6,14:NEXT
 F:SOUND 0,0,0,0:GOTO 800
980 FOR F=0 TO 250 STEP 2:SOUND 0,F,8,14
:NEXT F:SOUND 0,0,0,0
990 SIZE(N)=C:POKE 766,0
1000 POSITION 9,17:? "Do You Want To Edi
t"
1010 POSITION 8,19:? "Any More Keys (Y/N
) )";
1020 GET #2,B
1030 IF  NOT (B=89 OR B=121 OR B=78 OR B
=110) THEN ? CHR$(253);:GOTO 1020
1040 CLOSE #2
1050 IF B=89 OR B=121 THEN 670
1060 TRAP 1140:? CHR$(125):POKE 764,255
1070 ? :? " OPTIONS ":? :?
1080 ? "1...Return To  BASIC ":? :?
1090 ? "2...Save To Cassette & Return":?
 :?
1100 ? "3...Save To Diskette & Return":?
 :?
1110 ? "Please Select (1,2 or 3) )";
1120 INPUT #1,B:B=INT(B)
1130 IF B>=1 AND B<=3 THEN 1150
1140 ? CHR$(253):GOTO 1060
1150 ON B GOTO 1160,1320,1690
1160 ? CHR$(125)
1170 ? "Returning To  BASIC ":?
1180 FOR A=1 TO 9
1190 POKE 1694+A,SIZE(A)
1200 IF SIZE(A)=0 THEN 1240
1210 FOR B=1 TO SIZE(A)
1220 POKE M+128*(A-1)+B,ASC(CODE$(A*128+
SIZE(A)+1-B))
1230 NEXT B
1240 NEXT A
1250 POKE 1704,SIZE(0)
1260 IF SIZE(0)=0 THEN 1300
1270 FOR B=1 TO SIZE(0)
1280 POKE M+1152+B,ASC(CODE$(SIZE(0)+1-B
))
```

PROGRAMS

```
1290 NEXT B
1300 POKE 16,192:POKE 53774,192
1310 GRAPHICS 0:NEW
1320 ? CHR$(125)
1330 ? "Save To  CASSETTE ":?
1340 ? "Insert SAVE Cassette Then":?
1350 ? "Press RETURN";
1360 POKE 764,255
1370 IF PEEK(764)<>12 THEN 1370
1380 ? :? :OPEN #3,8,0,"C"
1390 FOR F=0 TO 9
1400 B=SIZE(F)
1410 ? #3,B
1420 NEXT F
1430 FOR F=0 TO 9
1440 IF SIZE(F)=0 THEN 1490
1450 FOR G=1 TO SIZE(F)
1460 B=ASC(CODE$(F*128+G,F*128+G))
1470 ? #3,B
1480 NEXT G
1490 NEXT F:CLOSE #3
1500 GOTO 1170
1510 ? "CASSETTE ENTRY"
1520 ? :? :? "Insert LOAD Cassette Then"
1530 ? :? "Press RETURN";
1540 POKE 764,255
1550 IF PEEK(764)<>12 THEN 1550
1560 ? :? :OPEN #3,4,0,"C"
1570 FOR F=0 TO 9
1580 INPUT #3,B
1590 SIZE(F)=B
1600 NEXT F
1610 FOR F=0 TO 9
1620 IF SIZE(F)=0 THEN 1670
1630 FOR G=1 TO SIZE(F)
1640 INPUT #3,B
1650 CODE$(F*128+G,F*128+G)=CHR$(B)
1660 NEXT G
1670 NEXT F:CLOSE #3
1680 GOTO 1060
1690 ? CHR$(125)
1700 ? "Save To  DISKETTE ":?
1710 GOSUB 1890
1720 ? "Insert SAVE Diskette Then":?
1730 ? "Press RETURN";
1740 POKE 764,255
1750 IF PEEK(764)<>12 THEN 1750
1760 ? :? :OPEN #3,8,0,FN$:? "Saving Fil
e > ";FN$:? :GOTO 1390
1770 ? "DISKETTE ENTRY"
1780 ? :? :GOSUB 1890
1790 ? "Insert LOAD Diskette Then"
1800 ? :? "Press RETURN";
1810 POKE 764,255
1820 IF PEEK(764)<>12 THEN 1820
1830 ? :? :OPEN #3,4,0,FN$:? "Loading Fi
le > ";FN$:?
1840 GOTO 1570
1850 PLOT 13,9+Z*3:DRAWTO 24,9+Z*3
1860 DRAWTO 24,11+Z*3
```


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PROGRAMS

```
1870 DRAWTO 13,11+Z%3:DRAWTO 13,9+Z%3
1880 RETURN
1890 ? "Enter Filename ";:POKE 764,255
1900 INPUT IN$:? :IF LEN(IN$)=0 THEN 189
0
1910 IF LEN(IN$)<3 THEN 1930
1920 IF IN$(1,2)="D:" OR (IN$(1,1)="D" A
ND IN$(3,3)=":" AND (ASC(IN$(2,2))>48 AN
D ASC(IN$(2,2))<53)) THEN 1950
1930 FN$(1,2)="D:"
1940 FN$(3)=IN$:GOTO 1960
1950 FN$=IN$
1960 RETURN
```

Brackets
by M C Hart

'Brackets' is a vital program for anyone submitting Commodore 64 programs to *PCW*!

One of the main problems in reproducing Commodore programs' listings is that cursor control and colour codes are often all but illegible. Brackets converts these characters into meaningful names in square brackets (see line 300 of the listing).

It would be greatly appreciated if all Commodore 64 listings accompanying *PCW* Programs submissions are produced using this program. Simply run Brackets, then SYS toggles the feature on/off.

Brackets also provides a useful pause facility during listings: hold down the SHIFT key (or engage SHIFT-LOCK) to pause a listing.

```
1 DATA173,7,3,73,223,141,7,3,173,6,3,73,11,141,6,3,96,72,173,141,02,208,251,104
2 DATA 8,133,255,152,72,36,15,48,8
3 DATA104,168,165,255,40,76,26,167,162,0,232,189,-188,240,240,197,255,208,246,16
0
4 DATA0,200,185,-156,201,91,208,248,202,208,245,32,210,255,200,185,-156,201,93
5 DATA208,245,32,210,255,104,168,165,255,40,76,246,166,144,5,28,159,156,30,31,15
8
6 DATA18,146,147,19,148,20,145,17,157,29,160,255,133,137,134,138,135,139,136,140
7 DATA0,0,0,0,91,66,76,65,67,75,93,91,87,72,73,84,69,93,91,82,69,68,93,91,67,89,
65
8 DATA78,93,91,80,85,82,80,76,69,93,91,71,82,69,69,78,93,91,66,76,85,69,93,91,89
9 DATA69,76,76,79,87,93,91,82,86,83,93,91,82,86,83,79,70,70,93,91,67,76,82,83,91
10 DATA72,79,77,69,93,91,73,78,83,93,91,68,69,76,93,91,85,80,93,91,68,79,87,78,9
3
11 DATA91,76,69,70,84,93,91,82,73,71,72,84,93,91,83,72,45,83,80,67
12 DATA93,91,80,73,93,91,70,49,93,91,70,50,93,91,70,51,93,91,70,52,93,91,70,53,9
3
13 DATA91,70,54,93,91,70,55,93,91,70,56,93
100 T=PEEK(55)+256*PEEK(56)
110 L=T-275
120 FORJ=LTOT-1:READ X%
130 IFX%<0 THEN Y=X%+T:X%=Y/256:Z=Y-X%*256:POKEJ,Z:J=J+1
140 POKEJ,X%:NEXT
162 H%=(L+17)/256
164 P=(H% OR 167) AND NOT (H% AND 167)
166 POKEL+4,P
172 L%=(L+17)-256*H%
174 P=(L% OR 26) AND NOT (L% AND 26)
176 POKE L+12,P
200 POKE 55,L-INT(L/256)*256:POKE56,L/256
210 SYSL
300 PRINT"[CLR][DOWN]SYS"L
310 PRINT"TURNS OFF THE SPECIAL "
320 PRINT"'LIST' FUNCTION NOW"
330 PRINT"LOADED IN MEMORY AND"
340 PRINT" TURNS IT ON LATER"
READY.
```

Atari Stock market
by Alex Kent

Many moons ago, we published a version of 'Stock market' for the Atari. This one is different in that it adds a 'real-time' element: prices are continually changing while you make up your mind what to do!

Stock market is one of the classics, along with Startrek and Eliza. The program is a simulation of the UK stock market, and your aim is to grow rich through buying and selling shares on the open market. Unlike many versions, the price fluctuations in this program are small; this makes it difficult to make a quick fortune, but does add a touch of realism.

Full instructions are contained within the program.

PROGRAMS

```
 1 REM ******************************
 2 REM ******************************
 3 REM ********                ********
 4 REM ******** STOCKMARKET ********
 5 REM ********     BY         ********
 6 REM ******** ALEX KENT     ********
 7 REM ********                ********
 8 REM ******************************
 9 REM ******************************
 10 REM *** OPEN KEYBOARD ***
 15 OPEN #1,12,0,"K:"
 20 REM *** GO TO INITIALISE AND INTRO. ***
 31 GOSUB 2000
 40 IF PEEK(53279)=3 THEN GOSUB 12000
 70 REM *** UPDATE TIME AND DATE ***
 71 MIN=MIN+30:BS=0
 72 IF MIN=60 THEN MIN=0:HR=HR+1
 73 IF HR=17 THEN GOTO 7000
 74 IF HR<10 THEN POSITION 16,2:PRINT HR
 75 IF HR>9 THEN POSITION 15,2:PRINT HR
 76 POSITION 18,2:PRINT MIN
 78 IF PEEK(53279)=3 THEN GOSUB 12000
 80 REM *** NEW PRICES  ***
 85 FOR X=1 TO 19:FEED$(X)=".":NEXT X
 86 B=21:S=62
 88 IF PEEK(53279)=3 THEN GOSUB 12000
 90 FOR Z=0 TO 19
 93 PCNT=INT(RND(0)*100)+1
 95 IF UD(Z)=0 THEN 180
 96 IF UD(Z)>0 THEN 140
 97 IF UD(Z)>-100 THEN 105
 98 IF PCNT<31 THEN PTR=1:GOTO 200
 99 IF PCNT<82 THEN PTR=0:GOTO 200
100 PTR=-1:GOTO 200
101 IF PEEK(53279)=3 THEN GOSUB 12000
105 IF UD(Z)>-50 THEN 110
106 IF PCNT<26 THEN PTR=1:GOTO 200
107 IF PCNT<86 THEN PTR=0:GOTO 200
108 PTR=-1:GOTO 200
109 IF PEEK(53279)=3 THEN GOSUB 12000
110 IF UD(Z)>-25 THEN 115
111 IF PCNT<26 THEN PTR=1:GOTO 200
112 IF PCNT<76 THEN PTR=0:GOTO 200
113 PTR=-1:GOTO 200
115 IF UD(Z)>-10 THEN 120
116 IF PCNT<21 THEN PTR=1:GOTO 200
117 IF PCNT<76 THEN PTR=0:GOTO 200
118 PTR=-1:GOTO 200
119 IF PEEK(53279)=3 THEN GOSUB 12000
120 IF PCNT<16 THEN PTR=1:GOTO 200
121 IF PCNT<76 THEN PTR=0:GOTO 200
122 PTR=-1:GOTO 200
140 REM ***** ITS BEEN GAINING SO FAR !!!! *****
145 IF UD(Z)<100 THEN 150
146 IF PCNT<20 THEN PTR=1:GOTO 200
147 IF PCNT<71 THEN PTR=0:GOTO 200
148 PTR=-1:GOTO 200
149 IF PEEK(53279)=3 THEN GOSUB 12000
150 IF UD(Z)<50 THEN 155
151 IF PCNT<16 THEN PTR=1:GOTO 200
152 IF PCNT<76 THEN PTR=0:GOTO 200
153 PTR=-1:GOTO 200
155 IF UD(Z)<25 THEN 160
156 IF PCNT<26 THEN PTR=1:GOTO 200
157 IF PCNT<76 THEN PTR=0:GOTO 200
158 PTR=-1:GOTO 200
159 IF PEEK(53279)=3 THEN GOSUB 12000
160 IF UD(Z)<10 THEN 165
161 IF PCNT<26 THEN PTR=1:GOTO 200
162 IF PCNT<81 THEN PTR=0:GOTO 200
163 PTR=-1:GOTO 200
165 IF PCNT<31 THEN PTR=1:GOTO 200
166 IF PCNT<91 THEN PTR=0:GOTO 200
167 PTR=-1:GOTO 200
180 IF PCNT<11 THEN  PTR=1:GOTO 200
181 IF PCNT<91 THEN  PTR=0:GOTO 200
182 PTR=-1
190 IF PEEK(53279)=3 THEN GOSUB 12000
199 REM ***** WORK OUT THE CHANGE *****
200 UD(Z)=UD(Z)+PTR
201 IF PTR=0 THEN 250
202 INC=(RND(0)*0.01):INC=(MET(Z)*(INC/100))
203 MET(Z)=MET(Z)+(PTR*INC)
204 MET(Z)=INT(MET(Z)*100):MET(Z)=MET(Z)/100
205 FEED$(1,6)=NA$((Z*6)+1,(Z*6)+6)
206 IF PTR=1 THEN FEED$(10,13)="UP.."
207 IF PTR=-1 THEN FEED$(10,13)="DOWN"
208 DIFF=INC*PTR
209 DIFF=ABS(INT(DIFF*100))
211 GOTO 900:REM **** WORK OUT TICKER TAPE ******
212 HU=INT(DIFF/100):TE=DIFF-(HU*100):TE=INT(TE/10)
213 U=DIFF/10:U=U-INT(U):U=U*10:U=U+48:TE=TE+48:HU=HU+48
214 FEED$(16,16)=CHR$(HU):FEED$(17,17)=CHR$(TE):FEED$(18,18)=CHR$(U)
215 IF HU>0 OR TE>0 OR U>0 THEN FEED$(19)="p"
218 IF PEEK(53279)=3 THEN GOSUB 12000
220 REM ***** PREPARE TIC$ ******
225 FOR X=1 TO 19
226 TIC$(X)="."
227 NEXT X
228 REM **** TRANSFER THE DATA ****
229 FOR X=1 TO 19
230 IF FEED$(X)=" " THEN 234
231 TIC$(X)=FEED$(X)
232 NEXT X
233 REM *** RUN THE TICKER TAPE ***
234 FOR PLO=1 TO 19
235 IF PEEK(53279)=3 THEN GOSUB 12000
236 POSITION 35,0: PRINT TIC$(PLO,PLO)
237 POSITION 5,0:PRINT CHR$(254):FOR SO=1 TO 3:SOUND 1,204,8,8:NEXT SO:SOUND 1,0,0,0
239 POSITION 35,0:PRINT "."
240 IF PEEK(53279)=3 THEN GOSUB 12000
241 NEXT PLO
243 POSITION 35,0:PRINT "."
245 POSITION 5,0:PRINT CHR$(254)
250 REM **** NEXT COMMODITY  ! ****
251 IF PEEK(53279)=3 THEN GOSUB 12000
254 NEXT Z
```


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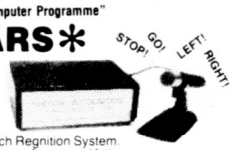


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PROGRAMS

```
255 REM **** CHANGE VALUES ON SCREEN ****
258 IF PEEK(53279)=3 THEN GOSUB 12000
260 GOSUB 2870
263 IF PEEK(53279)=3 THEN GOSUB 12000
265 REM **** BACK TO THE TOP ! *****
270 GOTO 40
500 REM **** WE APPEAR TO BE TRADING ! *******
505 POSITION 3,20: PRINT "                              ":POSITION 3,21:PRINT "    "
506 IF BS=1 THEN POSITION 3,20:PRINT "BUY WHICH?"
507 IF BS=2 THEN POSITION 3,20:PRINT "SELL WHICH?"
510 REM *** GET FIRST 3 LETTERS OF COMMODITY NAME ***
511 GET #1,L1: POSITION 3,21: PRINT CHR$(L1): GET #1,L2:POSITION 4,21:
PRINT CHR$(L2):POSITION 5,21:GET #1,L3:PRINT CHR$(L3)
512 C$(1,1)=CHR$(L1): C$(2,2)=CHR$(L2):C$(3,3)=CHR$(L3)
513 FOR XX=0 TO 20
514 SP=(XX*3)+1
515 IF XX=20 THEN 518
516 IF C$(1,3)=I$(SP,SP+2) THEN 518
517 NEXT XX
518 NAM=XX:C$=""
519 IF NAM=20 THEN POSITION 3,20: PRINT "     ": POSITION 3,21: PRINT "    ":
POSITION 3,20:PRINT "NEVER HEARD OF IT"
520 IF NAM=20 THEN CHE=1: FOR LO=1 TO 100: NEXT LO: GOTO 505
525 REM * HOW MANY ARE WE TRADING IN *
526 POSITION 3,21:PRINT "   ": POSITION 3,20: PRINT "           ":
POSITION 3,20:PRINT "HOW MANY"
527 CHE=0
528 GET #1,TH:POSITION 3,21:PRINT CHR$(TH): TH=TH-48
529 GET #1,HU: IF HU=155 THEN PT=1:GOTO 535
530 POSITION 4,21: PRINT CHR$(HU):HU=HU-48:GET #1,TE
531 IF TE=155 THEN PT=10: GOTO 535
532 POSITION 5,21:PRINT CHR$(TE):TE=TE-48:GET #1,U
533 IF U=155 THEN PT=100: GOTO 535
534 POSITION 6,21: PRINT CHR$(U):U=U-48: PT=1000
535 IF PT=1 THEN NUM=TH
536 IF PT=10 THEN NUM=(TH*10)+HU
537 IF PT=100 THEN NUM=(TH*100)+(HU*10)+TE
538 IF PT=1000 THEN NUM=(TH*1000)+(HU*100)+(TE*10)+U
539 POSITION 3,21: PRINT "    "
540 IF NUM<0 THEN POSITION 3,20:PRINT "STOP TRYING TO BE CLEVER":FOR L=1 TO 100:
NEXT L:POSITION 3,20:PRINT "                              "
541 IF NUM<0 THEN 505
545 IF BS=2 AND OWN(NAM)<NUM THEN POSITION 3,20:PRINT "YOU DON'T HAVE THAT MANY"
:CHE=1:FOR L=1 TO 100:NEXT L:GOTO 505
550 POSITION 3,20:PRINT "                              "
560 PRI=MET(NAM)*NUM
565 IF BS=2 THEN 575
570 IF PRI>DOL THEN POSITION 3,20:PRINT "TOO MANY": CHE=1: FOR XX=1 TO 100:
NEXT XX:GOTO 505
571 REM ***** DO THE TRANSACTION *****
575 IF BS=2 THEN DOL=DOL+PRI:OWN(NAM)=OWN(NAM)-NUM:POI=1:GOTO 2830
580 DOL=DOL-PRI:OWN(NAM)=OWN(NAM)+NUM:POI=1:GOTO 2830
581 POI=0
582 REM **** PUT THE $ ON THE SCREEN *****
585 POSITION 2,2:PRINT "      "
586 POSITION 2,2:IF DOL<10 THEN PRINT "00000";DOL:GOTO 595
587 IF DOL<100 THEN PRINT "0000";DOL:GOTO 595
588 IF DOL<1000 THEN PRINT "000";DOL:GOTO 595
589 IF DOL<10000 THEN PRINT "00";DOL:GOTO 595
590 IF DOL<100000 THEN PRINT "0";DOL:GOTO 595
591 PRINT DOL
592 REM ****** LET'S GET OUT OF HERE ********
595 GOTO 12060
899 REM ***CLEAN UP AFTER THE INT***
900 IF DIFF=0 THEN MET(Z)=MET(Z)+(PTR*0.01)
901 IF DIFF=0 THEN DIFF=1
902 GOTO 212
1999 REM ****** SET UP ROUTINE ********
2000 DIM MET(20),OWN(20),UD(20),C$(10),TIC$(19),NA$(120),H$(6),FEED$(19),A$(1),
B$(1),I$(60)
2001 NA$="":NA$(119,120)=".."
2002 REM **** GO SET UP NA$ ******
2003 GOSUB 27700
2004 REM **** PREPARE A$ AND B$ FOR INTRO DISPLAY ******
2005 A$="*":B$="*"
2006 FOR LP=1 TO 19:FEED$(LP)=" ":NEXT LP
2010 DOL=100000
2011 HR=9:MIN=0:LIMIT=0
2012 CI=223:MI=550:DAY=1
2013 BY=0:S=62:B=21:C=18
2015 REM *** INTRO DISPLAY ***
2020 GRAPHICS 2+16
2040 REM ***** DO THE BOARDER *****
2050 FOR X=0 TO 9
2060 POSITION X*2,0:PRINT #6;A$;B$:POSITION X*2,10:PRINT #6;B$;A$
2070 IF X/2=INT(X/2) THEN POSITION 0,X:PRINT #6;B$:POSITION 19,X:PRINT #6;A$
:GOTO 2090
2080 POSITION 0,X:PRINT #6;A$:POSITION 19,X:PRINT #6;B$
2090 NEXT X
2091 GOTO 2170
2100 IF COUNT/2=INT(COUNT/2) THEN  POSITION 4,3:PRINT #6;"STOCKMARKET":GOTO 2121
2110 POSITION 4,3:PRINT #6;"STOCKMARKET"
2121 IF COUNT<>0 THEN 2140
2130 POSITION 2,7:PRINT #6;"PRESS START TO"
2135 POSITION 10,8:PRINT #6;"BEGIN"
2140 COUNT=COUNT+1
2148 REM ***** HAS START BEEN PRESSED ******
2150 IF PEEK(53279) <>6 THEN FOR X=1 TO 10:NEXT X:GOTO 2100
2160 GOTO 2500
2170 RESTORE 30100
2171 FOR X=2 TO 4
2172 POSITION X,3:PRINT #6;"S"
2173 GOSUB 30000
2175 POSITION X,3:PRINT #6;" "
2176 NEXT X
2180 POSITION 4,3:PRINT #6;"S"
2185 FOR Y=9 TO 3 STEP -1
2186 POSITION 5,Y:PRINT #6;"T"
2190 GOSUB 30000
2191 POSITION 5,Y:PRINT #6;"T"
2193 POSITION 5,Y:PRINT #6;" "
2194 NEXT Y
2200 POSITION 5,3:PRINT #6;"T":SOUND 0,0,0,0
2211 FOR X=16 TO 6 STEP -1
2212 POSITION X,3:PRINT #6;"OCK"
2213 GOSUB 30000
2214 POSITION X,3:PRINT #6;"   "
```

PROGRAMS

