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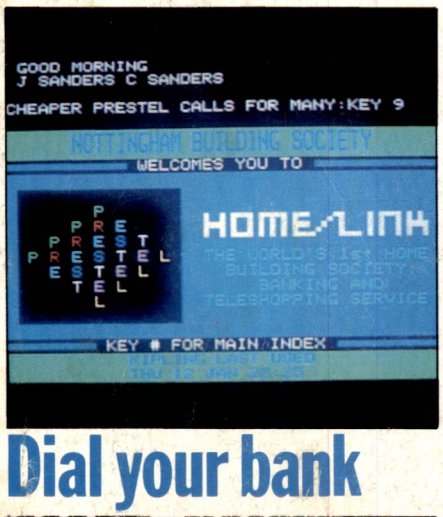

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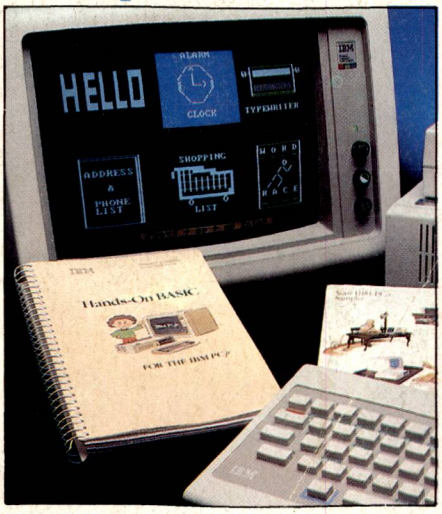

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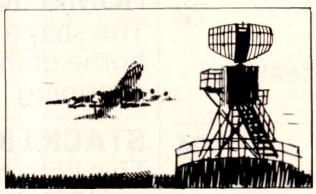

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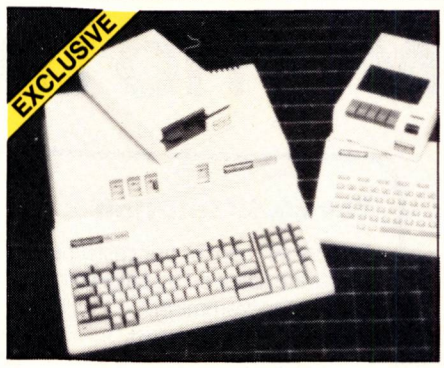

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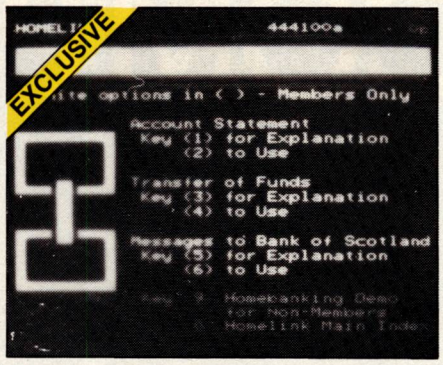

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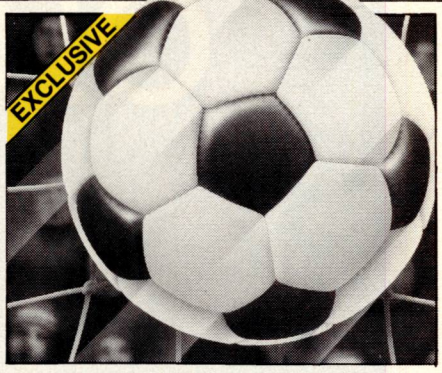

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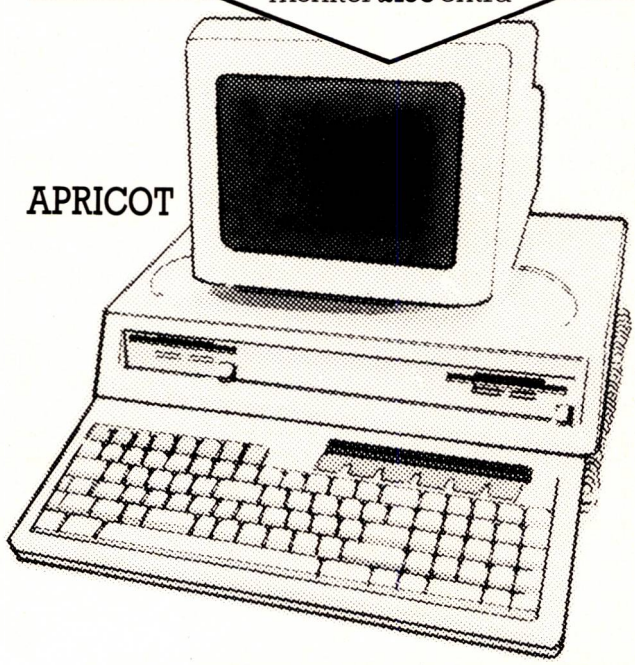

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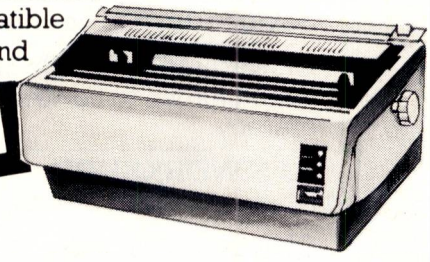

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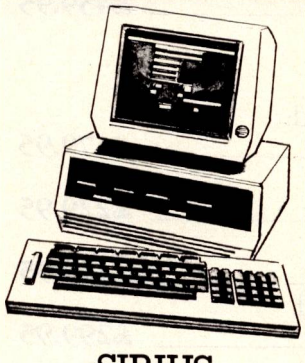

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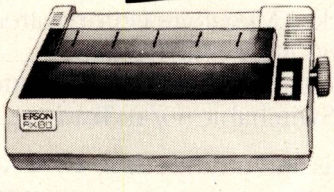

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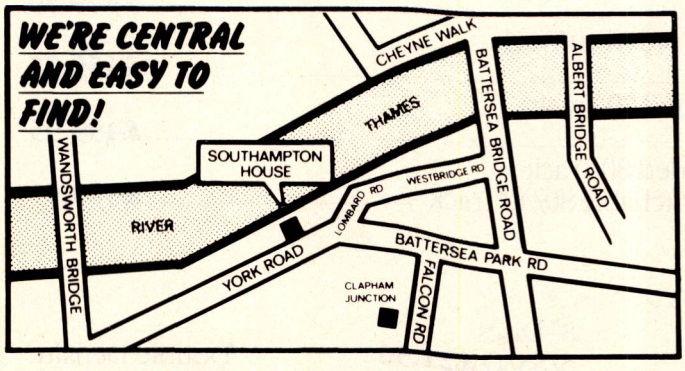

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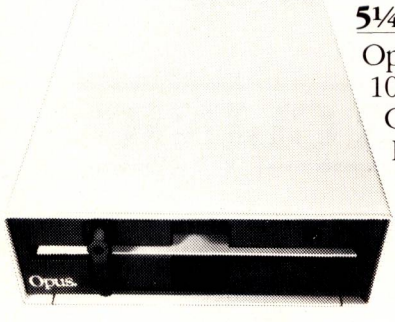

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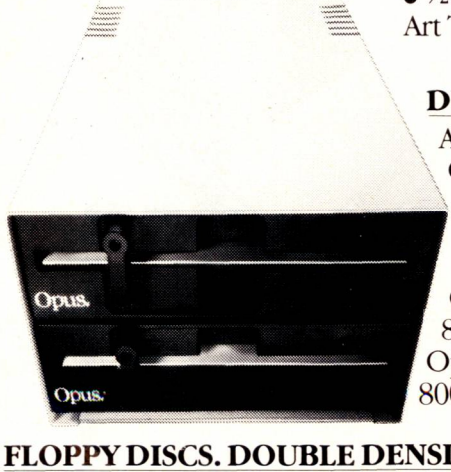

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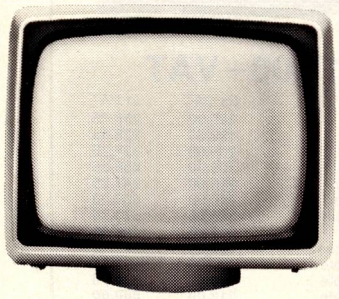

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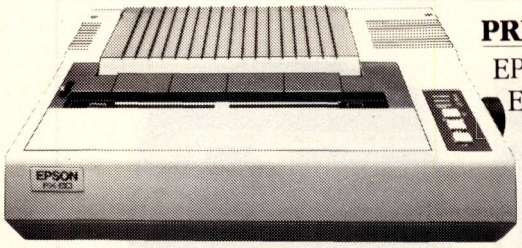

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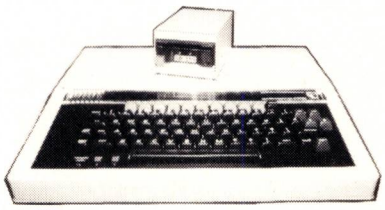

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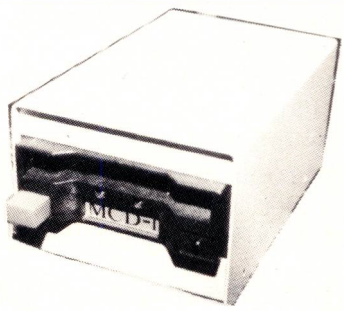

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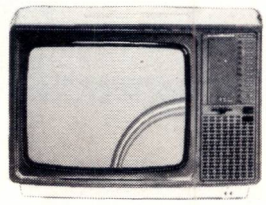

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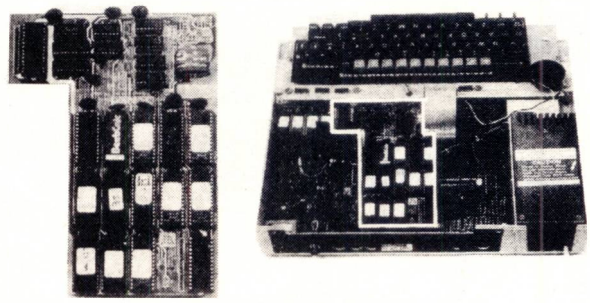
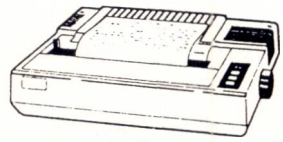
SIDEWISE SIDEWISE FITTED



"SIDEWAYS" rom board for BBC Micro
No soldering required **£38.00 +VAT**

EPSON



RX-80 **£263.12 +VAT**
FX-80 **£365.09 +VAT**

Printer price includes cable for BBC and screen dump rom.

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Perfectly Made in Britain

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Kings Lynn Branch
Tel: 0553 3782

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Electronequip

BBC

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5101	220
5514	250
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81LS95	120
81LS96	120
81LS97	120
81LS98	120
8123	125
8131	275
8154	£9
8155	350
8156	350
8202	£25
8212	150
8214	425
8215A-300	300
8216	100
8224	150
8226	250
8228	220
8236	00
8243	270
8250	950
8253	400
8255	375
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8257	450
8259	450
8271	00
8279	400
8282	450
8283	450
8284	35"
8288	00
88LS120	00
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8T27	150
8T28A	120
8T31	350
8T95N	90
8T97N	90
9364AP	550
9602	220
AM26LS33	150
AY-3-1015	300
AY-3-1270	875
AY-3-8910	375
AY-3-9812	625
AY-5-1013	300
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AY-5-2376	600
AY-5-3600	750
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Z80S10	850
Z80AS10	900
ZN419	180
ZN423E	138
ZN424E	130
ZN425E-8	345
ZN426E-8	300
ZN427	130
ZN428E	410
ZN429E-8	210
ZN459	570
ZN1034E	200
ZN1040	665
ZNA234E	850