```
2215 NEXT X
2220 POSITION 6,3:PRINT #6;"OCK"
2230 FOR Y=8 TO 3 STEP -1
2231 POSITION 9,Y:PRINT #6;"MARKE"
2232 GOSUB 30000
2233 POSITION 9,Y:PRINT #6;"     "
2234 NEXT Y
2240 POSITION 9,3:PRINT #6;"MARKE"
2250 FOR Y=7 TO 3 STEP -1
2251 X=Y+11
2252 POSITION X,Y:PRINT #6;"T"
2253 GOSUB 30000
2254 POSITION X,Y:PRINT #6;" "
2255 NEXT Y
2256 GOSUB 30000
2260 POSITION 14,3:PRINT #6;"T":GOTO 2100
2499 REM **** GO TO INSTRUCTIONS ****
2500 GOSUB 11000
2501 GRAPHICS 0:SETCOLOR 2,0,0:PRINT "How many days would you like the game to
last":INPUT LIMIT
2510 REM **** SET UP DISPLAY *****
2560 GRAPHICS 0:SETCOLOR 2,0,0:POKE 752,1:POKE 82,0:POKE 764,255
2561 REM *752,1 IS CURSOR INHIBIT ***
2562 REM *** 82,0 SETS THE MARGIN TO 0 IN THE HORIZONTAL ******
2563 REM **** 764,255 CLEARS THE LAST KEY PRESSED ADDRESS *****
2580 PRINT:PRINT
2590 PRINT "$";DOL;"   TIMEO";HR;":";"0";MIN;"   DAY";DAY
2600 POSITION 30,1:PRINT "YOU OWN"
2610 FOR X=0 TO 38:POSITION X,3:PRINT CHR$(18);:POSITION X,23:PRINT CHR$(18);:NEXT X
2615 A$=CHR$(22)
2620 FOR Y=4 TO 22:POSITION 15,Y:PRINT A$:POSITION 29,Y:PRINT A$:POSITION 0,Y:
PRINT A$:POSITION 38,Y:PRINT A$:NEXT Y
2625 FOR Y=18 TO 22:POSITION 15,Y:PRINT " ":NEXT Y
2630 FOR X=1 TO 28:POSITION X,18:PRINT CHR$(18):NEXT X
2650 POSITION 6,4:PRINT "METALS"
2660 POSITION 19,4:PRINT "SOFTS"
2670 POSITION 6,19:PRINT "BUYING & SELLING"
2680 FOR Y=6 TO 15:POSITION 7,Y:PRINT ":" :NEXT Y
2690 FOR Y=6 TO 15:POSITION 21,Y:PRINT ":" : NEXT Y
2700 FOR Y=3 TO 22:POSITION 33,Y:PRINT ":":NEXT Y
2705 RESTORE
2730 FOR X=6 TO 15:READ C$:POSITION 1,X:PRINT C$:C$="":NEXT X
2740 FOR X=6 TO 15:READ C$:POSITION 16,X:PRINT C$:C$="":NEXT X
2750 RESTORE
2755 FOR X=29 TO 38:POSITION X,3:PRINT " ":POSITION X,2:PRINT CHR$(18):NEXT X
2756 POSITION 29,3:PRINT CHR$(22):POSITION 38,3:PRINT CHR$(22)
2760 FOR X=3 TO 22
2770 READ C$:POSITION 30,X:PRINT C$(1,3):C$="":NEXT X
2775 POSITION 33,3:PRINT ":"
2790 DATA GOLD,SILVER,PLATI.,COPPER,TIN,ZINC,ALUMI.,NICKEL,LEAD,IRON
2795 DATA COFF.,TEA,SALT,COCOA,RICE,SOYA,WHEAT,BARL.,MAIZE,WOOL
2800 FOR X=0 TO 19:OWN(X)=0:UD(X)=0:NEXT X
2810 FOR X=0 TO 19:READ IN:MET(X)=IN:NEXT X
2820 DATA 900,800,1000,700,300,500,400,600,200,100,500,400,300,350,200,150,75,
250,175,125
2830 FOR XX=0 TO 19
2840 Y=OWN(XX):GOSUB 3000
2850 POSITION 34,XX+3:PRINT C$;:C$=""
2855 IF Y<>0 THEN PRINT Y
2856 IF Y=0 THEN PRINT
2860 NEXT XX
2861 IF POI=1 THEN 585
2870 FOR X=0 TO 9
2880 Y=MET(X):GOSUB 3000
2890 POSITION 8,X+6:PRINT C$;Y:C$=""
2891 IF Y*10=INT(Y*10) THEN POSITION 14,X+6:PRINT "0"
2892 IF INT(Y)=Y THEN POSITION 12,X+6:PRINT ".0"
2895 IF PEEK(53279)=3 THEN GOSUB 12000
2900 NEXT X
2910 FOR X=10 TO 19
2920 Y=MET(X):GOSUB 3000
2930 POSITION 22,X-4:PRINT C$;Y:C$=""
2931 IF Y*10=INT(Y*10) THEN POSITION 28,X-4:PRINT "0"
2932 IF INT(Y)=Y THEN POSITION 26,X-4:PRINT ".0"
2940 NEXT X
2950 RETURN
3000 REM **** NUMBER DISPLAYER ****
3005 IF Y>=1000 THEN 3015
3010 C$(1,1)="0"
3015 IF Y>=100 THEN 3025
3020 C$(2,2)="0"
3025 IF Y>=10 THEN  3035
3030 C$(3,3)="0"
3035 IF Y>0 THEN 3045
3040 C$(4,4)="0"
3045 RETURN
7000 REM ***** END OF DAY *****
7010 DAY=DAY+1
7020 POSITION 26,2:PRINT DAY
7030 HR=9:MIN=0
7035 POSITION 15,2:PRINT "0"
7040 IF DAY=LIMIT+1 THEN 7060
7050 GOTO 72
7055 REM ***** END OF GAME *****
7060 GRAPHICS 2+16:PRINT #6;"THE END"
7070 FOR X=0 TO 19
7080 DOL=DOL+(OWN(X)*MET(X))
7090 NEXT X
7100 PRINT #6;"YOU FINISHED WITH"
7110 PRINT #6;"$";DOL
7111 PM=DOL-100000:PM=PM/LIMIT:PM=INT(PM*100):PM=PM/100
7112 PRINT #6;"YOU SCORED";PM
7151 FOR XX=1 TO 200:NEXT XX
7152 IF PM>-25 THEN 7195
7153 GRAPHICS 2+16:PRINT #6;"IT APPEARS THAT THE"
7154 PRINT #6;"LOST MONEY BELONGED"
7155 PRINT #6;"TO SOMEONE ELSE. THE"
7156 PRINT #6;"FRAUD SQUAD ARE AT"
7157 PRINT #6;"THE DOOR. THERE IS A"
7158 PRINT #6;"WINDOW LEADING TO A"
7159 PRINT #6;"HIGH LEDGE I SUGGESTTHAT YOU  DO  THE   DECENT THING.."
7160 RESTORE 7180
7161 FOR X=1 TO 11
7162 READ A,B
7163 SOUND 0,A,10,10
7164 FOR XX=1 TO B:NEXT XX
7165 SOUND 0,0,0,0
```


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PROGRAMS

```
7166 FOR XX=1 TO 2:NEXT XX
7167 NEXT X
7180 DATA 121,50,121,50,121,25,121,50,
102,50,108,25,108,50,121,25,121,50,128
,25,121,50
7195 IF PM>-25 AND PM<0 THEN PRINT #6;"GOOD THING IT'S ONLY A GAME"
7196 IF PM=0 THEN PRINT #6;"WHY DID YOU BOTHER"
7197 IF PM>0 AND PM<26 THEN PRINT #6; "THERE'S HOPE FOR YOU YET"
7198 IF PM>25 AND PM<51 THEN PRINT #6;"ENCOURAGING"
7199 IF PM>50 AND PM<76 THEN PRINT #6;"WELL DONE"
7200 IF PM>75 AND PM<101 THEN PRINT #6;"YOU SHOULD BE RICH"
7210 IF PM>100 AND PM<200 THEN PRINT #6;"YOU ARE RICH"
7230 IF PM>199 THEN PRINT #6;"YOU MUST BE A COMPUTER !!!"
7240 PRINT #6;"TO PLAY AGAIN"
7250 PRINT #6;"PRESS START"
7260 IF PEEK(53279)<>6 THEN 7260
7270 CLOSE #1:RUN
11000 REM ***** INSTRUCTIONS ******
11001 GRAPHICS 0:SETCOLOR 2,0,0
11002 PRINT "      INSTRUCTIONS"
11003 PRINT
11004 POSITION 8,2:PRINT"The object of the game is to"
11005 PRINT"make as much money as possible in a"
11006 PRINT"limited time.You set the time limit"
11007 PRINT"as a number of days.Each day starts"
11008 PRINT"at 9:00 and ends at 17:00 and is"
11009 PRINT"split into sixteen periods.Once the"
11010 PRINT"game display has been put on the"
11011 PRINT"screen you will see there are four"
11012 PRINT"sections.The top line is the ticker"
11013 PRINT"tape.This notifies you of changes in"
11014 PRINT"the price of the various commodities"
11015 PRINT"The display below that is in two"
11016 PRINT"parts,METALS/SOFTS and YOU OWN.The"
11017 PRINT"METALS/SOFTS tells you what the"
11018 PRINT"price of 1 unit of any comodity is"
11019 PRINT"The YOU OWN display shows how many"
11020 PRINT"units of each comodity you own."
11021 PRINT"You start with $100000."
11022 PRINT"PRESS START TO CONTINUE"
11023 IF PEEK(53279)<>6 THEN 11023
11024 GRAPHICS 0:SETCOLOR 2,0,0
11025 PRINT "     INSTRUCTIONS"
11026 PRINT
11027 PRINT"    There are three commands you can"
11028 PRINT"use during the game,these are used by"
11029 PRINT"pressing the OPTION key and holding"
11030 PRINT"it down until you get the response"
11031 PRINT"'COMMAND'.You then reply with either"
11032 PRINT"<B> if you wish to buy or <S> if you"
11033 PRINT"wish to sell or <C> if you wish to"
11034 PRINT"calculate the total value of your"
11035 PRINT"shares and unused money."
11036 PRINT"      When buying and selling you"
11037 PRINT"will first be prompted with 'WHICH',"
11038 PRINT"reply with the first 3 letters of"
11039 PRINT"the commodity you wish to deal in."
11040 PRINT"Next it will prompt 'HOW MANY' type"
11041 PRINT"in the number and then press <RETURN>."
11042 PRINT"     At the end of the game you will"
11043 PRINT"see a final balance, score and comment."
11044 PRINT"START TO CONTINUE"
11046 IF PEEK(53279)<>6 THEN 11046
11047 RETURN
12000 REM*** GET COMMAND LETTER ***
12001 CHCK=0
12002 POSITION 3,20:PRINT "                "
12005 POSITION 3,20:PRINT "COMMAND"
12010 GET #1,COM
12020 IF COM=66 THEN BS=1:GOTO 500
12030 IF COM=83 THEN BS=2:GOTO 500
12040 IF COM=67 THEN GOSUB 28000
12050 IF CHCK<>1 THEN POSITION 3,20:PRINT "ILLEGAL COMMAND":FOR Q=1 TO 100:
NEXT Q:GOTO 12002
12060 BS=Q
12070 RETURN
27700 FOR X=1 TO 120
27701 NA$(X,X)="."
27702 NEXT X
27703 IP=1
27704 FOR X=1 TO 115 STEP 6
27780 READ C$
27790 NA$(X,X+5)=C$
27791 IF X>IP THEN IP=IP+3
27792 I$(IP,IP+2)=C$(1,3)
27795 C$=""
27796 NEXT X
27800 DATA GOLD..,SILVER,PLATI.,COPPER,TIN...,ZINC..,ALUMI.,NICKEL,LEAD..,IRON..
,COFFEE,TEA...,SALT..,COCOA.
27801 DATA RICE..,SOYA..,WHEAT.,BARLEY,MAIZE.,WOOL..
27805 RETURN
28000 CT=0
28001 FOR LOOP=0 TO 19
28002 O=OWN(LOOP):PR=MET(LOOP)
28003 T=O*PR
28004 CT=CT+T
28005 NEXT LOOP
28007 CT=CT+DOL: POSITION 3,20: PRINT "          "
28008 POSITION 3,20:PRINT "$";CT
28010 CHCK=1:RETURN
30000 READ A,B:SOUND 0,A,10,10:FOR YY=1 TO B:NEXT YY:SOUND 0,0,0,0:RETURN
30100 DATA 91,16,96,16,108,16,114,16,121,16,72,8,72,8,72,16,121,16,128,16,81,8
30105 DATA 81,8,81,16,128,16,136,16,91,8,91,8,91,16,0,8,91,16,96,16,108,16
30110 DATA 114,16,121,16,72,8,72,8,72,16,72,16,68,16,72,16,81,16,91,16,60,16
30120 END
OK.
```



Spectrum Martian attack
by Nikola Stojanovic

'Martian attack' is an arcade-style game running on a 48k Spectrum. The scenario is, as usual, based on saving the earth from nasty green alien

thingies carried out with the aid of a helicopter and a plane. The plane is used to shoot down aliens, while the helicopter attempts to reach the landing platform at the top of the screen. When you reach the platform, you pass onto the next level of the game.

The controls are as follows:

Key	Controls	Effect
q	Plane	Move up
m	Plane	Move down
i	Plane	Turn around
p	Plane	Fire missile
Q	Copter	Move up
M	Copter	Move down
I	Copter	Move left
p	Copter	Move right

As the helicopter nears the platform, the aliens change from modules to heads, and the points scored for zapping them increases. At each successive level, the number of aliens increases. There are also a few flying octopi lurking about (don't ask me . . .). The general rule is: 'If it moves, shoot it.' The score table is:

Modules	25 points each	
Octopi	50	,, ,,
Heads	75	,, ,,
Landing 'copter	100	,, ,,

The speed of the game is controlled by the variable z, set in line 440 and reduced according to the skill level in line 800. The lower the value, the faster the game.

All graphics characters are indicated by a surrounding box, and inverse characters are underlined. Where the spacing in a line is critical (for example, line 170), dotted lines mark the beginning and end of the line.

```
  1 REM "ATTACK"
 10 REM MARTIAN ATTACK, the game written by Nikola I. Stojanovic,
    Yugoslavia.
 20 REM Generating of graphical symbols.
 30 FOR k=1 TO 3
 40 FOR i=0 TO 167
 50 READ red: POKE USR "a"+i,red
 60 NEXT i
 70 IF k=1 THEN GO TO 160
 80 IF k=2 THEN GO TO 340
 90 IF k=3 THEN GO TO 370
100 NEXT k
110 REM Data for determining graphical fields.
120 DATA 49,74,132,132,132,132,132,132,140,82,33,33,33,33,33,32,
    0,0,0,0,0,0,64,128
121 DATA 56,69,131,131,131,131,69,56
122 DATA 48,73,134,4,4,4,4,4,128,80,32,0,0,0,0,0
123 DATA 49,74,132,132,132,132,132,132,128,64,32,32,32,32,40,16
124 DATA 8,16,32,64,64,32,34,28
125 DATA 31,2,4,4,4,2,2,1,248,0,0,0,0,16,32,192,0,0,4,8,16,32,64,128
126 DATA 60,66,129,128,128,129,66,60
127 DATA 4,8,28,32,32,32,28,0
128 DATA 255,146,167,149,182,166,230,255,255,103,101,77,191,181,165,255
129 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0,0,0
130 DATA 255,195,195,195,195,195,195,195,255,195,195,195,255,255,255,
    255,15,6,6,31,63,127,255,255,0,0,0,255,255,255,255,255,0,0,0,248,
    252,254,255,255
131 DATA 0,4,12,28,60,62,127,255,1,7,15,15,7,3,1,0,255,255,255,255,255,
    255,255,127,128,192,192,224,192,192,128,0,60,28,24,24,24,24,56,60
132 DATA 24,24,60,60,126,126,255,255
133 DATA 127,127,127,127,127,127,255,48,128,240,136,132,254,254,255,12
134 DATA 0,0,15,16,112,127,255,48,0,0,128,64,32,254,255,12
135 DATA 0,24,60,60,60,24,24,24
136 DATA 0,0,0,255,165,165,165,165
137 DATA 0,24,60,36,126,66,66,255,15,31,31,8,7,128,255,255,255,255,255,
    0,255,0,255,255,240,248,248,16,224,1,255,255
138 DATA 255,4,30,35,67,67,63,12,224,0,0,1,195,255,254,0
139 DATA 0,224,62,255,252,0,0,0,240,15,255,255,131,56,96,128,3,225,127,
    63,63,1,2,7
140 DATA 24,36,36,126,255,129,129,255,255,255,153,153,153,153,153,189
141 DATA 7,0,0,128,195,255,127,0,255,32,120,196,194,194,252,48
142 DATA 0,3,124,255,63,0,0,0,15,240,255,255,193,56,6,1,192,135,254,
    252,252,128,64,224
143 DATA 0,0,0,126,0,0,0,0
144 DATA 60,126,219,255,126,102,36,60
145 DATA 60,90,126,60,82,137,133,133
146 DATA 146,64,10,81,4,40,136,4,72,81,126,241,36,80,0,136,144,32,64,
    156,0,8,136,68
147 DATA 146,96,67,27,66,4,136,1,32,8,65,216,0,201,4,2
148 DATA 130,68,40,56,88,20,66,129
150 REM Prologue.
160 BORDER 2: PAPER 2: INK 7: CLS
170 PRINT AT 4,17;"I";AT 5,1;"  ABC  DC  EF  JK  I  DC  GH";AT 7,0;
    "  **** ******** **** **** * *     * *  * *  * * *  * *
       ****   *  *  ****  *   **     *  *  *  *  *  *  *
    *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *
     **** *  *  "
180 PRINT AT 19,0;" Author:  N.I. StojanoviN,  1984"
190 PLOT 0,150: DRAW 255,0: PLOT 0,55: DRAW 255,0: PLOT 169,142
200 BEEP .1,5: BEEP .2,10: BEEP .1,12: BEEP .3,17: BEEP .35,21:
    BEEP .05,19: BEEP .05,17: BEEP .05,15: BEEP .05,11: BEEP .2,9:
    BEEP .1,12: BEEP .2,15: BEEP .1,11: BEEP .25,16: BEEP .1,21
210 PRINT AT 21,0;"  Press any key to continue ..."
220 LET t$=INKEY$
230 IF CODE t$=0 THEN GO TO 220
240 BORDER 0: PAPER 0: INK 7: CLS
250 PLOT 255,12: DRAW -255,0: BEEP .07,27: DRAW 0,163: BEEP .07,27:
    DRAW 255,0: BEEP .07,27: DRAW 0,-163: BEEP .07,27: PLOT 0,80:
    DRAW 255,0: BEEP .07,27
260 PRINT AT 1,1;"Commands:          OP - change";AT 3,19;"Q - up";
    AT 4,19;"M - down";AT 6,12;"Plane: I - opposite";AT 7,19;"P - missi
    le";AT 9,7;"Helicopter: I - left";AT 10,19;"P - right"
270 PRINT AT 14,1;" If you feel cruel because of";AT 15,2;"killing of
    the Martians, you";AT 16,2;"should know that the invasion";AT 17,2;
    "is conducted by the robots !"
280 PRINT AT 21,2;"Press any key to continue ..."
290 LET t$=INKEY$
```


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PROGRAMS

```
30Ø IF CODE t$=Ø THEN GO TO 29Ø
31Ø BORDER 5: PAPER 5: CLS
32Ø GO TO 1ØØ
33Ø REM City. Martian headquarters.
34Ø INK 2: PRINT AT 19,1;"CDE": INK 4: PRINT AT 19,7;"F  K  KK":
    INK 2: PRINT AT 19,24;"CE": INK 4: PRINT AT 19,26;"K  F"
341 INK 6: PRINT AT 2Ø,1;"BBB": INK 4: PRINT AT 2Ø,6;"GHI  K  KK":
    INK 6: PRINT AT 2Ø,9;"CE";AT 2Ø,2Ø;"CDE": INK 7:
    PRINT AT 2Ø,24;"BB"
342 INK Ø: PRINT AT 21,Ø;"Q  P Q Q Q P Q Q  QP": INK 6:
    PRINT AT 21,1;"BAB": INK 1: PRINT AT 21,4;"NO": INK 3: PRINT AT 21,7
    ;"J": INK 7: PRINT AT 21,9;"BA": INK 4: PRINT AT 21,12;"K";AT 21,17;
    "KK";AT 21,26;"K": INK 2: PRINT AT 21,14;"LM": INK 6: PRINT AT 21,2Ø
    ;"BAB": INK 7: PRINT AT 21,24;"AB": INK 2: PRINT AT 21,27;"NO":
    INK 3: PRINT AT 21,29;"J"
35Ø INK 1: PRINT AT 1,15;"R";AT 2,1Ø;"123456STU2324"
36Ø GO TO 1ØØ
37Ø INK Ø: PRINT AT Ø,Ø;"SCORE ØØØØ  3  3  HI ØØØØ": INK 1:
    PRINT AT Ø,12;"HI": INK 2: PRINT AT Ø,18;"EDC"
38Ø LET nj=Ø
39Ø INK Ø: IF nj<1Ø THEN PRINT AT Ø,28;"ØØØ";nj: GO TO 44Ø
4ØØ INK Ø: IF nj<1ØØ THEN PRINT AT Ø,28;"ØØ";nj: GO TO 44Ø
41Ø INK Ø: IF nj<1ØØØ THEN PRINT AT Ø,28;"Ø";nj: GO TO 44Ø
42Ø INK Ø: PRINT AT Ø,28;nj
43Ø REM Initial conditions.
44Ø LET a=3: LET z=1
45Ø LET c=3: LET d=3: LET sc=Ø: LET rc=Ø
46Ø INK Ø: PRINT AT Ø,15;d;AT Ø,22;c: GO SUB 351Ø
47Ø LET e=Ø: LET f=Ø: LET x=Ø: LET y=Ø: LET w=Ø: LET b=Ø
48Ø DIM r(a): DIM m(a): DIM n(a): DIM s(a): DIM h(a): DIM g(a): DIM u(a)
    : DIM v(a): DIM k(a)
49Ø REM Helicopter. Plane. Initial positions.
5ØØ LET ax=12: LET ay=25: LET kh=17: LET khh=4: LET kg=Ø: LET gy=Ø:
    LET ex=Ø: LET ey=Ø: LET bm=1: LET bg=Ø
5Ø1 LET hx=kh: LET hy=khh: LET gx=kg
51Ø INK 1: PRINT AT hx,hy;"HI"
52Ø INK 2: PRINT AT ax,ay;"JKL"
53Ø BEEP .1,5: BEEP .2,1Ø: BEEP .1,12: BEEP .3,17: BEEP .35,21:
    BEEP .Ø5,19: BEEP .Ø5,17: BEEP .Ø5,15: BEEP .Ø5,11: BEEP .2,9:
    BEEP .1,12: BEEP .2,15: BEEP .1,11: BEEP .25,16: BEEP .1,21
54Ø REM Main part of the program - command receiving.
55Ø RANDOMIZE
56Ø IF hx<7 THEN GO TO 551Ø
57Ø IF hx>=7 THEN GO TO 5Ø1Ø
58Ø LET t$=INKEY$
59Ø IF t$="q" THEN GO TO 6Ø1Ø
6ØØ IF t$="Q" THEN GO TO 651Ø
61Ø IF t$="m" THEN GO TO 7Ø1Ø
62Ø IF t$="M" THEN GO TO 751Ø
63Ø IF t$="i" THEN GO TO 8Ø1Ø
64Ø IF t$="I" THEN GO TO 851Ø
65Ø IF t$="p" THEN GO TO 9Ø1Ø
66Ø IF t$="P" THEN GO TO 951Ø
67Ø IF b=1 THEN GO TO 451Ø
68Ø IF y>1Ø-a THEN LET b=1: LET y=Ø: LET kg=3: LET gy=hy: GO TO 451Ø
69Ø IF x>1Ø-a THEN LET b=1: LET x=Ø: LET kg=ax-1: LET gy=INT (31*RND):
    GO TO 451Ø
7ØØ LET x=x+1: LET y=y+1
71Ø LET sc=sc+1
72Ø GO TO 56Ø
73Ø REM Case of the victory of the defense.
74Ø LET sc=sc+1ØØ: GO SUB 351Ø
75Ø INK 1: FLASH 1: PRINT AT 1Ø,1Ø;"  SUCCESS !  "´"  The invasion is
    suppressed!  ": FLASH Ø: PRINT AT 13,3;"Prepare yourself, there is"
    ´"  another fleet of invaders"´"  comming !"
76Ø BEEP .1,3: BEEP .3,6: BEEP .6,13: BEEP .2,9: BEEP .1,13: BEEP .1,7:
    BEEP .4,11: BEEP .7,17: PAUSE 6Ø
77Ø GO SUB 381Ø: GO SUB 391Ø
78Ø GO SUB 331Ø
79Ø IF a=7 THEN GO TO 81Ø
8ØØ LET a=a+1: LET z=z-.2
81Ø IF sc<9999 THEN GO TO 46Ø
82Ø PAPER 2: INK 7: FLASH 1: PRINT AT 1Ø,Ø;"  You have obtained
    "´"  the best possible score !  ": FLASH Ø: PAPER 5
83Ø BEEP .1,3: BEEP .3,6: BEEP .6,13: BEEP .2,9: BEEP .1,13: BEEP .1,7:
    BEEP .4,11: BEEP .7,17: PAUSE 25
84Ø GO TO 94Ø
85Ø REM Case of the victory of the invaders.
86Ø INK Ø: PRINT AT Ø,15;d;AT Ø,22;c: GO SUB 351Ø
87Ø FOR i=1 TO 3
88Ø BORDER 1: BEEP .2,59: BRIGHT 1: BEEP .2,63: BORDER 7: BEEP .2,55:
    BORDER 1: BRIGHT Ø: BEEP .2,59: BORDER 2: BORDER 5
89Ø NEXT i
9ØØ GO SUB 331Ø
91Ø FOR i=5 TO 15
92Ø INK 2: PRINT AT i-1,1;"                                ";AT i,3;
    "THE EARTH HAS BEEN INVADED !": BEEP .2,3
93Ø NEXT i
94Ø GO SUB 331Ø
95Ø INK Ø: PRINT AT 1Ø,1;"Do you want another game (y/n)?"
96Ø LET t$=INKEY$
97Ø IF t$="n" THEN PRINT AT 12,5;"Maybe some other time !";AT 15,11;
    "GOODBYE !": STOP
98Ø IF t$="y" AND sc>9999 THEN RUN
99Ø IF t$="y" THEN GO TO 1Ø1Ø
1ØØØ GO TO 96Ø
1Ø1Ø IF sc>nj THEN LET nj=sc
1Ø2Ø GO SUB 381Ø: GO SUB 391Ø
1Ø3Ø GO SUB 331Ø
1Ø4Ø GO TO 39Ø
2ØØØ REM The module - helicopter crash.
2Ø1Ø INK Ø: PRINT AT m(i),n(i);"S";AT m(i)+1,n(i);"T";AT hx,hy;"ST":
    BEEP .5,3: PRINT AT m(i),n(i)," ";AT m(i)+1,n(i)," ";AT hx,hy;"  "
2Ø2Ø LET k(i)=1: FOR j=1 TO a: LET m(j)=Ø: LET u(j)=r(j): LET v(j)=n(j):
    NEXT j: GO SUB 581Ø: FOR j=1 TO a: LET r(j)=u(j): LET n(j)=v(j):
    NEXT j
2Ø3Ø GO SUB 371Ø
2Ø4Ø GO SUB 351Ø
2Ø5Ø GO TO 56Ø
21ØØ REM The octopus - helicopter crash.
211Ø INK Ø: PRINT AT gx,gy;"F";AT hx,hy;"ST": BEEP .5,3: PRINT AT gx,gy;
    " ";AT hx,hy;"  "
```

PROGRAMS

```
212Ø GO SUB 371Ø
213Ø LET kg=Ø: LET gx=Ø: LET gy=Ø: LET b=Ø
214Ø GO SUB 351Ø
215Ø GO TO 56Ø
22ØØ REM The module - missile crash.
221Ø INK Ø: PRINT AT m(i),n(i);"S";AT m(i)+1,n(i);"T": BEEP .5,3:
      PRINT AT m(i),n(i);" ";AT m(i)+1,n(i);" "
222Ø LET k(i)=1: FOR j=1 TO a: LET m(j)=Ø: LET u(j)=r(j): LET v(j)=n(j):
      NEXT j: GO SUB 581Ø: FOR j=1 TO a: LET r(j)=u(j): LET n(j)=v(j):
      NEXT j
223Ø LET sc=sc+25: GO SUB 351Ø
224Ø GO TO 56Ø
23ØØ REM The helicopter - missile crash.
231Ø INK Ø: PRINT AT hx,hy;"ST": BEEP .5,3: PRINT AT hx,hy;"  "
232Ø LET sc=sc-5Ø: IF sc<Ø THEN LET sc=Ø
233Ø GO SUB 351Ø
234Ø GO SUB 371Ø
235Ø GO TO 56Ø
24ØØ REM The head - missile crash.
241Ø INK Ø: PRINT AT h(i),g(i);"U": BEEP .5,3: PRINT AT h(i),g(i);" "
242Ø LET k(i)=1: FOR j=1 TO a: LET h(j)=Ø: LET u(j)=s(j): LET v(j)=g(j):
      NEXT j: GO SUB 581Ø: FOR j=1 TO a: LET s(j)=u(j): LET g(j)=v(j):
      NEXT j
243Ø LET sc=sc+75: GO SUB 351Ø
244Ø GO TO 56Ø
25ØØ REM The octopus - missile crash.
251Ø INK Ø: PRINT AT gx,gy;"U": BEEP .5,3: PRINT AT gx,gy;" "
252Ø LET sc=sc+5Ø: GO SUB 351Ø
253Ø LET kg=Ø: LET gx=Ø: LET gy=Ø: LET b=Ø
254Ø GO TO 56Ø
26ØØ REM The module - plane crash.
261Ø INK Ø: PRINT AT m(i),n(i);"S";AT m(i)+1,n(i);"T";AT ax,ay;"HQR":
      BEEP .5,3: PRINT AT m(i),n(i);" ";AT m(i)+1,n(i);" ";AT ax,ay;"   "
262Ø LET k(i)=1: FOR j=1 TO a: LET m(j)=Ø: LET u(j)=r(j): LET v(j)=n(j):
      NEXT j: GO SUB 581Ø: FOR j=1 TO a: LET r(j)=u(j): LET n(j)=v(j):
      NEXT j
263Ø GO SUB 361Ø
264Ø GO SUB 351Ø
265Ø GO TO 56Ø
27ØØ REM The helicopter - plane crash.
271Ø INK Ø: PRINT AT hx,hy;"ST";AT ax,ay;"HQR": BEEP .5,3: PRINT AT hx,
      hy;"  ";AT ax,ay;"   "
272Ø LET sc=sc-1ØØ: IF sc<Ø THEN LET sc=Ø
273Ø GO SUB 351Ø
274Ø GO SUB 361Ø: GO SUB 371Ø
275Ø GO TO 56Ø
28ØØ REM The head - plane crash.
281Ø INK Ø: PRINT AT h(i),g(i);"U";AT ax,ay;"HQR": BEEP .5,3: PRINT AT
      h(i),g(i);" ";AT ax,ay;"   "
282Ø LET k(i)=1: FOR j=1 TO a: LET h(j)=Ø: LET u(j)=s(j): LET v(j)=g(j):
      NEXT j: GO SUB 581Ø: FOR j=1 TO a: LET s(j)=u(j): LET g(j)=v(j):
      NEXT j
283Ø GO SUB 361Ø
284Ø GO SUB 351Ø
285Ø GO TO 56Ø
29ØØ REM The octopus - plane crash.
291Ø INK Ø: PRINT AT gx,gy;"U";AT ax,ay;"HQR": BEEP .5,3: PRINT AT gx,
      gy;" ";AT ax,ay;"   "
292Ø GO SUB 361Ø
293Ø LET kg=Ø: LET gx=Ø: LET gy=Ø: LET b=Ø
294Ø GO SUB 351Ø
295Ø GO TO 56Ø
3ØØØ REM Subroutine - clearing of the screen.
3Ø1Ø PRINT AT 1,Ø;"                ";AT 1,16;"                ";AT 2,Ø;
      "                ";AT 2,21;"                "
3Ø2Ø FOR i=3 TO 18
3Ø3Ø PRINT AT i,Ø;"                                "
3Ø4Ø NEXT i
3Ø5Ø RETURN
35ØØ REM Subroutine - score printing.
351Ø LET rc=sc
352Ø INK Ø: IF sc<1Ø THEN PRINT AT Ø,6;"ØØØ";sc: RETURN
353Ø INK Ø: IF sc<1ØØ THEN PRINT AT Ø,6;"ØØ";sc: RETURN
354Ø INK Ø: IF sc<1ØØØ THEN PRINT AT Ø,6;"Ø";sc: RETURN
355Ø INK Ø: PRINT AT Ø,6;sc
356Ø RETURN
36ØØ REM Subroutine - plane destruction.
361Ø LET c=c-1
362Ø IF c=Ø THEN GO TO 86Ø
363Ø INK Ø: PRINT AT Ø,22;c
364Ø LET ax=12: LET ay=25: LET f=Ø
365Ø INK 2: PRINT AT ax,ay;"JKL"
366Ø BEEP .Ø5,5: BEEP .1,1Ø: BEEP .15,15
367Ø LET y=Ø
368Ø RETURN
37ØØ REM Subroutine - nelicopter destruction.
371Ø LET d=d-1
372Ø IF d=Ø THEN GO TO 86Ø
373Ø INK Ø: PRINT AT Ø,15;d
374Ø LET kh=17: LET hx=17: LET khh=4: LET hy=4: LET e=Ø
375Ø INK 1: PRINT AT hx,hy;"HI"
376Ø BEEP .Ø5,5: BEEP .1,1Ø: BEEP .15,15
377Ø LET x=Ø
378Ø RETURN
38ØØ REM Subroutine - elimination of the heads.
381Ø FOR i=1 TO a
382Ø PRINT AT h(i),g(i);" "
383Ø LET s(i)=Ø: LET h(i)=Ø: LET g(i)=Ø
384Ø NEXT i
385Ø LET w=Ø
386Ø INK Ø: PRINT AT Ø,Ø;"SCORE";AT Ø,25;"HI": INK 1: PRINT AT Ø,12;"HI"
      : INK 2: PRINT AT Ø,18;"EDC"
387Ø RETURN
39ØØ REM Subroutine - elimination of the modules.
391Ø FOR i=1 TO a
392Ø PRINT AT m(i),n(i);" ";AT m(i)+1,n(i);" "
393Ø LET r(i)=Ø: LET m(i)=Ø: LET n(i)=Ø
394Ø NEXT i
395Ø LET w=Ø
396Ø INK Ø: PRINT AT Ø,Ø;"SCORE";AT Ø,25;"HI": INK 1: PRINT AT Ø,12;"HI"
      : INK 2: PRINT AT Ø,18;"EDC"
397Ø RETURN
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PROGRAMS

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4500 REM Octopus generation.
4510 LET o=INT kg: LET kg=kg+1/z/5: LET gx=INT kg: IF gx=3 AND hx=3
     THEN LET kg=4: LET o=4: LET gx=4
4520 IF gx=o THEN GO TO 4570
4530 REM Crash checking.
4540 IF gx=hx AND (gy=hy OR gy=hy+1) THEN PRINT AT o,gy;" ": GO TO 2110
4550 IF gx=ax AND (gy=ay OR gy=ay+1 OR gy=ay+2) THEN PRINT AT o,gy;" ":
     GO TO 2910
4560 IF gx>18 THEN LET gx=18: GO TO 8600
4570 INK 2: PRINT AT o,gy;" ";AT gx,gy;"O"
4580 BEEP .005*z,49
4590 GO TO 7100
5000 REM Module generation.
5010 IF bm=0 THEN GO SUB 3810: LET bm=1: LET bg=0
5020 IF w=a THEN GO TO 5090
5030 LET p=INT (31*RND)
5040 IF p/(10-a)-INT (p/(10-a))<>0 THEN GO TO 5080
5050 LET w=w+1
5060 LET r(w)=4: LET m(w)=4: LET n(w)=p
5070 INK 1: PRINT AT m(w),n(w);"H";AT m(w)+1,n(w);"G"
5080 IF w=0 THEN GO TO 580
5090 FOR i=1 TO w
5100 LET o=INT r(i): LET r(i)=r(i)+1/z/6+sc/20000: LET m(i)=INT r(i)
5110 IF m(i)=o THEN GO TO 5160
5120 REM Crash checking.
5130 IF m(i)+1=hx AND (n(i)=hy OR n(i)=hy+1) THEN PRINT AT o,n(i);" ";
     AT o+1,n(i);" ": GO TO 2010
5140 IF m(i)+1=ax AND (n(i)=ay OR n(i)=ay+1 OR n(i)=ay+2) THEN PRINT
     AT o,n(i);" ";AT o+1,n(i);" ": GO TO 2610
5150 IF m(i)>17 THEN LET m(i)=17: GO TO 860
5160 PRINT AT o,n(i);" ";AT o+1,n(i);" "
5170 INK 1: PRINT AT m(i),n(i);"H";AT m(i)+1,n(i);"G"
5180 BEEP .005*z,39
5190 NEXT i
5200 GO TO 580
5500 REM Head generation.
5510 IF bg=0 THEN GO SUB 3910: LET bg=1: LET bm=0
5520 IF w=a THEN GO TO 5590
5530 LET p=INT (31*RND)
5540 IF p/(10-a)-INT (p/(10-a))<>0 THEN GO TO 5580
5550 LET w=w+1
5560 LET s(w)=10: LET h(w)=10: LET g(w)=p
5570 INK 2: PRINT AT h(w),g(w);"N"
5580 IF w=0 THEN GO TO 580
5590 FOR i=1 TO w
5600 LET o=INT s(i): LET s(i)=s(i)+1.2/z/6+sc/20000: LET h(i)=INT s(i)
5610 IF h(i)=o THEN GO TO 5650
5620 REM Crash checking.
5630 IF h(i)=ax AND (g(i)=ay OR g(i)=ay+1 OR g(i)=ay+2) THEN PRINT AT
     o,g(i);" ": GO TO 2810
5640 IF h(i)>18 THEN LET h(i)=18: GO TO 860
5650 INK 2: PRINT AT o,g(i);" ";AT h(i),g(i);"N"
5660 BEEP .005*z,29
5670 NEXT i
5680 GO TO 580
5800 REM Subroutine - ejection of the hit invader.
5810 LET w=w-1
5820 LET j=1
5830 FOR i=1 TO a
5840 IF k(i)=1 THEN GO TO 5870
5850 LET u(j)=u(i): LET v(j)=v(i)
5860 LET j=j+1
5870 NEXT i
5880 FOR i=1 TO a: LET k(i)=0: NEXT i
5890 FOR i=j+1 TO a: LET u(i)=0: LET v(i)=0: NEXT i
5900 RETURN
6000 REM Moving the plane up.
6010 LET x=0
6020 LET ox=ax: LET oy=ay
6030 IF f=0 THEN GO TO 6110
6040 IF f=1 THEN GO TO 6210
6100 REM Move up - left direction.
6110 LET ax=ax-1: LET ay=ay-1
6120 IF ax<6 THEN LET ax=6: LET ay=oy: GO TO 6700
6130 IF ay<0 THEN LET ay=0: LET ax=ox: GO TO 6700
6140 GO SUB 6310
6150 INK 2: PRINT AT ox,oy;"   ";AT ax,ay;"IKL"
6160 GO TO 6700
6200 REM Move up - right direction.
6210 LET ax=ax-1: LET ay=ay+1
6220 IF ax<6 THEN LET ax=6: LET ay=oy: GO TO 6700
6230 IF ay>29 THEN LET ay=29: LET ax=ox: GO TO 6700
6240 GO SUB 6310
6250 INK 2: PRINT AT ox,oy;"   ";AT ax,ay;"EDC"
6260 GO TO 6700
6300 REM Subroutine - plane crash checking.
6310 FOR i=0 TO 2
6320 PRINT AT ax,ay+i;
6330 LET sad=PEEK 23684+256*PEEK 23685
6340 IF PEEK sad<>0 THEN GO TO 6370
6350 NEXT i
6360 RETURN
6370 IF ax=hx AND (ay+2=hy OR ay+1=hy OR ay=hy OR ay=hy+1) THEN PRINT
     AT ox,oy;"   ": GO TO 2710
6380 FOR i=1 TO w
6390 IF (ax=m(i)+1 OR ax=m(i)) AND (ay=n(i) OR ay+1=n(i) OR ay+2=n(i))
     THEN PRINT AT ox,oy;"   ": GO TO 2610
6400 IF ax=h(i) AND (ay=g(i) OR ay+1=g(i) OR ay+2=g(i)) THEN PRINT AT
     ox,oy;"   ": GO TO 2810
6410 NEXT i
6420 IF ax=gx AND (ay=gy OR ay+1=gy OR ay+2=gy) THEN PRINT AT ox,oy;
     "  ": GO TO 2910
6430 RETURN
6500 REM Moving the helicopter up.
6510 LET o=INT kh: LET kh=kh-.3*z: LET hx=INT kh
6520 LET ad=1
6530 GO SUB 6810
6540 IF hy>8 AND hy<21 AND hx=2 THEN LET hx=3: LET kh=3: GO TO 6700
6550 IF hx=0 THEN LET hx=1: LET kh=1: GO TO 6700
6600 REM Helicopter position printing - case of the vertical move.
6610 PRINT AT o,hy;"  "
6620 INK 1: IF e=0 THEN PRINT AT hx,hy;"HI"
6630 INK 1: IF e=1 THEN PRINT AT hx,hy;"AB"
```

PROGRAMS