74S Series

74S00	30
74S02	30
74S03	32
74S04	30
74S06	40
74S10	40
74S11	50
74S20	40
74S22	50
74S27	60
74S32	70
74S37	60
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
74S267	225
74S288	210
74S289	200
74S299	540
74S301	350
74S365	250
74S373	400
74S374	365
74S412	380
74S470	325
74S471	620
74S472	1150
74S474	400
74S475	25
74S571	620
74S573	950

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75150/54	125
75154	125
75159	195
75182/3	99
75188/9	55
7532	140
75450	86
75451/2	52
75454	70
75491/2	65

74LS

LS00	20
LS02	18
LS04	25
LS08	20
LS10	20
LS11	18
LS13	30
LS14	45
LS19	56
LS20	20
LS22	18
LS27	20
LS30	20
LS32	50
LS40	25
LS42	40
LS47	38
LS48	40
LS63	55
LS72	20
LS73	30
LS74	35
LS75	40
LS85	55
LS86	28
LS90	30
LS91	60
LS92	35
LS93	35
LS136	30
LS138	40
LS139	40
LS148	110
LS151	50
LS153	50
LS156	36
LS157	35
LS158	35
LS175	40
LS240	100
LS241	100
LS242	75
LS243	75
LS244	125
LS245	150
LS273	100
LS274	150
LS373	100
LS374	100
LS393	100
LS640	200
LS641	200
LS645	200
LS668	60
LS669	60
LS670	200
LS673	950

CMOS

4000	14
4001	14
4002	14
4007	15
4009	24
4010	24
4011	15
4012	18
4016	20
4017	32
4018	45
4023	15
4025	16
4027	20
4034	140
4039	280
4040	40
4051	45
4052	60
4053	50
4066	24
4068	18
4069	13
4070	18
4071	20
4072	18
4073	20
4075	18
4076	18
4077	18
4078	18
4081	18
4082	18
4093	20
4097	275
4099	75
4160	35
4161	99
4162	99
4163	99
4174	99
4175	105
4411	000
4412	790
4419	350
4450	350
4451	350
4490	350
4500	375
4504	75
4505	185
4508	130
4511	46
4512	45
4519	30
4526	60
4528	50
4532	50
4549	375
4568	175
4583	90
4584	40
4585	70
4597	330
4598	290
4599	290
40101	130
40105	105
40105	25
40108	198
40109	100
40110	225
40114	240
40163	50
40193	95
40244	195
40245	195
40373	160
40374	245
45106	595

BROTHER HR-15
DAISY-WHEEL PRINTER

An exceptionally high quality Daisy Wheel printer at the price of a Dot matrix printer. 18CPS: Bi-directional, has 3K of Buffer; has clear buffer facility, Carriage skip movement, Proportional spacing; underlining; Bold print and Shadow print. Prints in two colours; Super and subscript facility. Impact control facility to vary pressure on paper for making carbon copies. Has Centronics parallel or RS-232 interface. Connects directly to BBC Micro. A ribbon cassette plus a separate red ribbon. Optional extras: Single Sheet Feeder takes up to 150 A4 sheets; & Keyboard that transforms HR15 into a sophisticated electronics typewriter. Attractively finished in Beige.

Special Introductory Offer:

£375

Single Sheet Feeder..... **£199**
Keyboard **£150**

BBC MICRO
BBC Model B £346

BBC MICRO WORD-PROCESSING PACKAGE

A complete wordprocessing package consisting of BBC Micro Model B; Zenith 12" Green Hi-res Monitor; twin cased 200K Teac Drives, the popular Wordwise wordprocessor, Watford's own highly sophisticated 62file DFS interface, world renown Brother HR15 Daisy Wheel Printer, Beebplot & Beebcal spreadsheet Analysis software discs, 10 blank diskettes, 500 sheets of paper, Manuals and all cables. All you require is a mains power point to have it up and running (we even supply the mains 4 way mains trailing socket).

Only: £1350

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(All Drives new slimline 5¼" type)

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- CS200 TEC Single, 80 track, single sided, 200K **£230**
- CD400 TEC Twin, 80 track, Single sided, 400K **£430**
- CS400 MITSUBISHI Single, 80 track, Double sided, 400K **£299**
- CS400S MITSUBISHI Single, 80 track, Double sided, 40/80 switchable, 400K **£340**
- CD800 MITSUBISHI Twin, 80 track, Double sided, 800K **£499**
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Carriage on Drives **£7** *(Securicor)*

5¼" DISKETTES

(Lifetime Warranty)

Verbatim or 3M

10 Single side D/D	£17
10 Double side D/D	£27

Z80A 2nd PROCESSOR BOARD FOR BBC MICRO

- Although intended as a BBC add-on, it is totally stand alone (i.e. Can be used with any RS232 Terminal/Computer).
- Z80A Processor running at 4MHZ (No. wait states) 64K Dynamic Memory, 16K ROM space. Disc interface with single/double density, 40/80 track,also another 64K Ram card can be plugged inside the unit)
- CP/M 2.2 — Not a lookalike, making the CP/M Users Group available to you.
- All BBC screen, sound and OSBYTE facilities available to the CP/M user.
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- Supplied in a standard half height drive case with integral PSU and finished in the standard BBC colour.

All this and more for ONLY £350 + VAT

Just phone your order through, we do the rest. Tel: (0923) 50234

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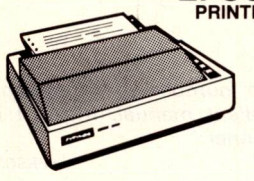

FX80

10" Tractor/Friction feed, 160 CPS, 11x9 matrix, 137 columns max, Bidirectional, Logic seeking, proportional spacing, Hi-res bit image, Italic & Elite characters, underlining, subscript & superscript.