```
6640 BEEP .0081,55
6650 GO TO 670
6800 REM Subroutine - helicopter crash checking (vertical move).
6810 IF hx=o THEN BEEP .0081,55: GO TO 670
6820 IF hx=ax AND (hy=ay-1 OR hy=ay OR hy=ay+1 OR hy=ay+2) THEN PRINT
     AT o,hy;"  ": GO TO 2710
6830 FOR i=1 TO w
6840 IF hx=m(i)+ad AND (hy=n(i) OR hy+1=n(i)) THEN PRINT AT o,hy;"  ":
     GO TO 2010
6850 NEXT i
6860 IF hx=gx AND (hy=gy OR hy+1=gy) THEN PRINT AT o,hy;"  ": GO TO
     2110
6870 RETURN
7000 REM Moving the plane down.
7010 LET x=0
7020 LET ox=ax: LET oy=ay
7030 IF f=0 THEN GO TO 7110
7040 IF f=1 THEN GO TO 7210
7100 REM Move down - left direction.
7110 LET ax=ax+1: LET ay=ay-1
7120 IF ax>18 THEN LET ax=18: LET ay=oy: GO TO 670
7130 IF ay<0 THEN LET ay=0: LET ax=ox: GO TO 670
7140 GO SUB 6310
7150 INK 2: PRINT AT ox,oy;"   ";AT ax,ay;"JKL"
7160 GO TO 670
7200 REM Move down - right direction.
7210 LET ax=ax+1: LET ay=ay+1
7220 IF ax>18 THEN LET ax=18: LET ay=oy: GO TO 670
7230 IF ay>29 THEN LET ay=29: LET ax=ox: GO TO 670
7240 GO SUB 6310
7250 INK 2: PRINT AT ox,oy;"   ";AT ax,ay;"EDC"
7260 GO TO 670
7500 REM Moving the helicopter down.
7510 LET o=INT kh: LET kh=kh+.4*z: LET hx=INT kh
7520 LET ad=0
7530 GO SUB 6810
7540 IF hx=2 AND (hy=9 OR hy=10 OR hy=20 OR hy=19) THEN LET hx=1:
     LET kh=1: GO TO 670
7550 IF hy>10 AND hy<19 AND hx=2 THEN GO TO 740
7560 IF hx=18 THEN LET hx=17: LET kh=17: GO TO 670
7570 GO TO 6610
8000 REM Rotation of the plane.
8010 LET f=1-f
8020 INK 2: IF f=0 THEN PRINT AT ax,ay;"JKL"
8030 INK 2: IF f=1 THEN PRINT AT ax,ay;"CDE"
8040 GO TO 670
8500 REM Moving the helicopter left.
8510 LET y=0: LET e=1
8520 LET o=INT khh: LET khh=khh-.7*z: LET hy=INT khh
8530 IF hy=o THEN BEEP .0081,55: GO TO 670
8540 REM Crash checking.
8550 IF hx=ax AND hy=ay+2 THEN PRINT AT hx,o;"  ": GO TO 2710
8560 FOR i=1 TO w
8570 IF (hx=m(i)+1 OR hx=m(i)) AND hy=n(i) THEN PRINT AT hx,o;"  ":
     GO TO 2010
8580 NEXT i
8590 IF hx=gx AND hy=gy THEN PRINT AT hx,o;"  ": GO TO 2110
8600 IF hx=1 AND hy=16 THEN LET hy=17: LET khh=17: GO TO 670
8610 IF hx=2 AND hy=20 THEN LET hy=21: LET khh=21: GO TO 670
8620 IF hy<0 THEN LET hy=0: LET khh=0: GO TO 670
8630 INK 1: PRINT AT hx,o;"  ";AT hx,hy;"AB"
8640 BEEP .0081,55
8650 GO TO 670
9000 REM Missile fireing.
9010 IF sc-rc<4*z THEN GO TO 670
9020 LET rc=sc
9030 IF f=0 THEN GO TO 9110
9040 IF f=1 THEN GO TO 9310
9100 REM Fire to the left.
9110 LET ex=ax: LET ey=ay-1
9120 IF ey<0 THEN GO TO 670
9130 LET eh=hy+1: GO SUB 9710
9140 INK 0: PRINT AT ex,ey;"M"
9150 FOR j=1 TO 10
9160 LET sy=ey: LET ey=ey-1
9170 IF ey<0 THEN PRINT AT ex,sy;" ": GO TO 670
9180 GO SUB 9860
9190 INK 0: PRINT AT ex,sy;" ";AT ex,ey;"M"
9200 BEEP .0081,59
9210 NEXT j
9220 PRINT AT ex,ey;" "
9230 GO TO 670
9300 REM Fire to the right.
9310 LET ex=ax: LET ey=ay+3
9320 IF ey>31 THEN GO TO 670
9330 LET eh=hy: GO SUB 9710
9340 INK 0: PRINT AT ex,ey;"M"
9350 FOR j=1 TO 10
9360 LET sy=ey: LET ey=ey+1
9370 IF ey>31 THEN PRINT AT ex,sy;" ": GO TO 670
9380 GO SUB 9860
9390 PRINT AT ex,sy;" ";AT ex,ey;"M"
9400 BEEP .0081,59
9410 NEXT j
9420 PRINT AT ex,ey;" "
9430 GO TO 670
9500 REM Moving the helicopter right.
9510 LET y=0: LET e=0
9520 LET o=INT khh: LET khh=khh+.5*z: LET hy=INT khh
9530 IF hy=o THEN BEEP .0081,55: GO TO 670
9540 REM Crash checking.
9550 IF hx=ax AND hy+1=ay THEN PRINT AT hx,o;"  ": GO TO 2710
9560 FOR i=1 TO w
9570 IF (hx=m(i)+1 OR hx=m(i)) AND hy+1=n(i) THEN PRINT AT hx,o;"  ":
     GO TO 2010
9580 NEXT i
9590 IF hx=gx AND hy+1=gy THEN PRINT AT hx,o;"  ": GO TO 2110
9600 IF hx=1 AND hy=13 THEN LET hy=12: LET khh=12: GO TO 670
9610 IF hx=2 AND hy=9 THEN LET hy=8: LET khh=8: GO TO 670
9620 IF hy>30 THEN LET hy=30: LET khh=30: GO TO 670
9630 INK 1: PRINT AT hx,o;"  ";AT hx,hy;"HI"
9640 BEEP .0081,55
9650 GO TO 670
```


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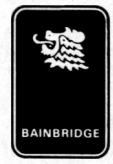
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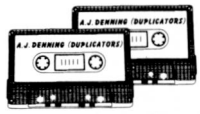
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PROGRAMS

```
9700 REM Subroutine - hit checking 1.
9710 PRINT AT ex,ey;
9720 LET sad=PEEK 23684+256*PEEK 23685
9730 IF PEEK sad=0 THEN RETURN
9740 IF ex=hx AND ey=eh THEN GO TO 2310
9750 FOR i=1 TO w
9760 IF (ex=m(i)+1 OR ex=m(i)) AND ey=n(i) THEN GO TO 2210
9770 IF ex=h(i) AND ey=g(i) THEN GO TO 2410
9780 NEXT i
9790 IF ex=gx AND ey=gy THEN GO TO 2510
9800 RETURN
9850 REM Subroutine - hit checking 2.
9860 PRINT AT ex,ey;
9870 LET sad=PEEK 23684+256*PEEK 23685
9880 IF PEEK sad=0 THEN RETURN
9890 IF ex=hx AND ey=eh THEN PRINT AT ex,sy;" ": GO TO 2310
9900 FOR i=1 TO w
9910 IF (ex=m(i)+1 OR ex=m(i)) AND ey=n(i) THEN PRINT AT ex,sy;" ":
     GO TO 2210
9920 IF ex=h(i) AND ey=g(i) THEN PRINT AT ex,sy;" ": GO TO 2410
9930 NEXT i
9940 IF ex=gx AND ey=gy THEN PRINT AT ex,sy;" ": GO TO 2510
9950 RETURN
```

Jupiter Ace Bigwriter

by Jonathan Hardwick

'Bigwriter' is a large character plotting routine for the unexpanded Ace. The listing defines two new words. EMITBIG and TYPEBIG — equivalents of the standard Ace Forth words EMIT and TYPE. EMITBIG requires the y-coordinate, x-coordinate and character to be plotted. For example: 26 30 ASCII P EMITBIG ASCII C EMITBIG ASCII W EMITBIG prints 'PCW' at the centre of the screen.

TYPEBIG requires the screen coordinates as before, followed by the name of the string to be plotted.

Also defined are EMITBIG2 and TYPEBIG2. These are intended as a demonstration of EMITBIG and TYPEBIG. Supplied with a character code, start address and number of bytes (like the standard EMIT and TYPE), a banner display is created at the top of the screen comprising eight characters. Comments must be omitted if you have the unexpanded machine.

```
 These words are needed by both
versions :-

: 7BYTE?
  ( ascii char - flag )
 DUP 63 < SWAP 93
 > OR
;

: FINDCHAR
 ( char - pattern addr,char )
 7322 OVER 7 * +
 OVER 7BYTE?
 IF
  OVER 93 >
  IF
   32 -
  THEN
 ELSE
  OVER 63 - -
 THEN
 SWAP
;


 Full-screen version :-

: HOME
 ( - y,x for top left corner )
 CLS 7 0 AT 44
 7
;

: MOVE>
 ( y,x - new y,x )
 7 + DUP 70 =
 IF
  DROP DUP 12 >
  IF
   8 -
  THEN
  7 CR CR CR CR
 THEN
```

PROGRAMS

```
;

: EMITBIG
( y,x,ascii char - new y,x )
FINDCHAR 7BYTE? 6 + 0
DO
  1+ DUP C@ 2 /
  7 0
  DO
    2 /MOD SWAP 4 PICK
    I - 6 PICK J
    - ROT PLOT
  LOOP
  DROP
LOOP
DROP MOVE>
;
: TYPEBIG
( y,x,str adr,len - new y,x )
OVER + SWAP
DO
  I C@ EMITBIG
LOOP
;

Banner version :-

CREATE SCROLL 33 C, 1 C, 36 C,
17 C, 0 C, 36 C, 1 C, 127 C, 0
C, 237 C, 176 C, 253 C, 233 C,

: PLOTBITS
( flag,addr,bit,column adjust
- flag,addr,bit/2 )
4 PICK 7 + 1
DO
  OVER 4 PICK I +
  C@ AND 0= 0= OVER
  62 + 46 I -
  ROT PLOT
LOOP
DROP 2 /
;

: EMITBIG2
( ascii char - )
FINDCHAR 7BYTE? SWAP 128 4
0
DO
  SCROLL CALL @ PLOTBITS 1
  PLOTBITS
LOOP
DROP DROP DROP
;

: TYPEBIG2
( string address,length - )
OVER + SWAP
DO
  I C@ EMITBIG2
LOOP
;