Only £345 (£7 carr)

RX80

100 CPS, 9x9 matrix, dot addressable graphics, Condensed & Double width printing, Normal, Italics & Elite characters, Tractor Feed, Bi-directional, logic seeking, Centronics Interface standard.

Only £235 (£7 carr)

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Same as above but has friction and tractor feed attachment. **£259**

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To interface above printers to BBC Micro. **£8**

We stock a wide selection of BBC Micro Hardware, Software and Firmware like:

Watford DFS, Beebmon, Screen Dump ROM, Printer ROM, Disassembler, LOGO, FORTH, PASCAL, Wordwise, Disc Doctor, Disc Fix, Beebfont, Beebplotter Graphic Tablet, Modem, Joysticks, Lightpen, Games Software, Books etc.

Send large SAE for our BBC leaflet.

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32.768KH	100	7.6MHz	200
100KHz	236	8.0MHz	150
1MHz	275	8.0833M	395
1.28MHz	392	8.86723	175
1.6MHz	392	9.0MHz	200
1.8MHz	395	9.375M	350
1.843M	200	10.0MHz	175
2.0MHz	225	10.7MHz	150
2.457M	200	10.24MHz	200
3.276MHz	160	12.0MHz	175
3.2768M	150	12.528M	300
3.57594	98	14.31818	170
3.6864M	300	16.0MHz	200
4.0MHz	150	18.0MHz	180
4.032MHz	290	18.432M	150
4.194304	200	19.968M	150
4.433619	100	20.0MHz	200
4.80MHz	200	24.0MHz	170
5.0MHz	160	24.930M	325
5.185MHz	300	48.0M	175
5.24288	390	100.0M	375
6.0MHz	140		
6.144MHz	150		
6.5536M	200		
7.0MHz	150		
7.7328M	250		
7.168MHz	160		

IDC Connectors:

Speed Block type	PCB PLug with latch Strut Pins	PCB PLug with latch Angle Pins	Female Header Socket	Female Card-Edge Connectors
Two rows				
10 way	90p	99p	85p	120p
16 way	130p	150p	110p	—
20 way	145p	166p	125p	195p
26 way	175p	200p	150p	240p
34 way	205p	236p	160p	320p
40 way	220p	250p	190p	340p
50 way	235p	270p	200p	395p

JUMPER LEADS Ribbon Cable Assembly/DIL Plug (Headers) Single Ended Lead 24" Long

Length	14pin	16pin	24pin	40pin
24"	145p	165p	240p	325p
Double Ended Leads				
6"	185p	205p	300p	465p
12"	198p	215p	315p	490p
24"	219p	235p	345p	540p
36"	230p	250p	375p	595p

IDC FEMALE RECEPTACLE JUMPER LEADS

24"	20way	26way	34way	4way
1end	160p	200p	260p	300p
2end	290p	370p	480p	525p

DIL SOCKETS

	Low Prof	Wire Wrap
8pin	8p	25p
14pin	10p	35p
16pin	10p	42p
18pin	16p	52p
20pin	22p	60p
22pin	25p	70p
24pin	25p	70p
28pin	28p	80p
40pin	30p	99p

RIBBON CABLE

Ways	Grey Price per Foot	Colour Price per Foot
10	15p	28p
16	25p	40p
20	30p	50p
26	40p	65p
28	55p	80p
34	60p	85p
40	70p	90p
64	120p	160p

DIL PLUGS (Header)

	Solder	IDC
14pin	40p	99p
16pin	49p	106p
24pin	88p	170p
28pin	240p	290p
40pin	250p	265p

AMPHENOL PLUGS

24 way IEEE	475p
36 way Centronics	
Parallel	450p

ZIF DIL SOCKETS

24 way	565p
28 way	750p
40 way	799p

VIDEO MONITORS

- ZENITH 12" Hi-Res. Green or Amber Monitor. 40/80 column select switch. Attractively finished **£75**
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- KAGA RGB 12" Medium Res. Colour **£259**
- MICROVITEC 1431. 14" Colour Monitor. RGB Input Cable included **£209**
- MICROVITEC 1451 Hi-res 14" Monitor incl. Lead **£319**
- Connecting lead for KAGA **£5**

EURO (DIN) CONNECTORS

	Female Strt. Pins	Female Angle Pins	Male Strt. Pins	Male Angle Pins
Gold Flashed Contacts DIN41617				
31 way 41612 A + B	170p	—	—	175p
2 x 32 way 41612 A + C	275p	320p	220p	285p
2 x 32 way 41612 ABC	295p	340p	240p	300p
3 x 32 way	360p	385p	260p	395p

EDGE CONNECTORS

TWO ROWS	.1"	.156"
2x18 way	180p	145p
2x22 way	199p	200p
2x23 way	185p	
2x25 way	225p	220p
2x28 way	210p	
2x30 way	245p	
2x36 way	295p	
2x40 way	315p	
2x43 way	395p	

D CONNECTORS: Miniature

	Male 9 way	15 way	25 way	37 way
Solder	80p	110p	160p	250p
Angle	160p	210p	250p	355p
Pins	120p	130p	195p	295p
	Female			
Solder	110p	160p	210p	350p
Angle	165p	215p	290p	440p
Pins	150p	180p	240p	420p
Covers	85p	80p	80p	100p

IDC 25 way 'D' plug 385p Skt 450p

48K SPECTRUM

TASWORD TWO THE WORD PROCESSOR

64 CHARACTERS PER LINE ON THE SCREEN AND TO PRINTERS!
MICRODRIVE COMPATIBLE — instructions supplied

"The number of on-screen prompts, together with the excellent manual, make it ideal – even for an absolute beginner."

PERSONAL COMPUTER WORLD September 1983

"What makes a word processor more or less versatile is its control features. Tasword Two offers an impressive selection and the tutor program succeeds in demonstrating them admirably."

ELECTRONICS AND COMPUTING November 1983

"Tasword is showing a degree of sophistication that business computers took many years to develop."

WHAT MICRO? October 1983

TASWORD TWO The Word Processor*

Your Spectrum becomes a **professional** word processor with TASWORD TWO. TASWORD TWO gives you an amazing **64 characters per line** on your screen. This is ideal for standard A4 paper and TASWORD TWO prints your text just as it appears on your screen.

Tasword Two drives the following interfaces:

Cobra RS232 I/O Port	*ADS Interface*
Euroelectronics Interface	*Kempston Interface*
Hilderbay Interface	*Morex Interface*
Sinclair ZX Interface 1	*Tasman Interface*

The same program drives these interfaces. A short easy to follow set of instructions takes you through setting up your Tasword Two to drive the interface you have or choose to buy.
Tasword Two also drives the ZX printer.

Tasword Two is readily adapted for the microdrives to give super-fast saving and loading of both program and text. The microdrive instructions are supplied with the Tasword Two manual.

£13·90 fully inclusive mail order price.

TASWORD TWO TUTOR

TASWORD TWO comes complete with a manual and a cassette. The cassette contains your TASWORD TWO **and** TASWORD TWO TUTOR. This teaches you word processing using TASWORD TWO. Whether you have serious applications or simply want to learn about word processing, TASWORD TWO and TASWORD TWO TUTOR make it easy and enjoyable.

TASWORD TWO £2 Demonstration Cassette

See for yourself the powerful features of TASWORD TWO. Send just £2 for the Tasword Two demonstration cassette. A voucher is included which gives you £1 off the price of TASWORD TWO.

All prices include VAT and post and packaging

* Available from larger branches of Boots

For further information on all these products send an s.a.e. with "Tasman Brochure" written on the flap.

Access

Send cheque/P.O. or Access number with order.
Telephone Access orders: Leeds (0532) 438301

TASPRINT

A must for dot matrix printer owners! Print your program output and listings in a choice of five impressive print styles. Drives all the printer interfaces listed under Tasword Two and all dot matrix printers with bit image graphics capabilities. You can also use TASPRINT to print Tasword Two text files. TASPRINT gives your output originality and style! Send s.a.e. for brochure which includes TASPRINT output.

£9.90 fully inclusive mail order price

TASWIDE – 64 characters per line!

A machine code utility program, TASWIDE **doubles** the information that your own programs can display. Make a simple change to your print statements and your output appears on the screen at 64 characters per line instead of the normal 32. Both print sizes can be mixed on the screen. 16K and 48K versions supplied on the same cassette.

£5·50 fully inclusive mail order price

TASMATH 1

Mathematics education. Three programs on one cassette:
TASIMEQ – simultaneous equations
TASQUAD – quadratic equations
TAS-TRIG – trigonometry of right angled triangles.
Available for the 16K and 48K Spectrum and for the BBC model B.

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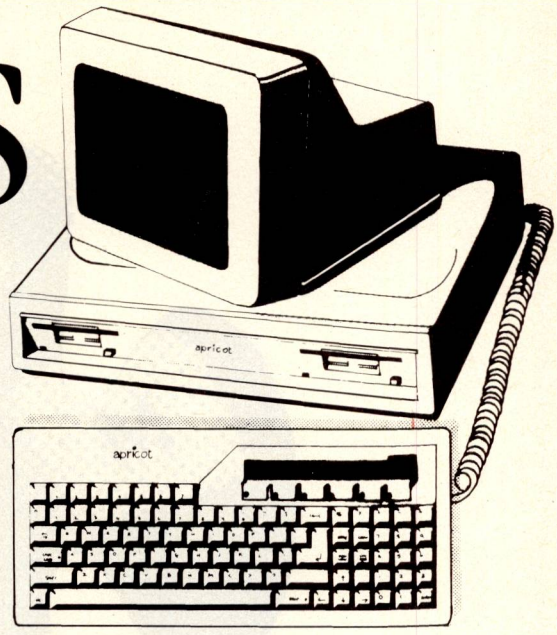

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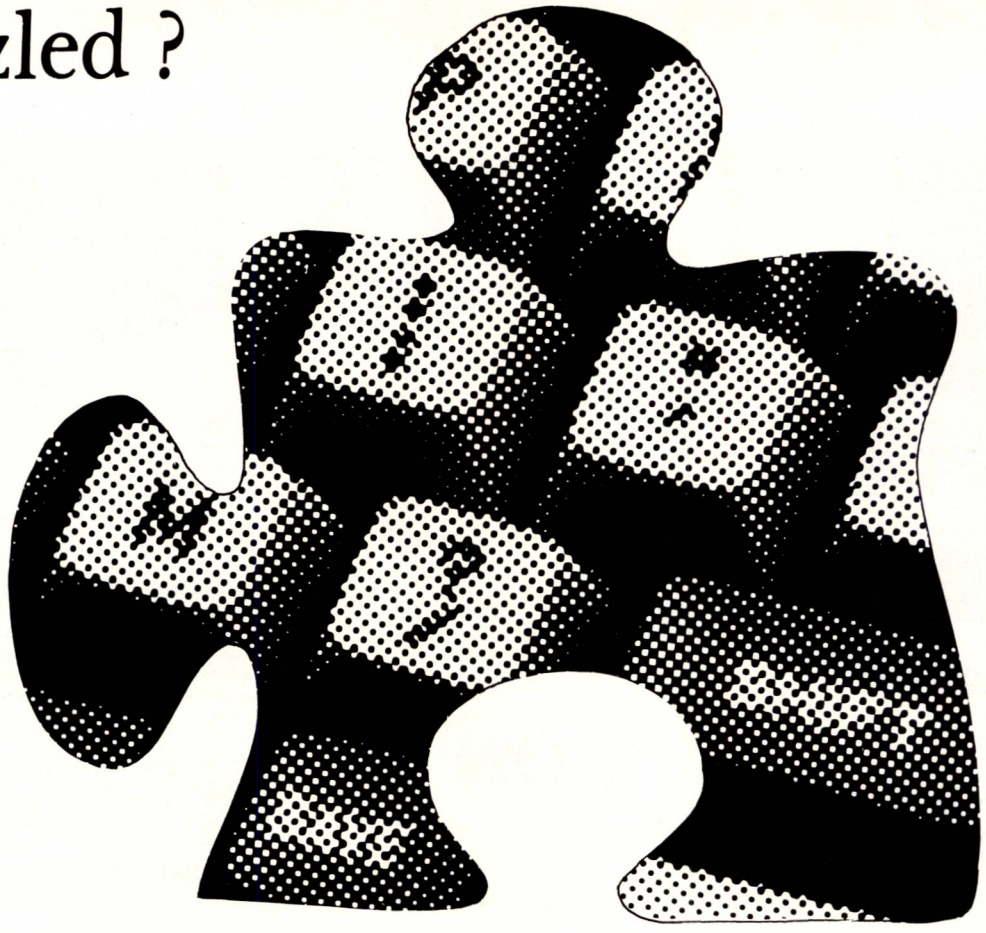