Example word :-

: WRITE
HOME ( change to CLS for
banner version )
BEGIN
  INKEY ?DUP
  IF
    32 MAX EMITBIG ( EMITBIG2
    for banner version )
  THEN
  0
UNTIL
;
```


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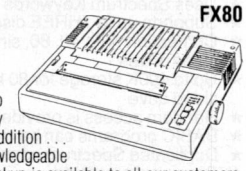
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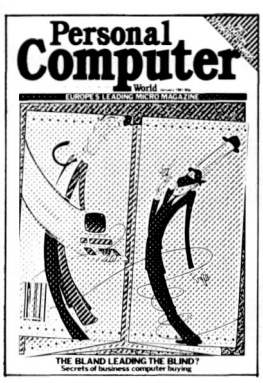
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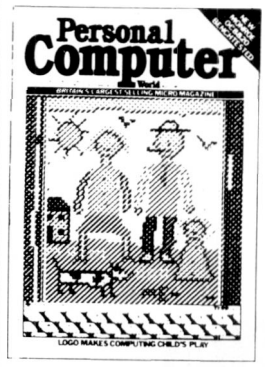


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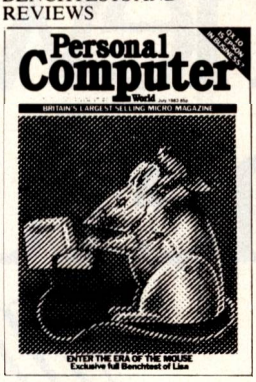
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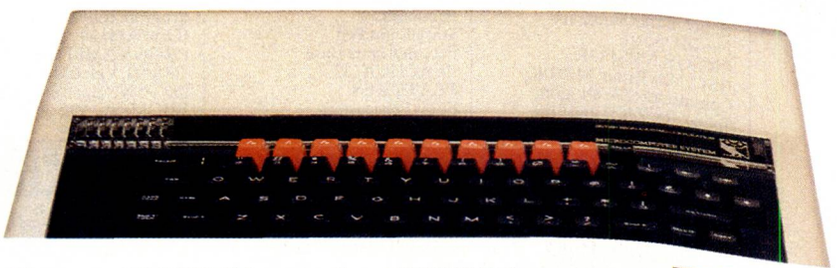
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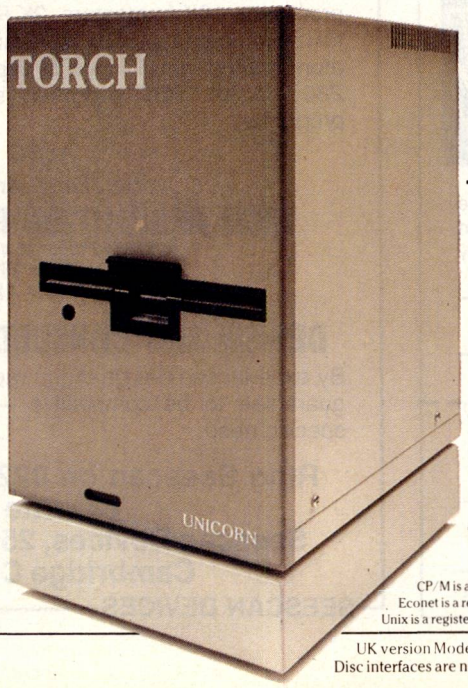
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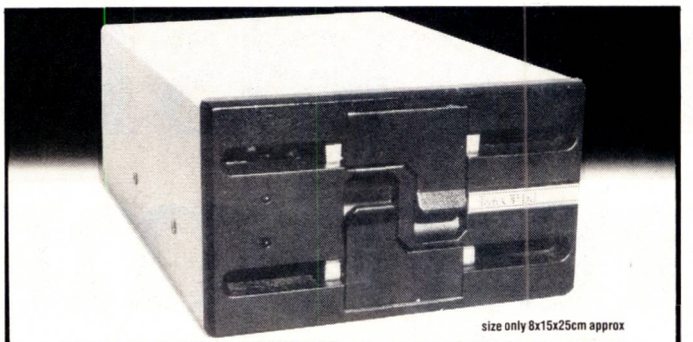
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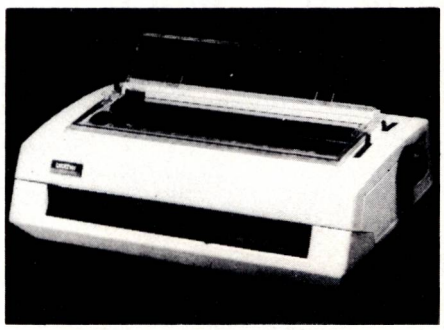
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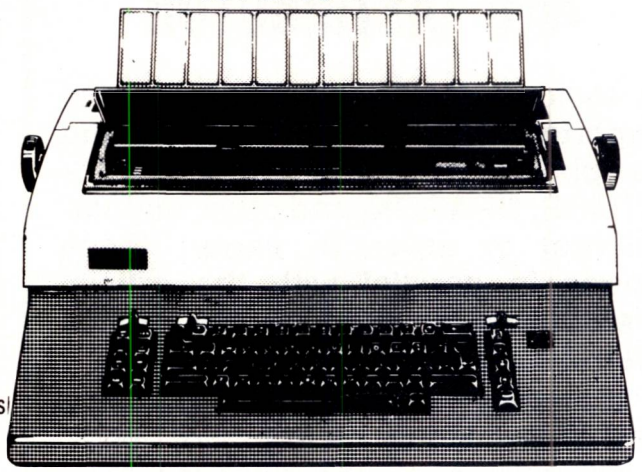
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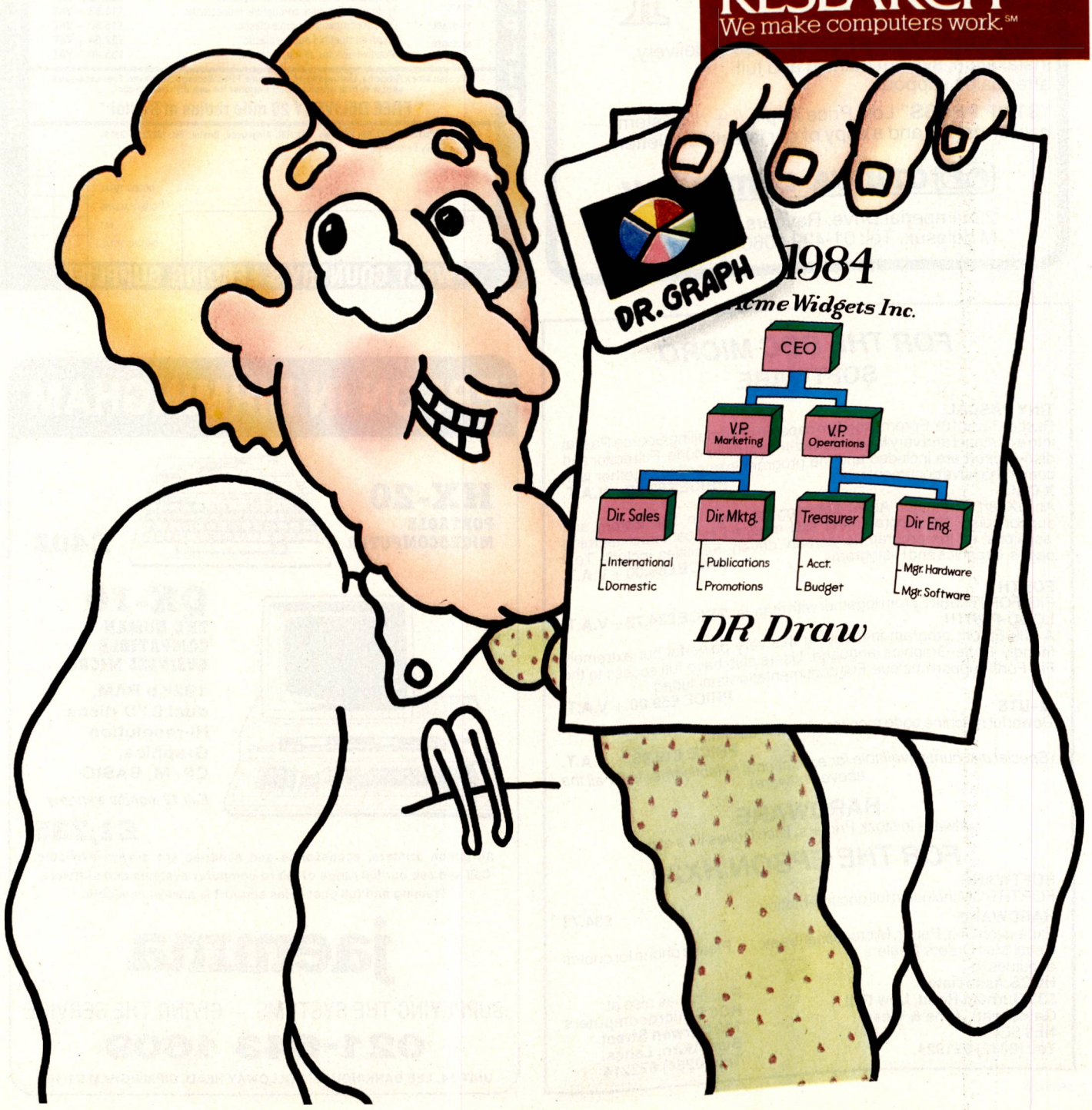
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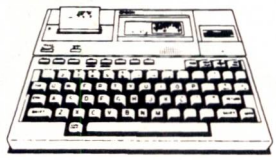
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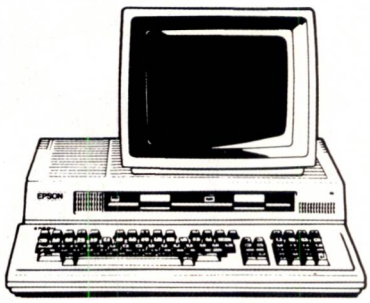
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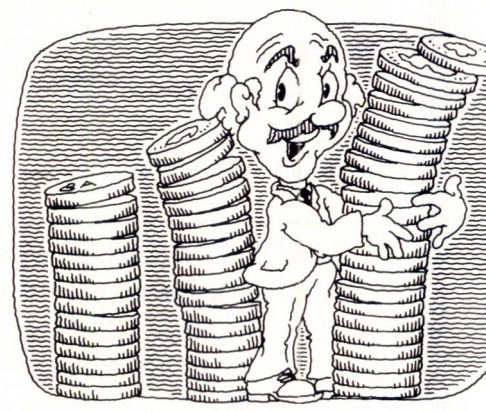
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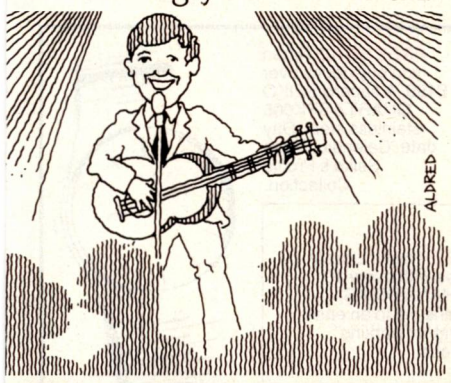
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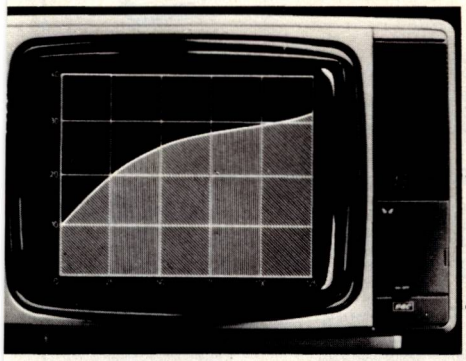


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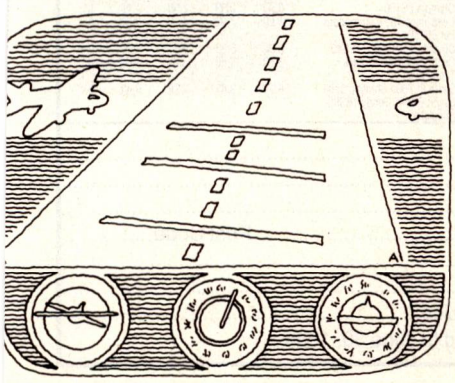






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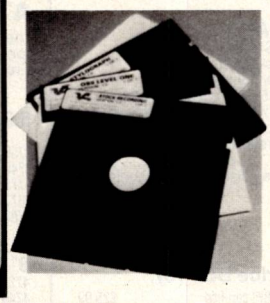
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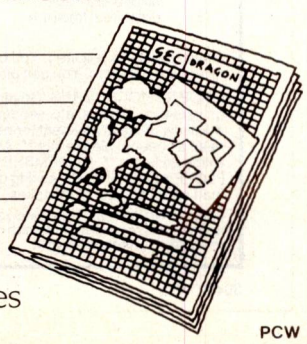
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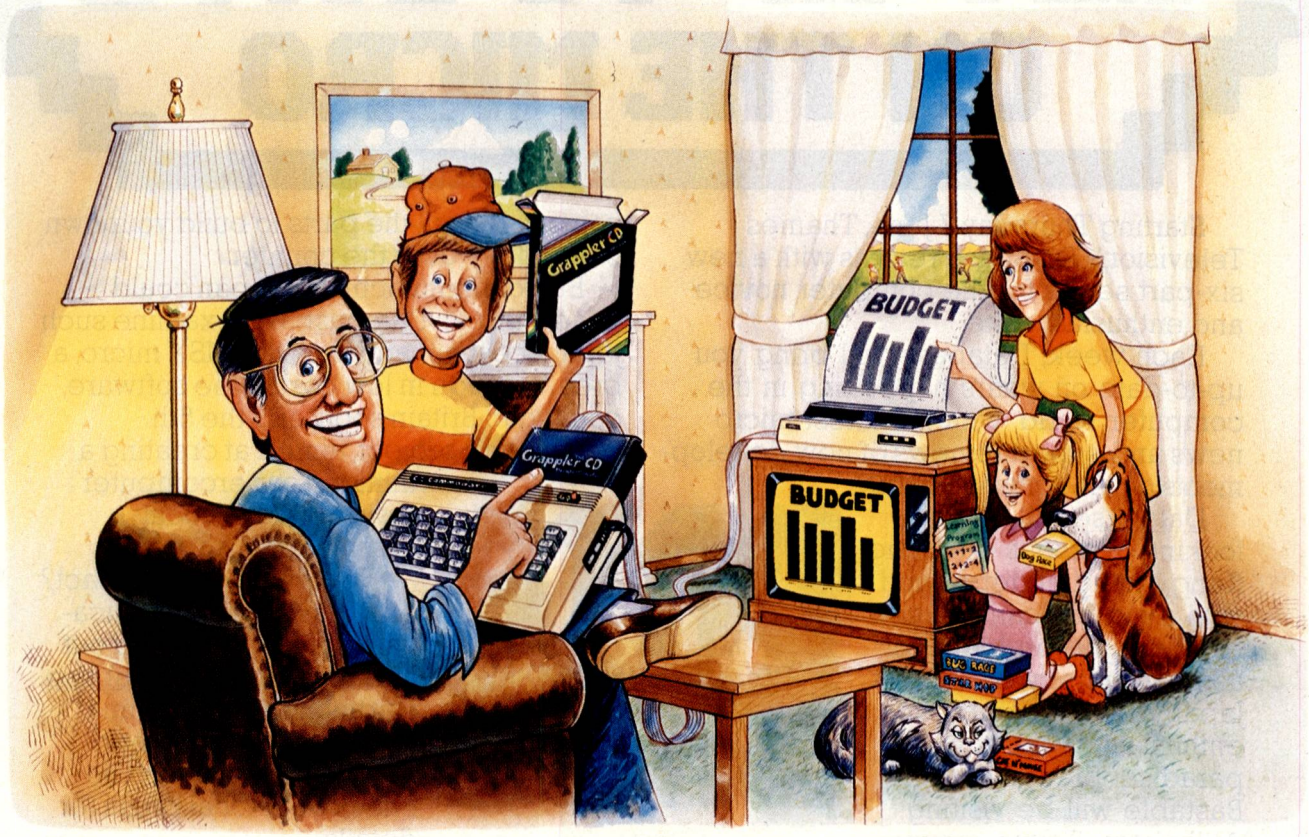
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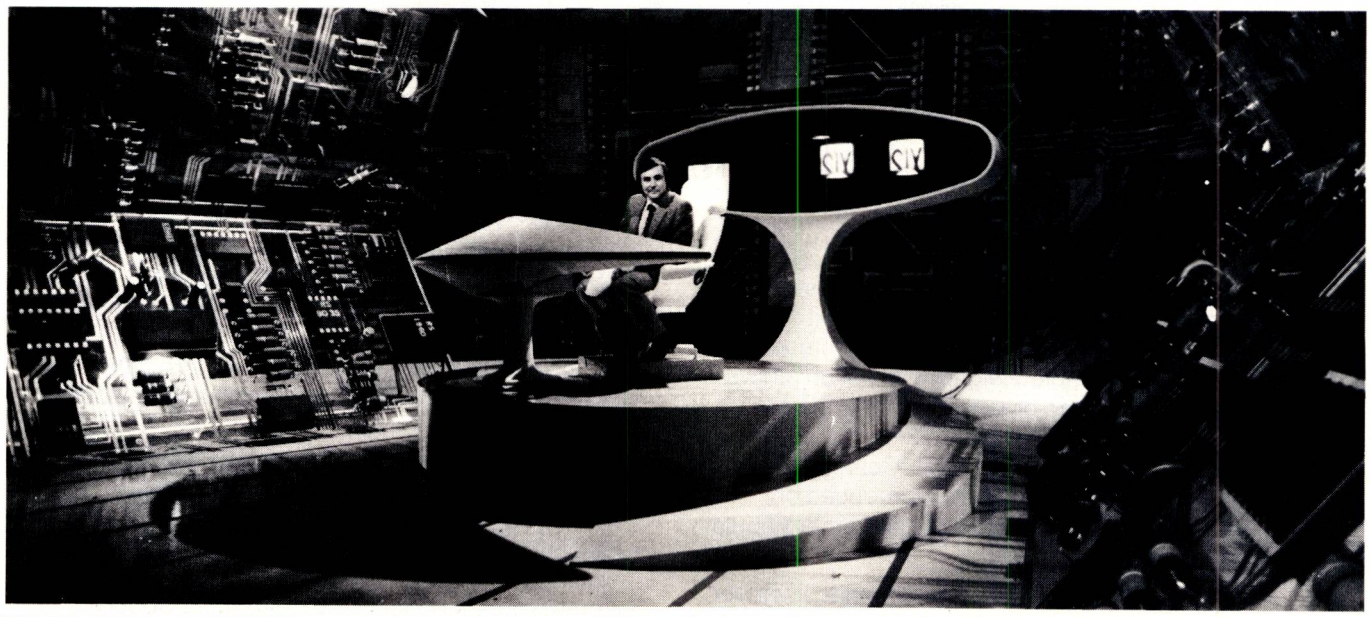
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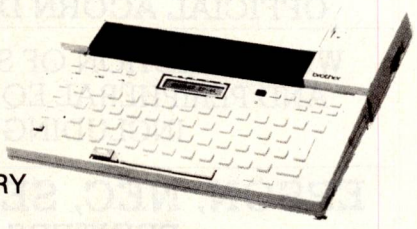
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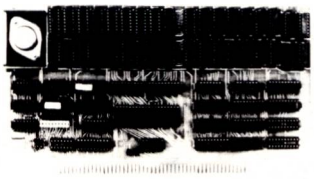
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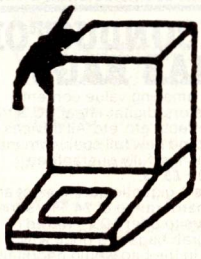
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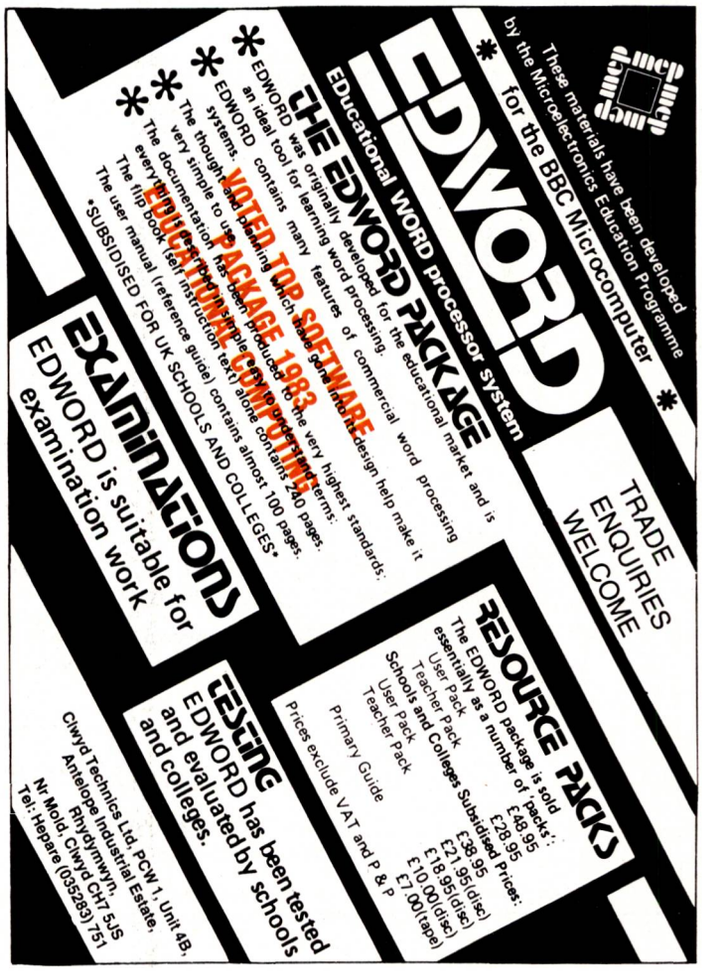
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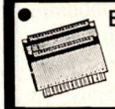
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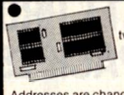
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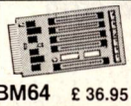
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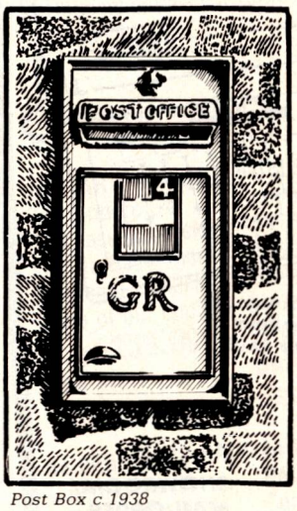
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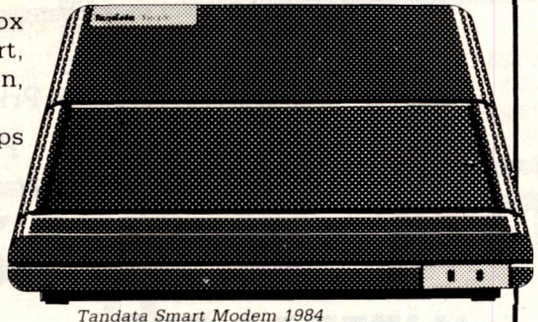
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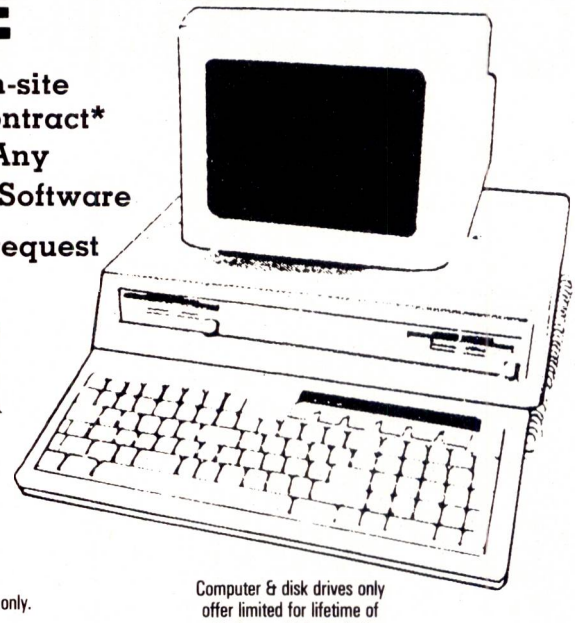
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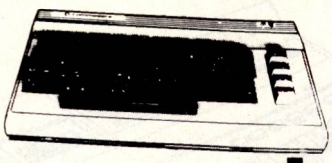
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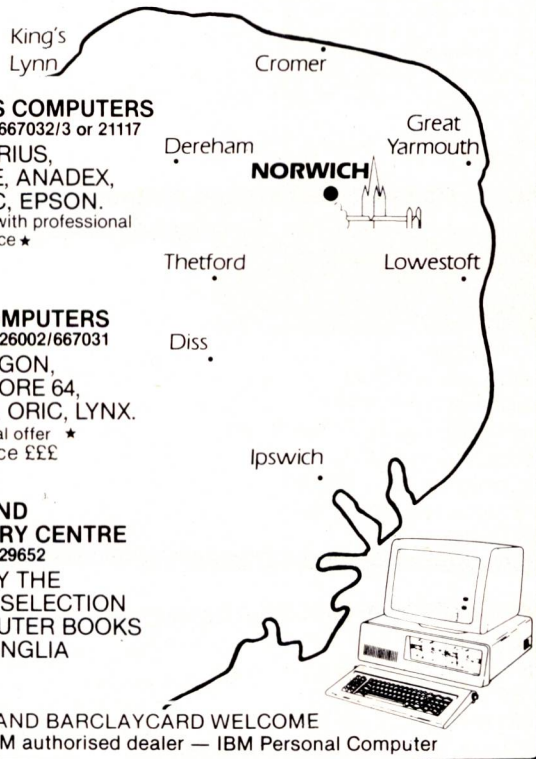
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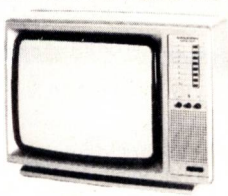
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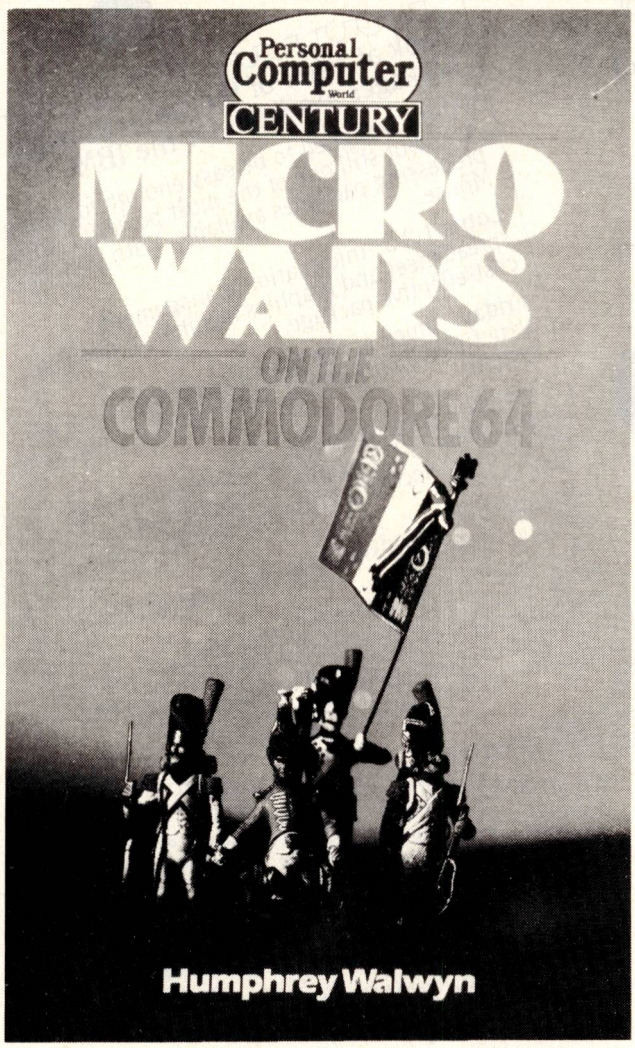
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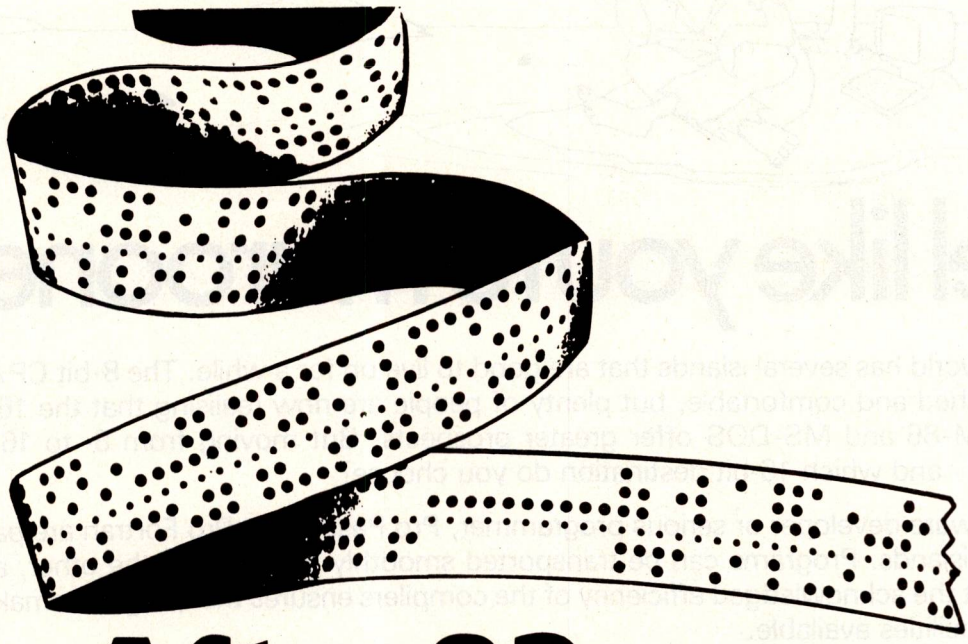
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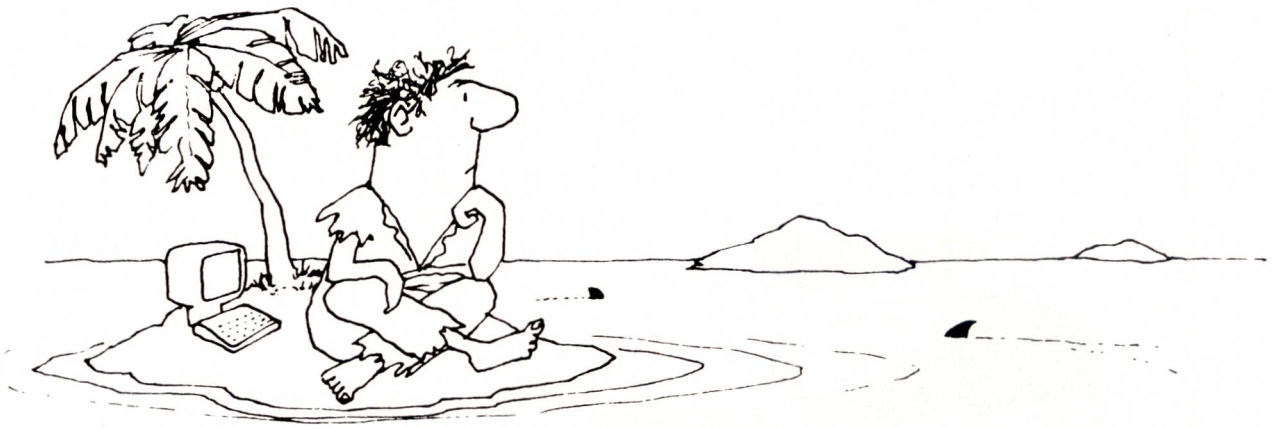
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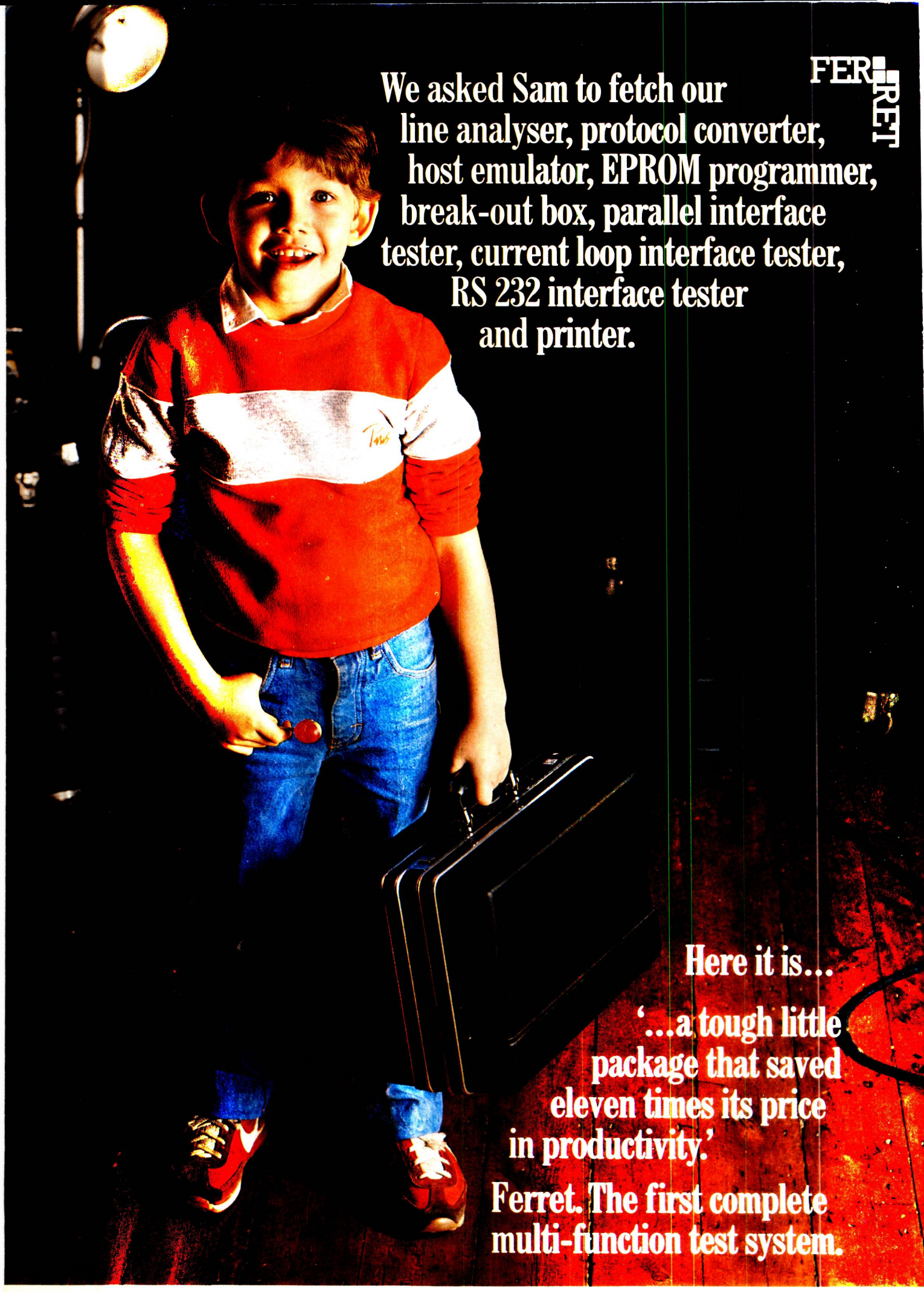
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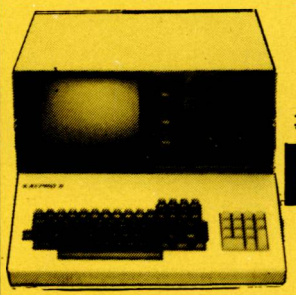
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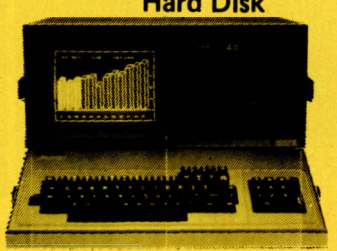
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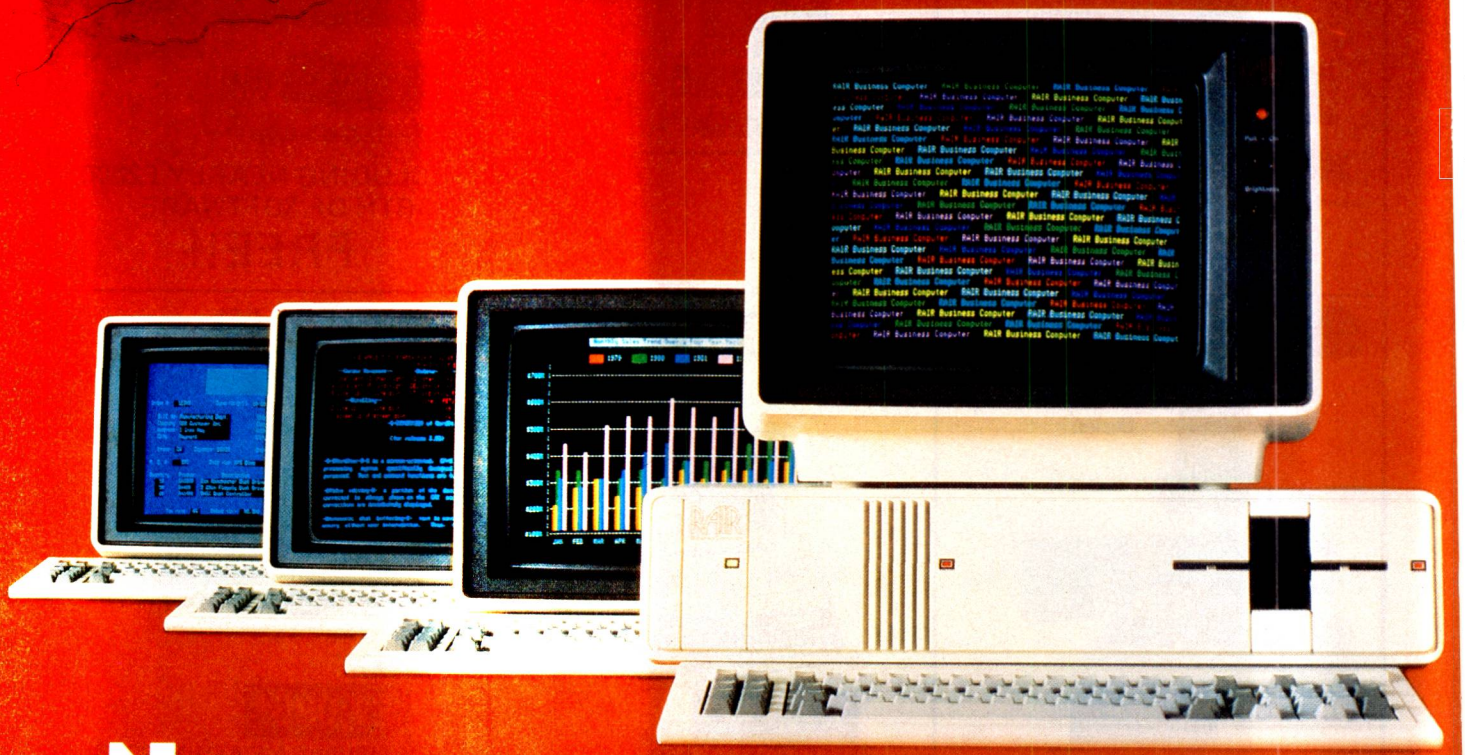
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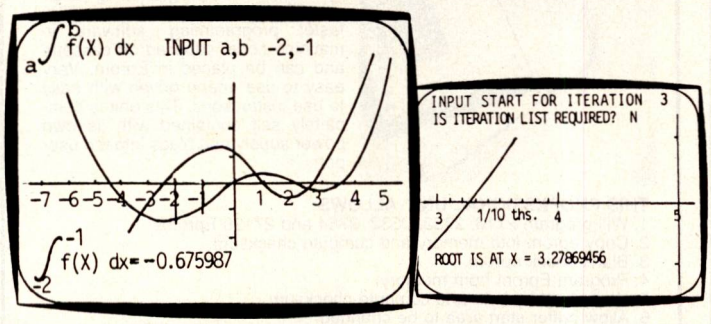
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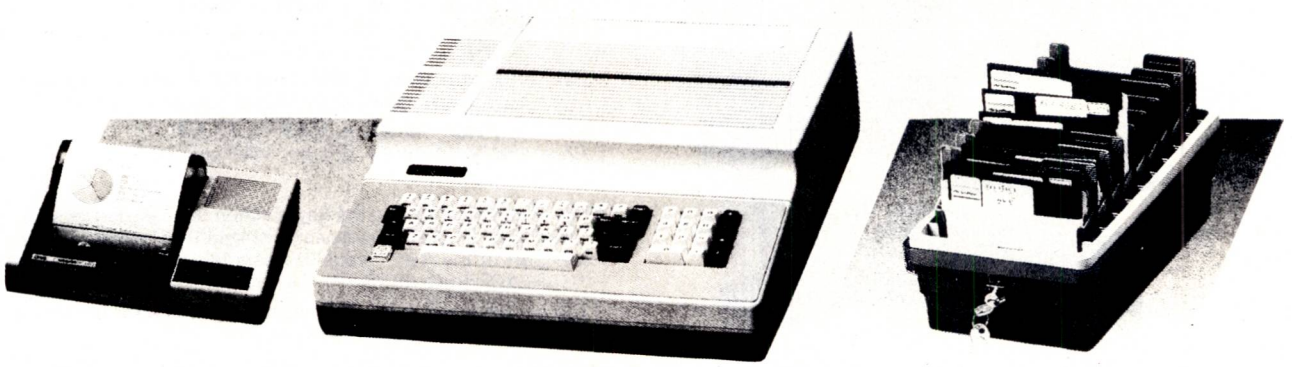
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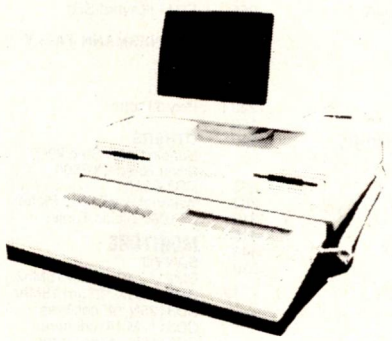
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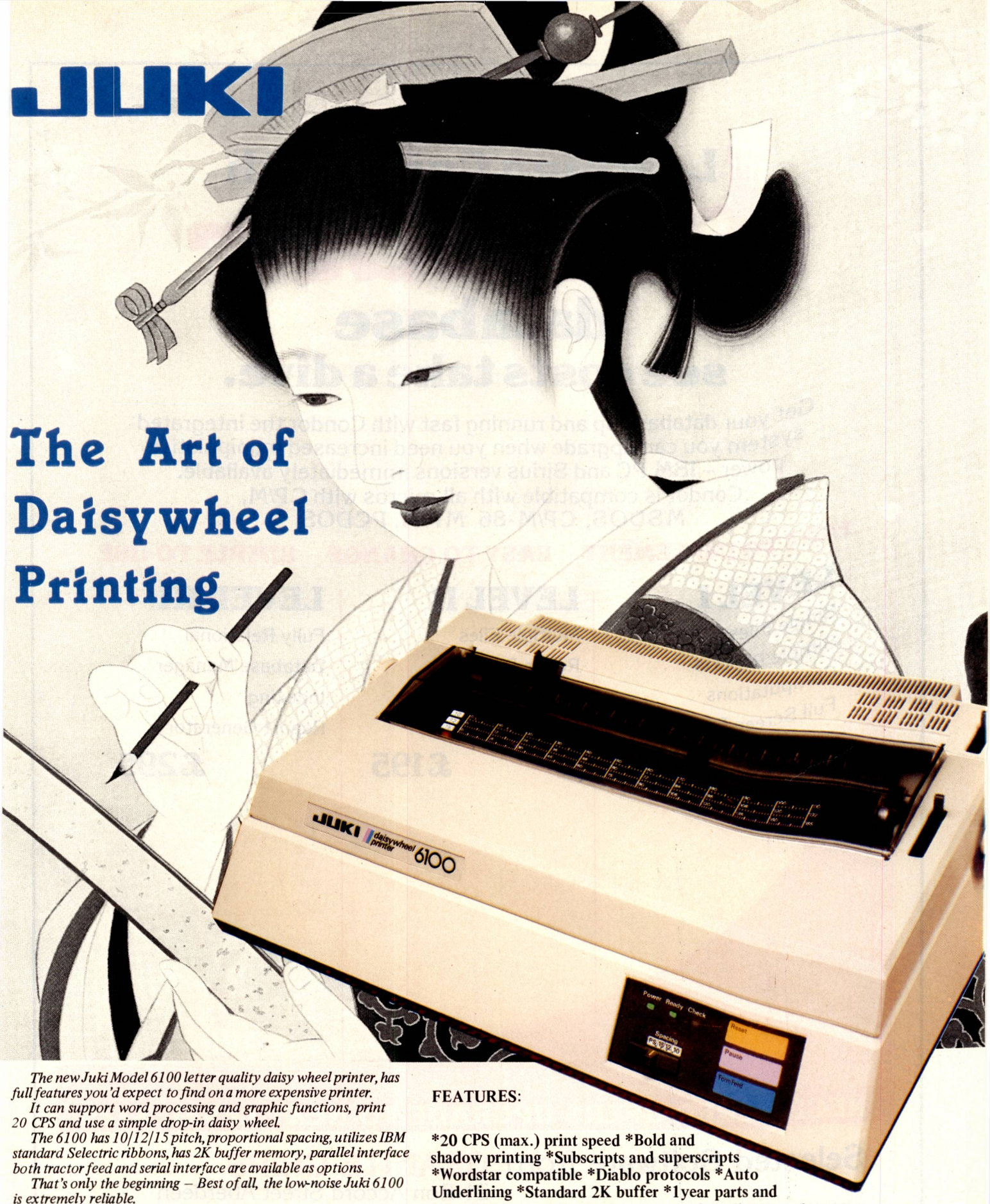
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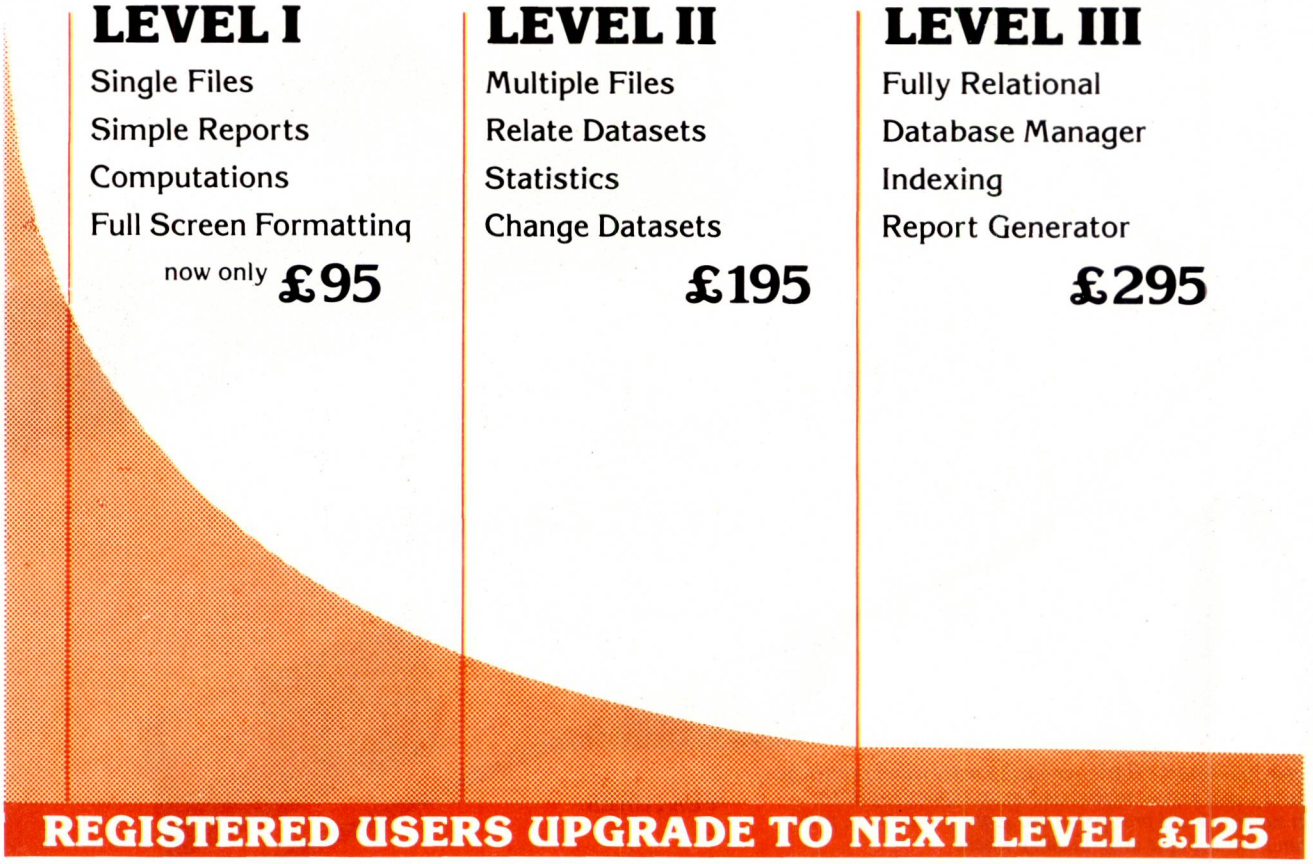
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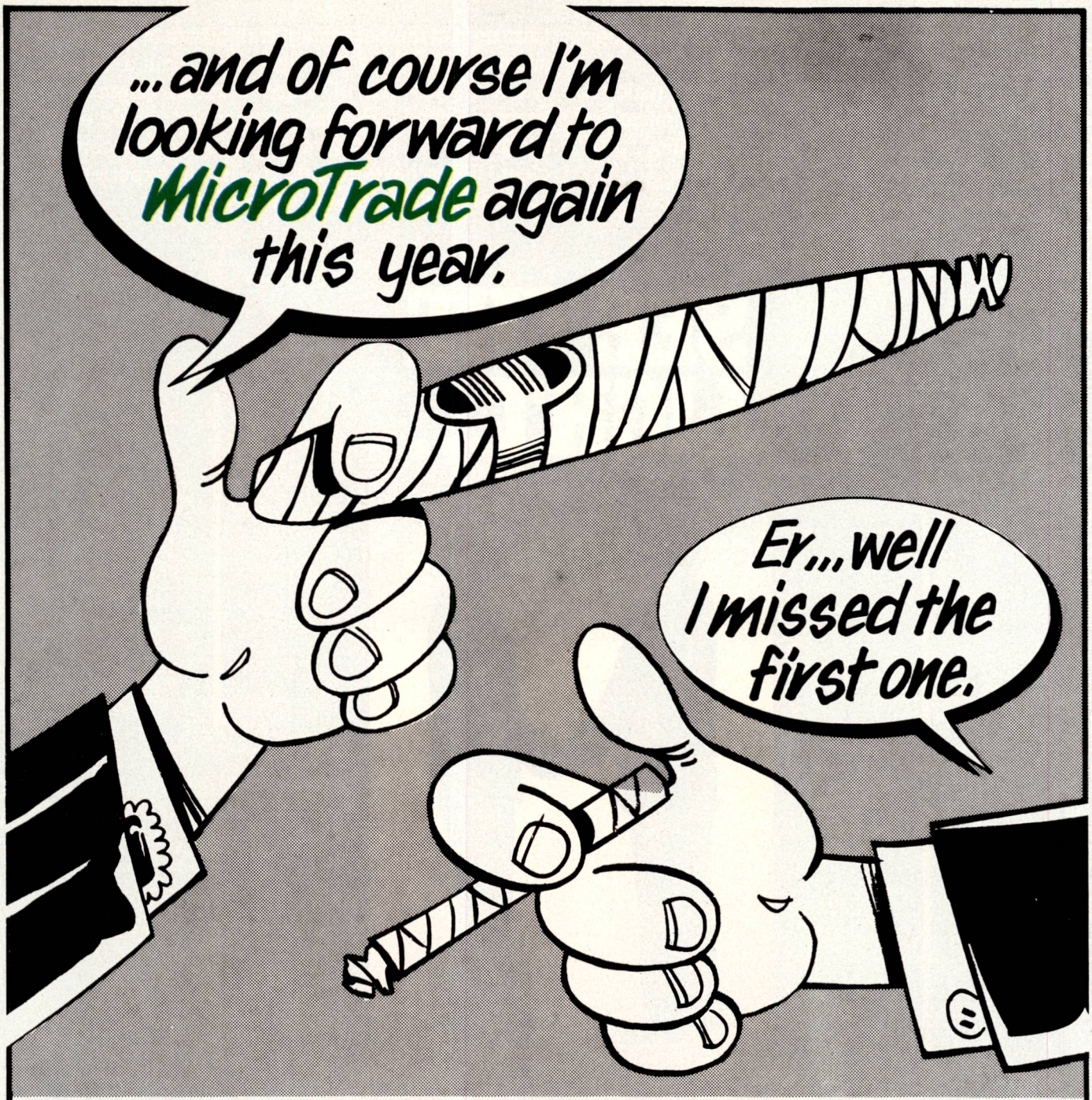
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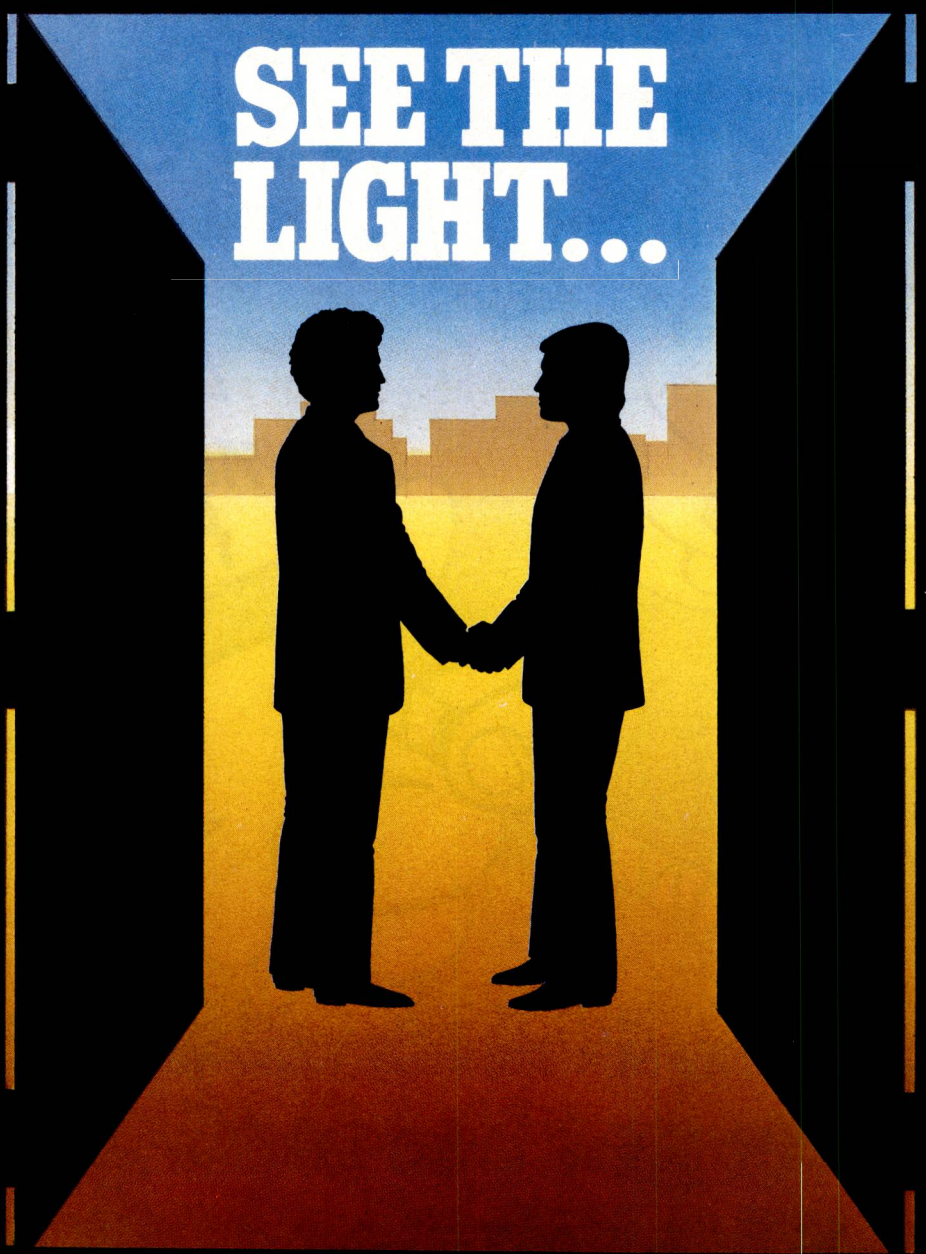
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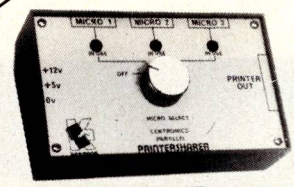
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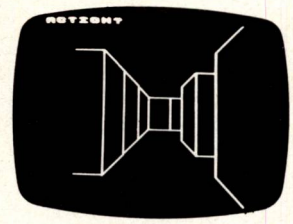
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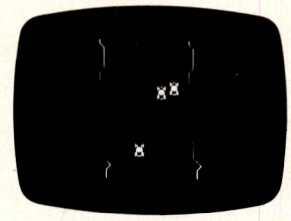
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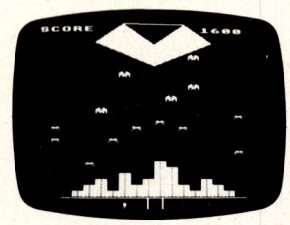