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N·E·W·S·P·R·I·N·T

Guy Kewney reports from Las Vegas on micro innovations and trends at the Consumer Electronics Show.



Showtime

The Consumer Electronics Show, held in Las Vegas, (from now on 'CES') is not fun, in the way that the *Personal Computer World* Show is fun. It isn't even fun in the way that Comdex, the biggest computer show in the world, was fun last November.

CES is full of video people, video porn, audio amplifiers, car stereos, solar-powered helmets with little fans (no, I'm not joking) to cool your sweaty brow, telephones, telephone diallers, satellite TV dishes, CB radio, video games and, finally, a couple of computers.

I shan't come again.

Commodore gave me a two hour sermon instead of a press conference, and announced a machine I wouldn't have crossed the room to see, never mind the world. Atari showed a few 'new' games. Mattel showed a pair of 3-D yellow spectacles, which wouldn't stay on my nose, but did give the illusion of depth with colour. Coleco told us that there were no defective Adam computers, and was rewarded with raspberries.

The atmosphere is thick with gimmickry and 'sexploitation'. Penthouse 'Pets' sign pictures of themselves (fully clothed) and give you a copy of the magazine, as an attraction on some stands (where as a result, you can't see what's on the stand). Scantily clad 'merchandising' girls hand out bumpf about trivial products that were launched six months ago, or may be launched in six months' time.

Worst of all, the UK electronics business hasn't bothered to come.

If I thought British industry lacked interest in Comdex (see Newsprint, February, *PCW*), then I was mistaken: by comparison with the Brits' attitude to the American consumer market, they were positively rabid about business computers.

Sinclair showed the flat-screen TV. Thorn showed some Atari games and that was about that.

The only interesting thing, really, was games software.

The computer games business, on the evidence of what I saw, is not about to take off on a new upwards curve of inspiration and innovation.

The old tired formula still applies: find an arcade game, some kind of blob-chaser with a new script, and transfer it to a computer with new rules, slower action, shapeless graphics and fuzzy colour.

Data Soft showed some understanding of the need to move away from this: time will tell whether the recipe can be brightened up by following film scripts, pop groups, TV comic characters, and so on.

And a final moan: once again, my attempt to use electronic mail as a way of sending stories to you failed.

Over the past three years I have had two computer failures, one mail system failure, two modem failures, three failures to find plug-in phone sockets, and, in every case, a total failure of the industry to provide support.

And the thing that frightens me is: if this is the way I feel about the technology — an enthusiast, with some minor technical know-how — what on earth is the average office administrator going to do when faced with this sort of technical cock-up?

I think the trip to the US was encapsulated by my visit to Apple.

I watched Steve Jobs talk, brilliantly and fascinatingly, about the future, and about the need to attract that huge group of non-innovative buyers who would use a micro if it took less than two hours to learn.

I watched Macintosh (Benchtested in this issue) do graphics, make sounds, and display text and figures at the twitch of a mouse's tail.

And then I watched the terminal emulation demonstration, run by an expert. He logged onto an IBM mainframe, pretending to be a 3278 terminal. Then he tried to switch to being a



Prism may think this is the year of the Androbot but Hubotics Inc seems to reckon that the whole point of having a robot is to watch television.

It would be nice if the vision of the future had seemed more real. When it appeared in the aisle of the CES exhibition hall. It didn't.

This picture of the Hubot (demonstrating the robot conspiracy to deprive humans of their digits by distracting them during hazardous operations), doesn't show the owner trying to get the fluff out of the vacuum cleaner under him. It doesn't show the family fighting over whether he should turn his radio on, or display a TV program, or run 'the latest video game' — all ideas from the promotional literature.

'You may think this sounds like something out of the book 1984,' concludes Hubotics wittily. 'Well, 1984 is here, and so is Hubot.'

At $3500 for a mobile cheese-board, who cares? Hubotics is on (619) 438 9028.

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simple remote TTY on a timesharing service—and he totally failed.

He changed the parity. He switched baud rate. He added start and stop bits. He re-booted. He re-dialled. He got garbage on the screen. And then, when I suggested that terminal emulation had some way to go before it matched Macintosh's other friendliness, he got sore. 'Why do you say that?' he asked me.

He was so used to that sort of foul-up that he didn't even notice how bad it was.

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Standing up to pressure

Atari surprised nobody with a computer, as the boss James Morgan had promised back in November.

Morgan went on record as saying that Atari 'will produce new products in 1984, but they won't be ready for the CES.' Sure enough, they weren't.

However, the impression gained on the stand was not of a company about to close down computer operations.

For one thing, there was a lot of software, from Atarisoft, not just for Atari machines.

In America, commercial interest focuses on the video game VCS box, rather than the computer. And much of Atarisoft's stuff runs on equivalent games boxes.

But Atarisoft has also done a deal in the educational market, through the Children's Computer Workshop. The name may sound familiar: it may remind you, perhaps, of the *Children's Television Workshop*, producer of the Muppet-infested *Sesame Street* programme. And indeed, the 'workshops' are linked.

People expect Atarisoft to be a success. This doesn't altogether please Atari executives, who are now starting to see the new version of the old Atari 800 computer (it's now the 800XL), and its baby brother, the 600XL, emerge from the factory.



John Brazier (left), Epyx vice president of Sales and Marketing, signing agreement with Ken Uston (right) of Fun and Games.

The reason they aren't pleased is that people assume the success (still not proven) of Atarisoft will be at the expense of the hardware side. In other words, they expect the computer side to be closed down.

Machines on which Atarisoft runs fuel this speculation: they run on Atari of course, and also on VIC 20, Commodore 64, TI 99/4, Apple II and IIe, and the IBM PC (and Junior, one day).

These are all seen as competitors whose chances Atari must rate as higher than its own. The argument is false, but a lot of people seem to believe it.

And since Commodore is universally disliked here—dealers dislike Commodore almost as much as British dealers dislike Acorn, and for the same reason (customers won't let them sell anything else)—and Texas is out of the business, they seem to assume that Atari can't keep it up.

This wouldn't matter: what matters is that Wall Street financiers agree. They give quotes to local papers saying that Atari would attract more finance if it dropped hardware.

Nobody knows what the future holds, but Atari is insisting that it has gone through the worst, and is not going to quit after suffering all that pain.

'We spent too much,' said Morgan (the boss) 'but that has been purged out. We are a company that has bottomed out and is on the way back. For somebody to walk out of the business now would be crazy—the opportunity is too great.'

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Out of touch

The first MSX computer (after the Spectravideo, of course—see Benchtest in this issue on page 72) to be seen in America, appeared on a Japanese company's stand: Daewoo.

It wasn't working.

A working system, said salesmen, would be around in April, and the price was just a guess, but $150 was today's guess for America. No, no idea of European plans.

And it was clear that European plans have not been started. The idea of a PAL colour encoding was 'unnecessary' the company said.

Boy, are they in for a surprise.

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Link up

If electronic mail is to be the next consumer boom, then somebody has got to start making sense on the subject of that vital link between computer and phone system—the modem.

Anyone who has an idea in this market appears to start from scratch, with their own genius.

The irony was marvellously illustrated at the CES, where I carried a portable computer with terminal emulation software around, testing modems on people's stands.

Only one modem out of ten actually worked.

Oh, they all worked really, just not with my computer.

One had a standard RS232 plug. It had a 'male socket'. I call a male socket a plug, not a socket, but whatever you call it, you can't plug another male plug into it.

The market seems to be turning towards integrated modems.

That makes all the sense in the world. Firstly, the modem can be driven directly by the central processor, without having to worry about what somebody's software may do down the RS232 lines, or what somebody's hardware may require.

And secondly, it can do things like dialling, answering the phone and driving a loudspeaker if the computer on the other end turns out to be a puzzled human being with a wrong number.

Commodore claims to be 'a leader in communications' on the strength of having sold more VIC modems than anybody else, and that shows the strength of the company's plan.

Coleco, with the Adam, has come up with a deal with AT&T—the American telephone authority—which will lead to a Coleco modem designed with AT&T's blessing.

And deals are also being done with bulletin boards, like The Source.

But the stand-alone modems are still around, from the Mura $60 box to the Zoom Apple add-on.

And some of them are using slightly new technology.

Two of the devices were

N·E·W·S·P·R·I·N·T

'phone powered' which sounds wonderful.

Normally, your modem has to plug into the mains, or have batteries. There are many reasons for this, but primarily they fall into two areas: first is that the standard computer RS232 doesn't provide power, and second, the phone company likes things to be isolated from its lines.

But the trouble with isolated systems is that the computer doesn't normally use them. Usually the computer can tell what is going down the line electrically, but optically isolated modems don't have the power to provide this. Instead, they use a 'Data Terminal Ready' signal.

Sadly, the computers seldom look for this signal, so they never get the message back. Write-only electronic mail is the result. Not much use, even at $80 for the modem.

For $250, you can buy a complete system with keyboard and modem, just for accessing bulletin boards. Quazon announced a Quik-Link 300, at that price, which will connect to The Source, Dialcom (BT Gold), Compuserve, and so on.

This has a horrible flat pad keyboard, and its only obvious virtue is the fact that the software is permanently loaded, and you don't have to understand electronic mail to use it. On the other hand, you can't use it for anything else.

Quazon of Carrolton in Texas has no European launch plans.

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Bright future

Rivals of the PC Junior (see exclusive Benchtest on page 168) now use its high price as proof that they (the rivals) are going to stay in business—but the electronics industry is paying no attention to their scepticism. The electronics industry is setting up to manufacture colour monitors.

Both the IBM PC and the PC Junior use a strange colour output, which does not have full brightness control (TV monitors use full brightness). Neither, however, does the IBM use the simple 'off or on' brightness of most computers. Instead, it has a half-on option, giving more colours.

Many of the cheaper TV monitors won't work without expensive extra circuitry, and this obviously attracts the TV monitor makers, who can undercut that, but still charge a premium over their standard products.

So naturally, they are looking for proof that PC Junior will sell and sell and sell.

Forecasts of sales by these people point to nearly a million Juniors going into American homes this year.

This doesn't directly concern the UK, yet. PC Junior won't be British until October, and will be rare and expensive then. And US colour is not the same as UK colour.