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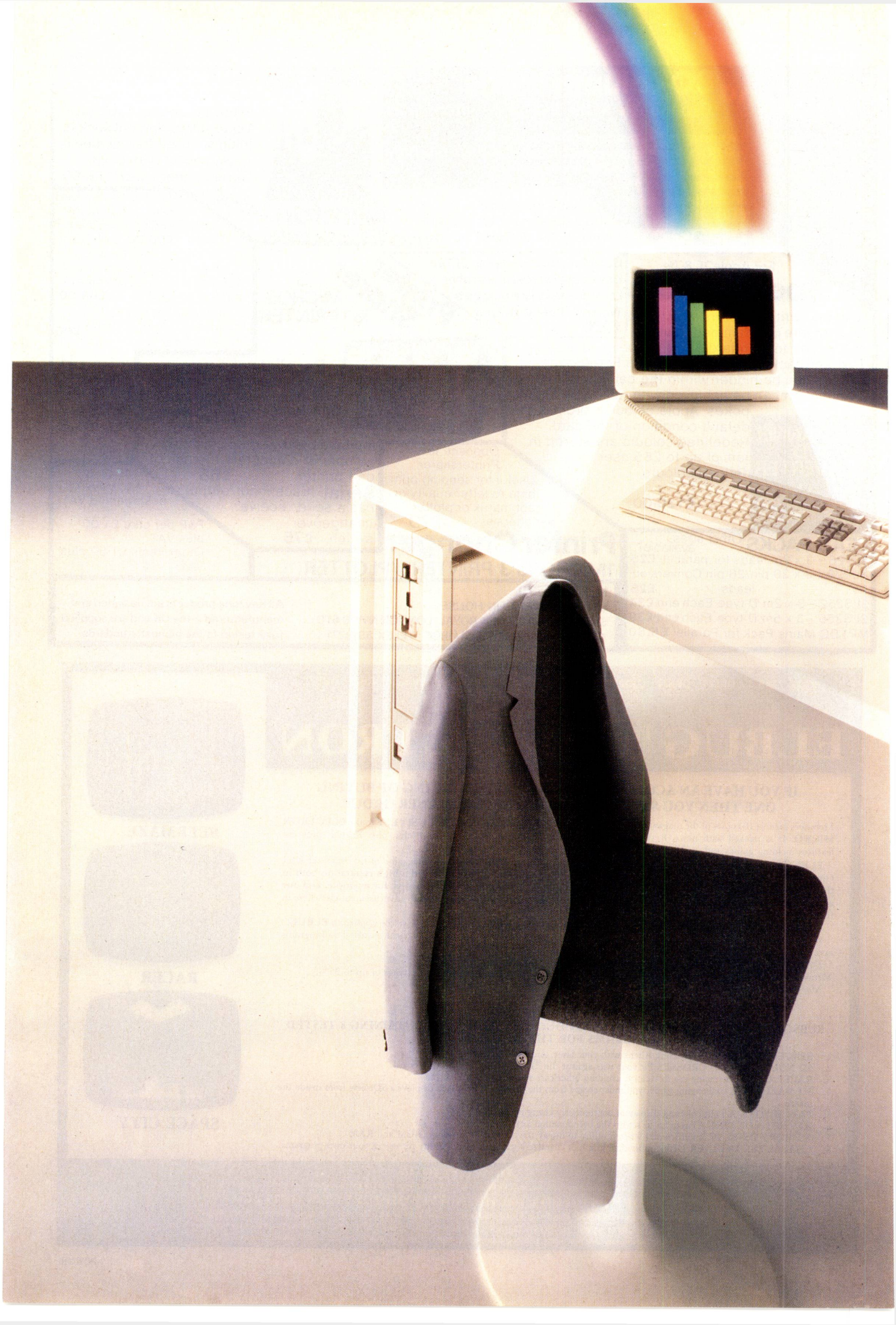
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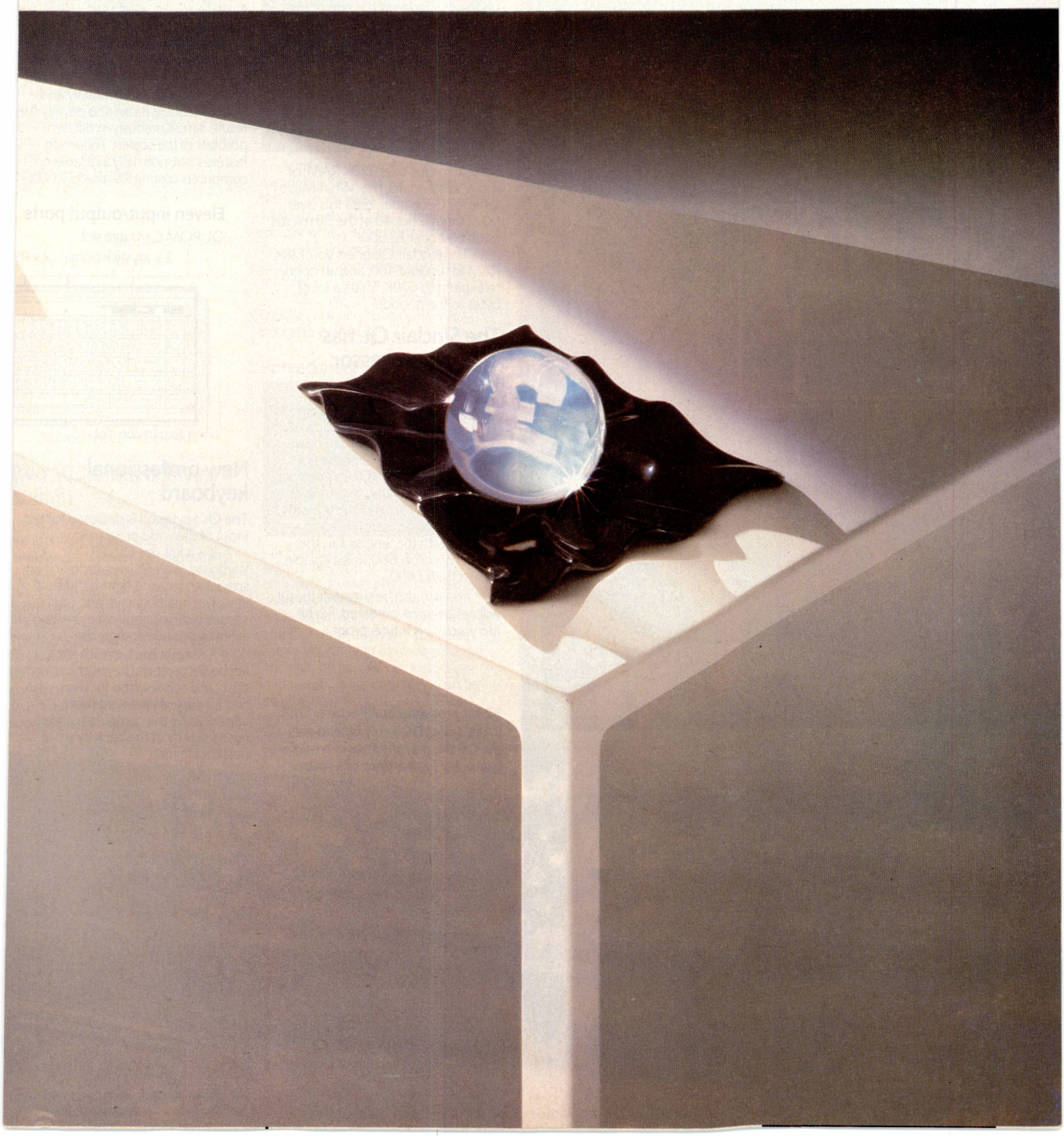
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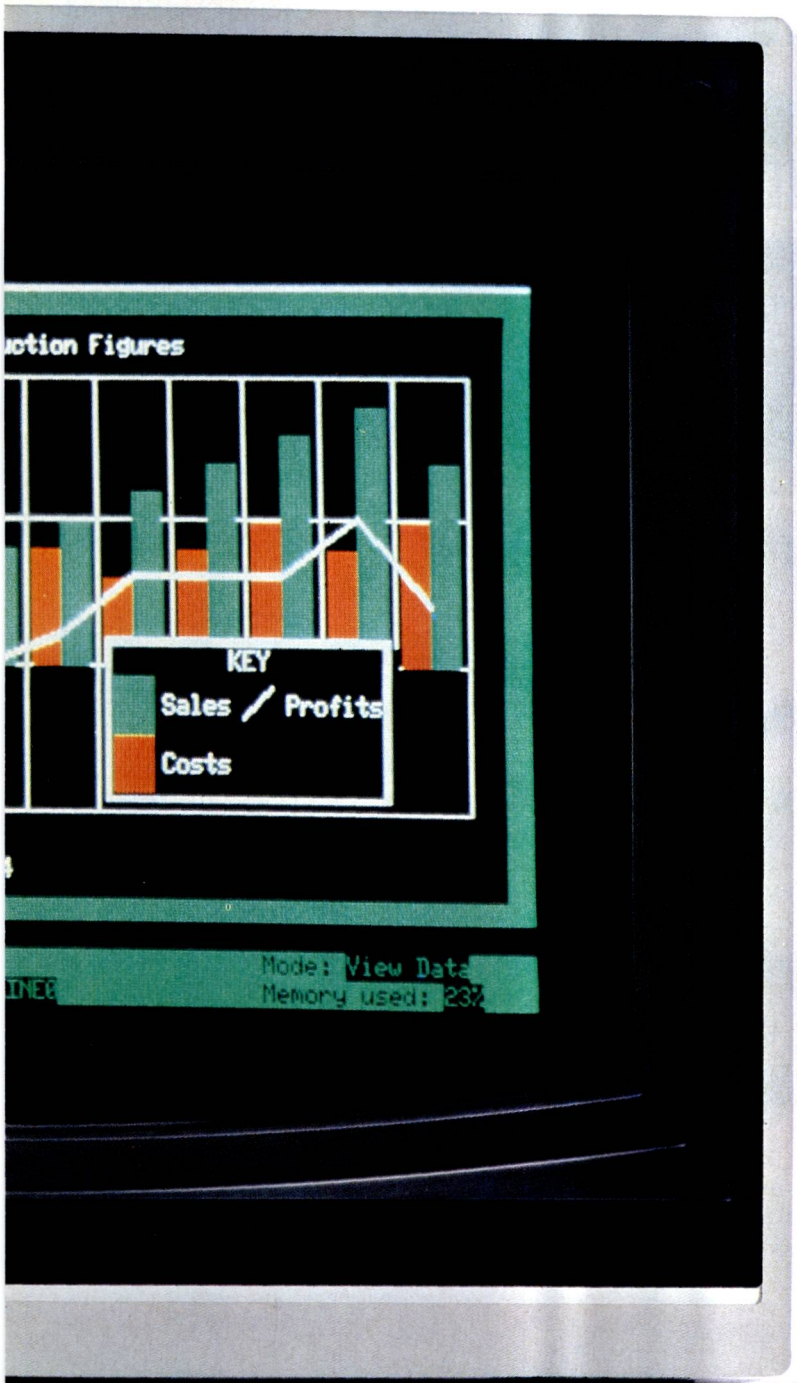
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New-Sinclair QL

There's no comparison chart,



The Sinclair QL is a new computer.

Not just a new Sinclair computer, but a totally new sort of computer – nothing like it exists anywhere.

It's not just a bit better than this, or a bit cheaper than that – it's a computer that's very hard to compare with anything. Just check the features below – and if you don't agree, take up the challenge at the end of the advertisement.

If you do agree, there's only one course of action you can take... get yourself a Sinclair QL at the earliest possible moment.

The Sinclair QL has 128K RAM. Big deal?

Several micros offer 128K RAM, or more, as standard. The 'What Micro?' table for December 1983 lists over 50 of them – but 40 of the 50 micros listed cost over £2,500!

The Sinclair QL offers you 128K RAM for under £400, and an option to expand to 640K. That's a lot of bytes to the pound!

The Sinclair QL has a 32-bit processor. Who else?

Under £2,700, nobody. Even the new generation of business computers, such as the IBM PC, are only now beginning to use 16-bit processors.

At prices like this, the Motorola 68000 family – widely regarded as the most powerful microprocessors available – will remain a luxury.

Yet with the Sinclair QL, the 32-bit Motorola 68008 is available for less than £400.

You can also be sure that the QL will not become outdated. 32-bit architecture is future-proof.

32-bit processor architecture, 128K RAM, and QDOS combine to give the QL the performance of a mini-computer for the price of a micro.

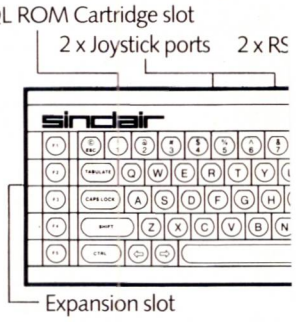
Exclusive: new QDOS operating system

No competition! QDOS sets a new standard in operating systems for the 68000 family of processors, and may well become the industry standard.

QDOS is a single-user, multi-tasking, time-sliced system using Sinclair's new SuperBASIC as a command language.

One of its most significant features is its very powerful multi-tasking capability – the ability to run several programs individually and simultaneously. It can also display the results simultaneously in different portions of the screen. These are features not normally available on computers costing less than £7,000.

Eleven input/output ports



New professional keyboard

The QL keyboard is designed for fast input of data and programs.

It is a full-size QWERTY keyboard, with 65 keys, including a space bar; left-and right-hand shift keys; five function keys; and four separate cursor-control keys – key action is positive and precise

A membrane beneath the keyboard protects the machine from dust (and coffee!), and for users who find an angled keyboard more comfortable, the computer can be raised slightly at the back by small detachable feet.



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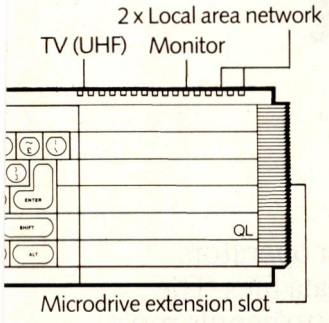
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dvanced new friendly anguage – Sinclair uperBASIC

he new Sinclair SuperBASIC ombines the familiarity of BASIC with number of major developments hich allow the QL's full power to be xploited.

Unlike conventional BASIC, its rocedure facility allows code to be ritten in clearly-defined blocks; exndability allows new procedures to e added which will work in exactly he same way as the command produres built into the ROM; and its onstant execution speed means that uperBASIC does not get slower as rograms get larger.



Two 100K microdrives built in

The Microdrives for the Sinclair QL are identical in principle to the popular and proven ZX Microdrives, but give increased capacity (at least 100K bytes each) and a faster data-transfer rate. Typical access speed is 3.5 seconds, and loading is at up to 15K bytes per second. The Sinclair QL has two built-in Microdrives. If required, a further six units can be connected.

Four blank cartridges are supplied with the machine.



Included – superb professional software

The suite of four programs is written by Psion specially for the QL and incorporates many major developments. All programs use full colour, and data is transportable from one to another. (For example, figures can be transferred from spreadsheet to graphics for an instant visual presentation.)

Word-processing

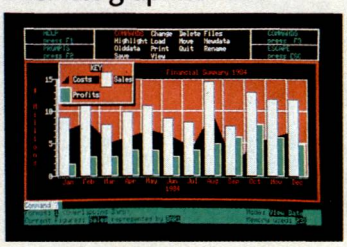


Certain to set a new standard of excellence, QL Quill uses the power of the QL to show on the screen exactly what you key in, and to print out exactly what you see on the screen.

A beginner can be using QL Quill for word-processing within minutes.

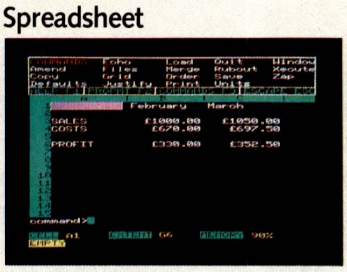
QL Quill brings you all the facilities of a very advanced word-processing package.

Business graphics



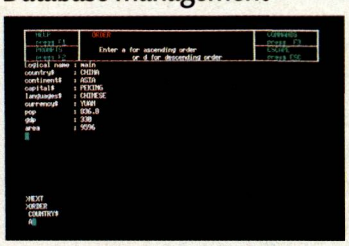
QL Easel is a high-resolution colour program so easy to use you probably won't refer to the manual! It handles anything from lines, shaded curves or histograms to overlapping or stacked bars or pie charts. QL Easel does not require you to format your display before entering data; it handles design and scaling automatically or under your control. Text can be added and altered as simply as data.

Spreadsheet



QL Abacus makes simultaneous calculations and 'what if' model-construction easier than they've ever been. Sample applications are provided, including budget-planning and cash-flow analysis. QL Abacus allows you to refer to rows, columns and cells by names, not just letters and numbers. Function keys can be assigned to change a variable and carry out a complete 'what if' calculation with a single key-stroke.

Database management



QL Archive is a very powerful filing system which sets new standards, using a language even simpler than BASIC. It combines ease of use for simple applications – such as card indices – with huge power as a multi-file data processor.

An easy-to-use labelling facility means that you don't have to ask for your file by its full name – a few letters are enough.

New – the Sinclair QLUB

The QLUB is the QL Users Bureau. Membership is open to all QL owners. For an annual subscription of £35, QLUB members receive one free update to each of the four programs supplied with the QL, and six bi-monthly newsletters. Sinclair has also made exclusive arrangements for QLUB members to obtain software assistance on QL Quill, Abacus, Archive or Easel by writing to Psion.

The Sinclair QL challenge

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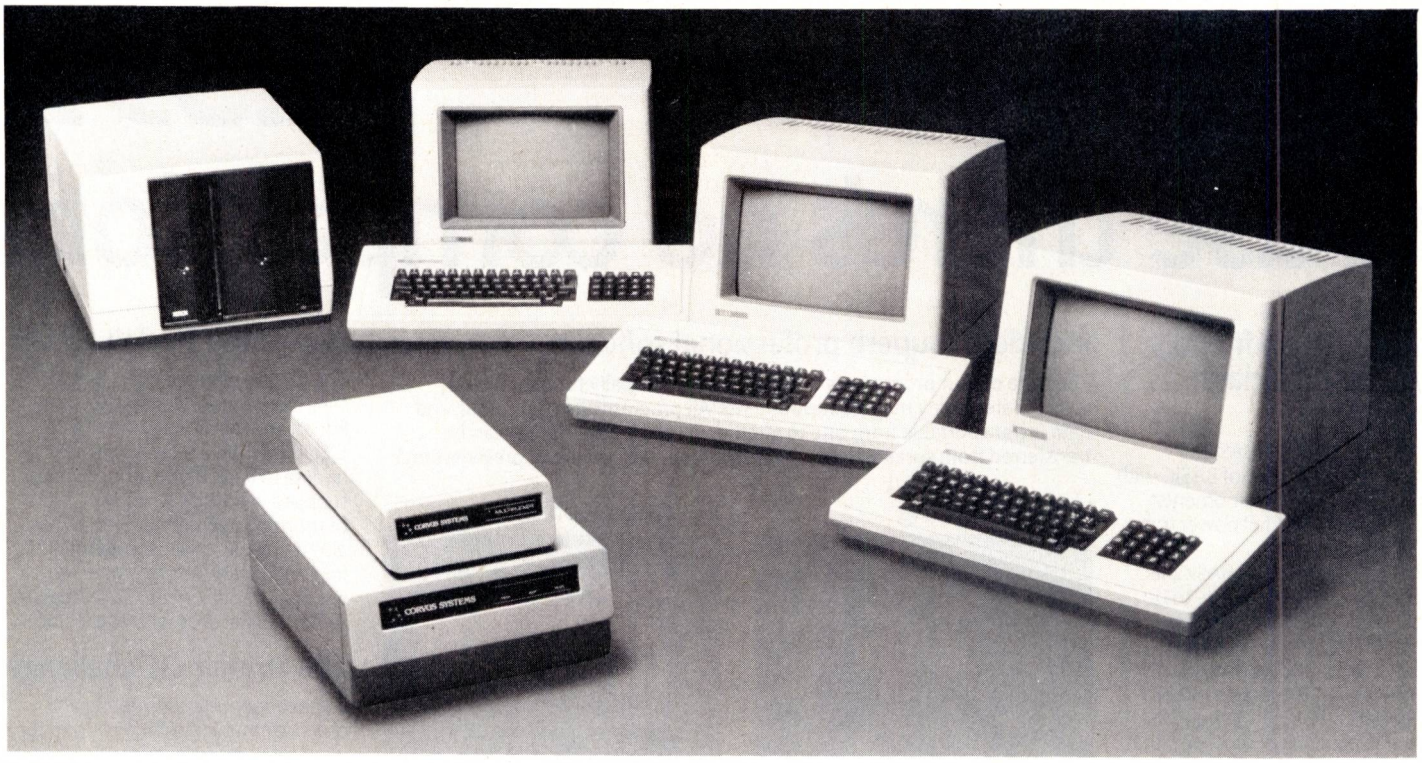
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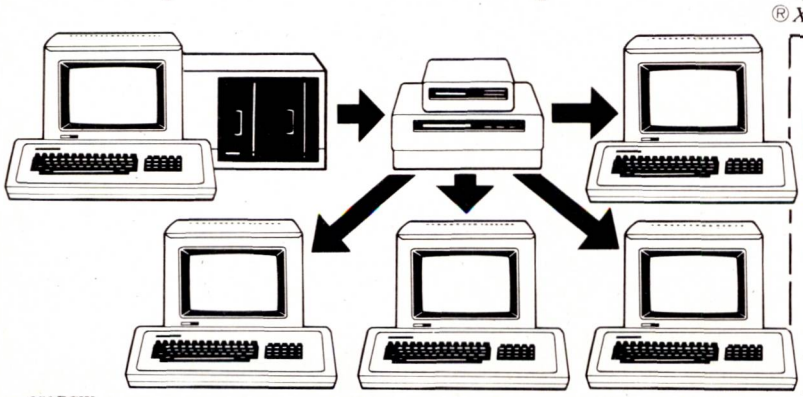
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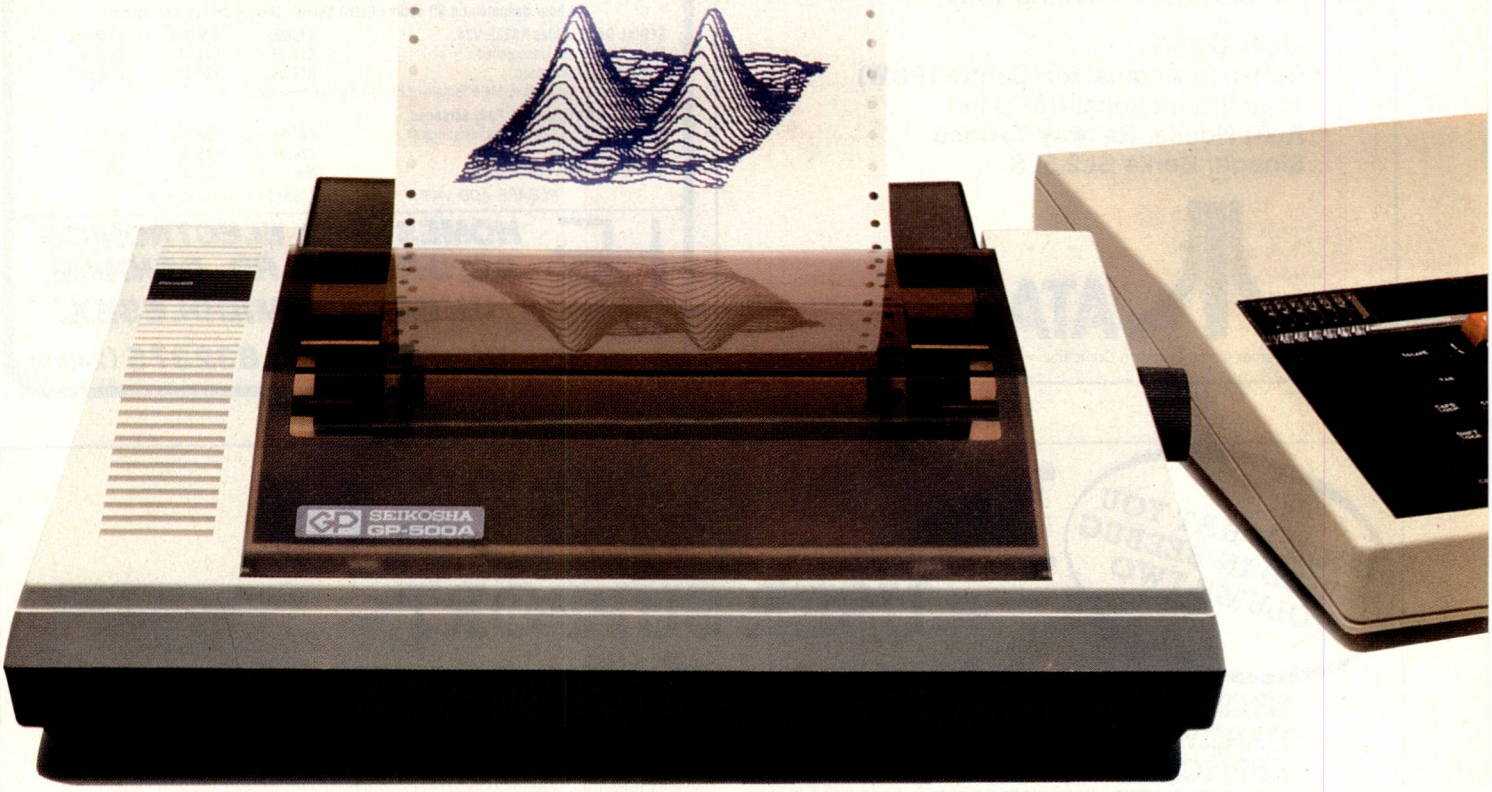
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No, you didn't misread. The Seikosha GP500A complete with BBC Micro interface cable costs only £199.00.

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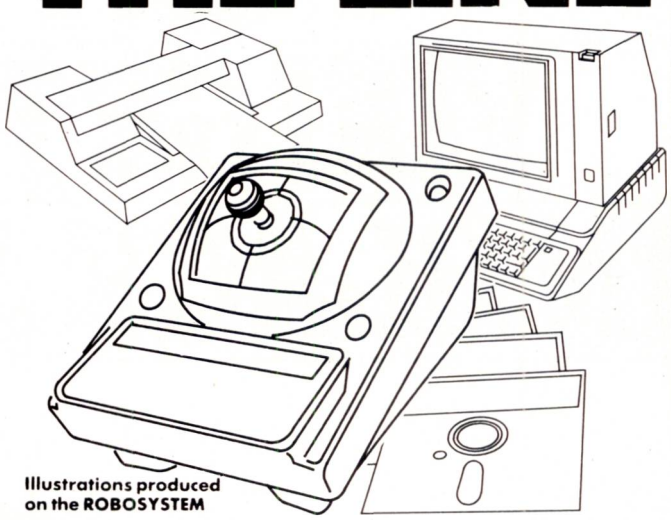
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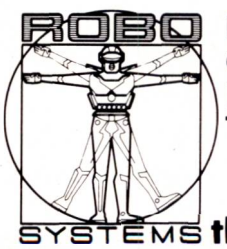
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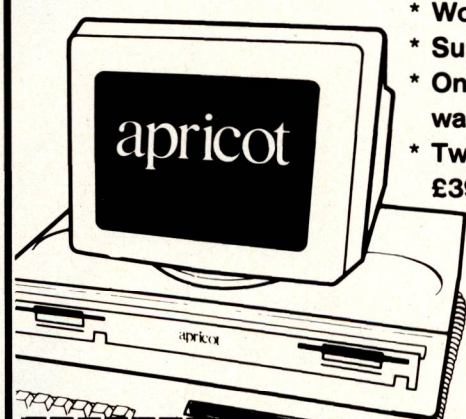
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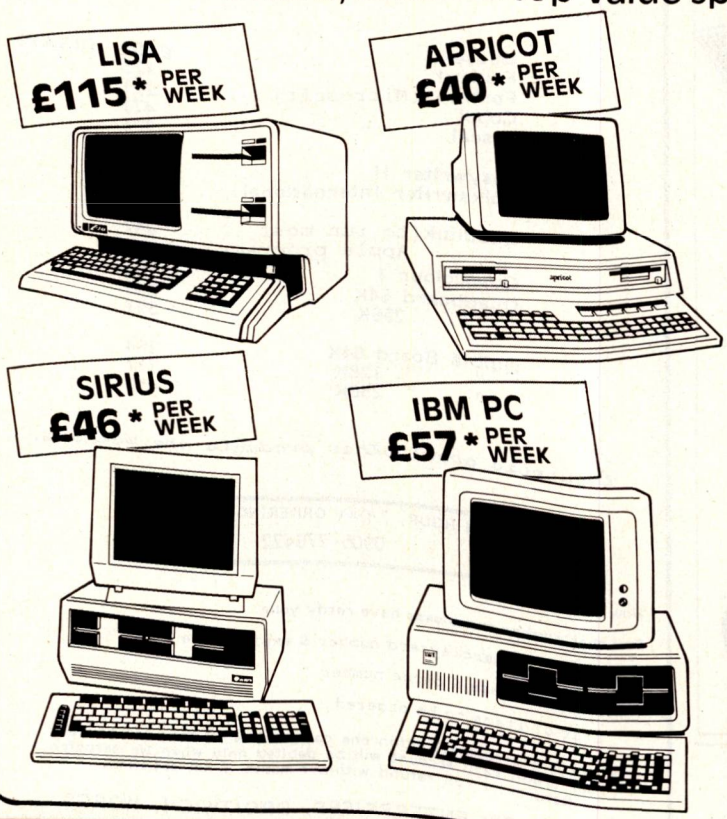
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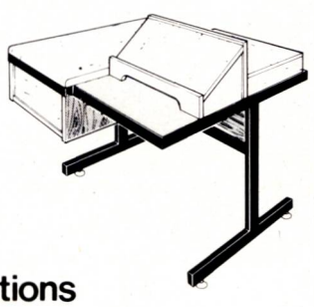
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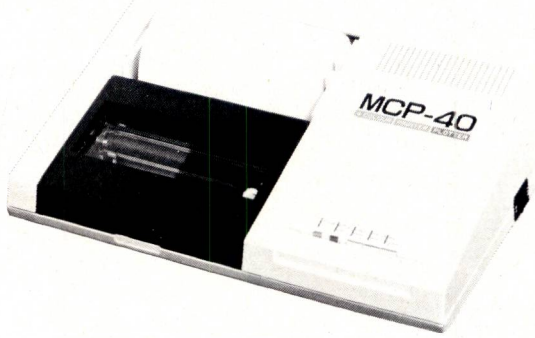
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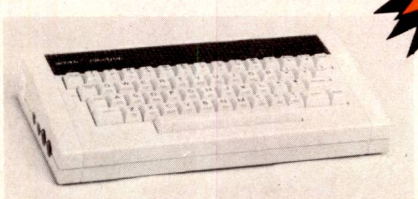
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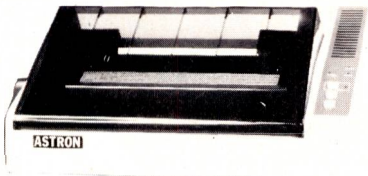
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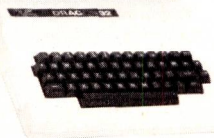


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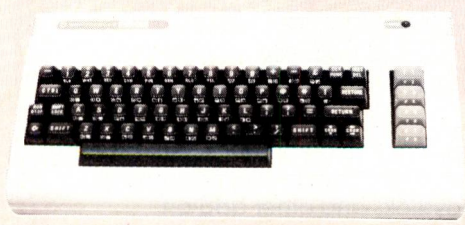


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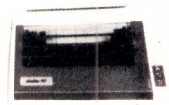
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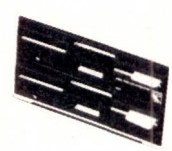
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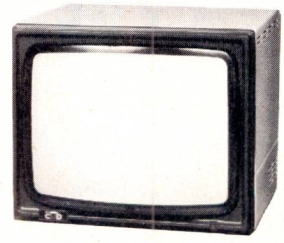
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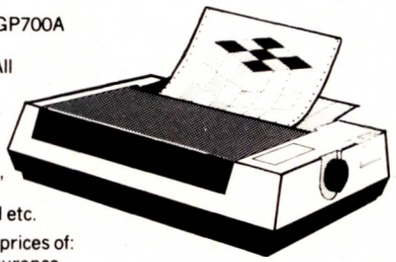
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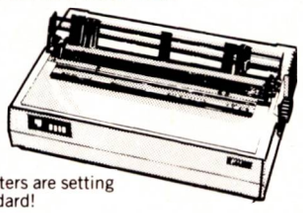


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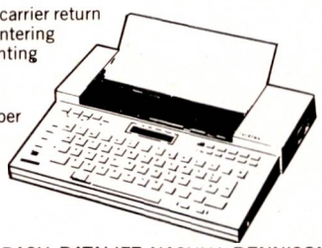


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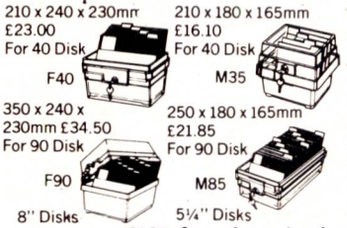
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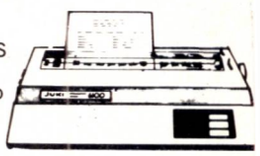
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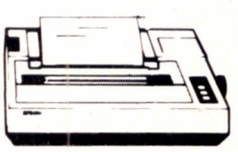
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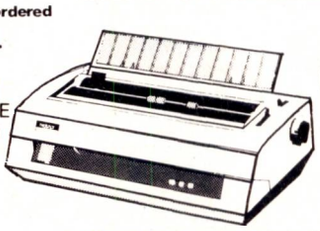
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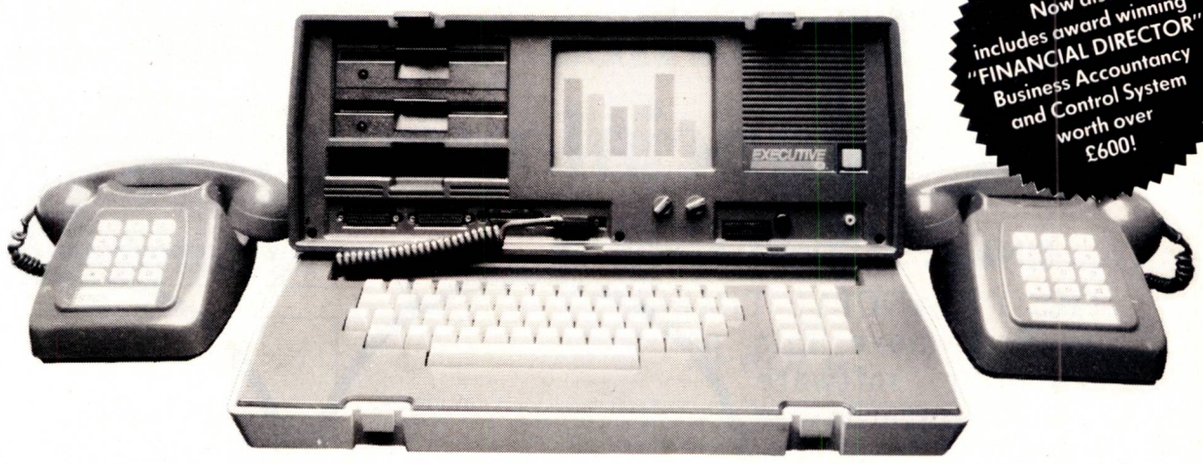
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CHIP CHAT

Harrods, according to Oric Products, likes the 'look and feel' of the Atmos. Mind you, no-one on the shop floor will admit to having felt it, or any other machine. The reason for their reticence has been revealed by a source in the store who admits: 'Staff caught having a surreptitious grope in the computer department are liable to suspension on full pay pending a psychiatrist's report.'

★ ★ ★

A novel program marketing strategy is announced by WH Smith Softeam. The company, working from within the High Street newsagent chain, plans to handle 'the widest range of business softwear in Britain'. Has Marks & Spencer attracted yet another lookalike competitor?

★ ★ ★

Time was when keen Sirius owners were petitioning ACT for an implementation of Lotus 1-2-3. 'We're working on it' was always the helpful reply. Then US Sirius manufacturer Victor pulled out. Now Raven Computers of Bradford is buying Victor 9000 versions of Lotus 1-2-3 Stateside for the UK Sirius market—US dealers have enough copies to keep Raven well supplied. This doesn't please Reflex, the UK Lotus product distributor: one of its representatives accosted Raven at the Sirius show in London claiming the Victor product didn't work on the Sirius, while in the background two Sirii quietly got on with the job (for which ACT is grateful).

★ ★ ★

Can you imagine a software company *not* cutting prices 'to save our competitors from going bust'? Bruce Everiss of Imagine can, which is why, he says, you won't be able to buy his games for £3.95 after all. ChipChat also learns from 'ol Brucey that the Imagine men are on a 24-hour-day-seven-days-a-week blockbuster trying to finish two megagames, which will 'break new barriers in games software, the universe and everything', and are rumoured to include packed lunches in the £30-plus price. That's a lot of overtime money to come from somewhere.

★ ★ ★

Artic Computing included responses to a selection of rather lurid naughty words input to Ship of Doom. How dare Artic assume that adventure gamers use swear words and expletive imperatives, or was it conscientious market research? The end result was the dual accolade of a mention in *The Sun* and expulsion from WH Smith, all good publicity. Artic has now modified the game and only the 'relaxation area' survives. After much deliberation, ChipChat has to deliver a moral edict here and now. We hereby declare that: a) fantasies involving androids in the minds of consenting adventure gamers are a matter for the individual conscience; and b) there is no question of such programs tending to corrupt or deprave, since users only get obscenity out if they put obscenity in.

★ ★ ★

Recent ads for the BBC Micro, apart from dubious classist overtones ('pupils use BBC Micros in Brixton and Glasgow as well as at Eton and Winchester'), stress the value of Econet in the classroom. As long as you're satisfied by theory that is, because much of the utility software produced by Acornsoft cannot be put onto the network. Acornsoft director David Johnson-Davies says: 'The state of the market dictates our protecting these programs and this unfortunately rules out the possibility of copying them to an Econet.' So much for the company's commitment to sharing out the goodies in society.

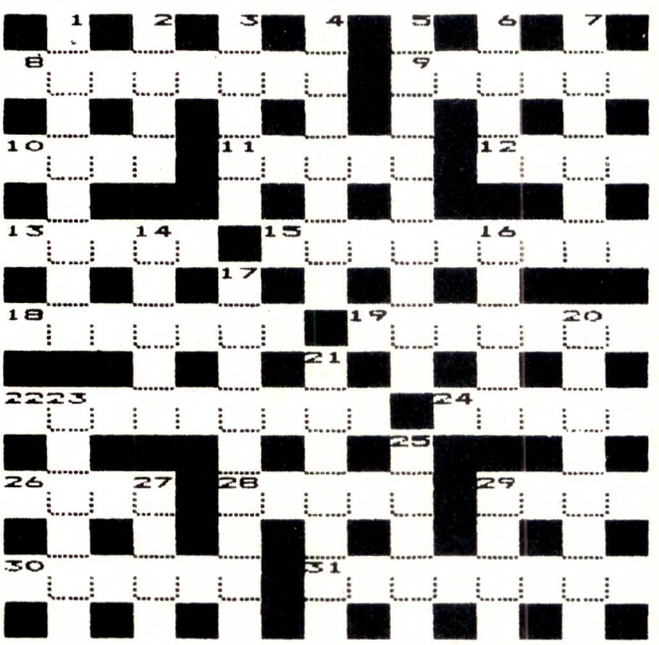
★ ★ ★

Not content with inventing computers, Uncle Clive has spawned the first truly universal language—a hype language. Sincalese has been welcomed with open arms by PR companies worldwide, and experts are busy on a grammar and dictionary. ChipChat is tracking down the linguistically adept who have shown the greatest alacrity in learning Sincalese. Spotting some promising talent we phoned Owl Consultants of Tring, who stated in a letter: 'We have obtained the new Sinclair QL microcomputers.' Sure enough, Owl was happy to confirm that: 'The letter was written by our PR lady' and had indeed not received any QLs.

★ ★ ★

BLUDNERS

An error sneakily appeared in Bludners in the May issue. The solution to amend line 2400 should read:
IFZ%=41AND N%<32ANDN%>11ST +−1ELSEST=1.



Submit your entry to *PCW* by 19 June. You could win £10!

CLUES ACROSS

8 Maybe get excited with so much storage capacity? (8)
9 A pole, poetry, pole, positive poles (6)
10 Patriotic indicator? (4)
11 Gets out of sex—it's awful! (5)
12 A six misprinted in part of the graph (4)
13 'Heather has nothing on.' What kind of language is that? (5)
15 A lost Oric might be a difficult thing to swallow (6-3)
18 A variant present in Reversi once (7)
19 A$="VIRTUALLY": B$="VORTEX": C$=RIGHT$(B$,3) + MID$ (A$,4,4): PRINT C$(7)
2 They come under pressure from players (9)
24 In which to store a Rolls-Royce a year initially! (5)
26 Laid-back face (4)
28 Brand of British computer (5)
29 Kick-start? (4)
30 Model with novel *LEGO* gravity switching device (6)
31 Machine turning out crumpets (8)

CLUES DOWN

1 Genuine period term describing concurrent processing (4-4)
2 Childishly telephoned a computer company (4)
3 This space for threatened video gamers? (5)
4 Erroneously claimed to be related to 10 (7)
5 Assets, and so on, exchanged for storage media (9)
6 Avon's wandering star (4)
7 Software house puts $1000 on English car (6)
14 Potentially bogus instruction (5)
16 It goes round either way (5)
17 The programmer's reward—princely strings (9)
20 Untidy AA lounge—it resembles something else (8)
21 Location of a large number on uniform (7)
23 New diet (two slices of orange) helpful to programmers (6)
25 Main kind of fiche (5)
27 Record has nothing that's commercially symbolic (4)
29 Pieces of eight? (4)

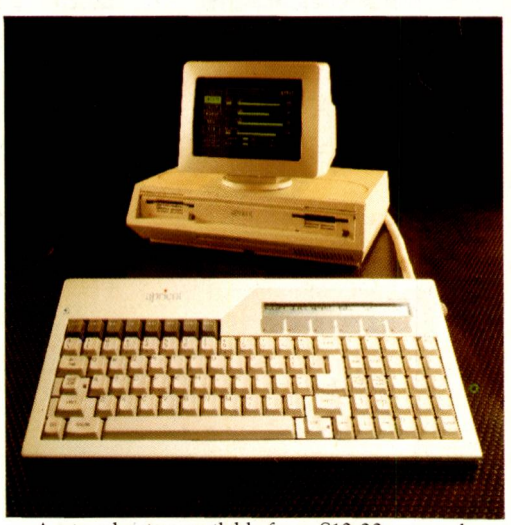
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