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Power to the robots

Robots are 'nicer than computers', according to one robot company. So, instead of having computer terminals to sell things, why not use robots?

Cleverly avoiding the question of 'Why not use humans?', Robot Entertainers has launched QT to do things like collect market research, take orders in hamburger bars, and so on.

The publicity blurb is purported to be written by QT. 'I am a robot,' it starts. 'Our army is marching on the USA to attack funny bones everywhere. We inflict pain by making people laugh until it hurts.'

Invasion plans, says QT, are simple. 'We have brainwashed our inventor into renting us so cheaply that even the hot dog vendor will want us. Earthlings love to play with our computer panel and watch us talk and move.'

I suspect that QT is going to get his cute little keypad bashed, but for those who are obstinately determined to put things which can be vandalised in public places, Robot Entertainers is contactable on (213) 700 8287 at Chatsworth, California 91311, address 9720 Topanga Canyon Place.

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Stocks and shares

Games software produced several surprises at the CES. Not least of these was the



The only 'home entertainment system which uses its own screen and uses vector scan display technology' now has a light pen.

Vector Scan means that the electron beam actually writes, like a pen, around the outline of the image displayed, rather than scanning parallel lines down the screen and filling in the bright bits.

Vectrex uses this method, which can't be done on an ordinary TV or monitor, so it has to have its own screen.

The light pen makes it a sort of 'touch sensitive' display, which Vectrex thinks will help with more creative games. Examples are the Art Master game cartridge, supplied free with the $40 pen, AnimAction (you draw things, and make them move around the screen, yippee) and Melody Master, where the light pen is used to select notes.

There is also a geography teaching program.

Vectrex comes from General Consumer Electronics, on (213) 458 1730.

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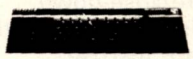

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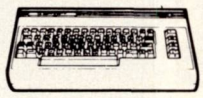

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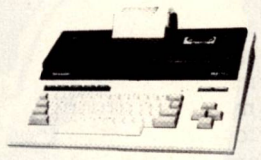

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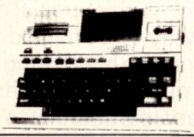

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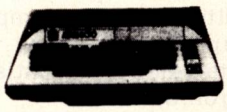

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appearance of Hewlett Packard with its HP-150, and coupled with this eyebrow-lifter was the appearance of several games programs for the IBM PC (which HP-150 closely resembles).

Examples of IBM software included normal arcade games—but one which might attract more attention is a game called Wall Street.

'It is a competitive game of financial speculation,' said Timeworks, the company which launched it. 'You have $1m to invest that will put you on Easy Street, or in the Poorhouse. If your cash is running low, your banker or another player may give you a loan, but the interest rate may be very high. A financial adviser may be available, but he costs, and he isn't always right.'

Timeworks attracted my attention with a special offer, by the way, to Commodore 64 users who have bought the company's tape software and want to transfer it to disk. For this 'service' it is asking $4 plus 70 cents handling.

H-P's appearance is not just a whim, however. The 'software acquisitions' executive in charge of this monochrome screen only, no joysticks, expensive business system assured me that there was no plan to turn it into an arcade machine.

'But we are going to get in touch with people who have done good games, and get them on the 150,' she assured me. Sensible strategy, I say.

➔➔➔

Late start

Elan blew £50,000 by coming to CES with a non-functioning product.

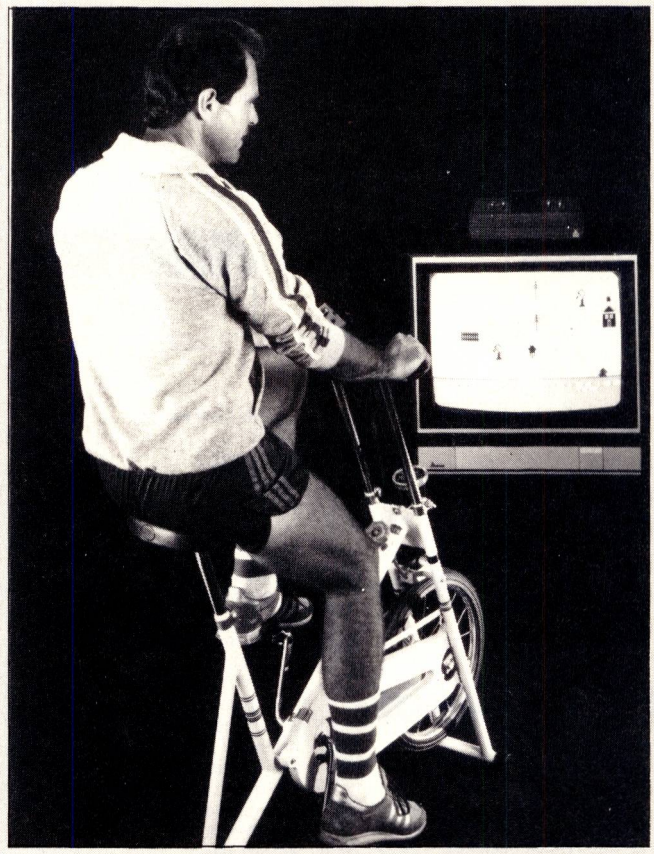
This remarkable British micro attracted rave reviews when previewed in October '83: in January '84, a working system for American trade buyers couldn't be cobbled together, even using circuit emulation methods.

The result was a very deserted stand where Kevin O'Connel and David Levy left *PCW*'s former programs editor, Maggie Burton, to show off the preliminary manual to puzzled Americans, while they wandered around the show with catalogues, talking to potential distributors.

The system specification is impressive, and I tried talking to one or two American software makers about it. SubLogic was impressed, and set off to ask questions; Data Soft, too, raised eyebrows in surprise.

But this is the ultra-hype show. And a stand with a few television screens blaring forth some graphics with music off video-tape was very avoidable indeed. Most people probably wondered what a video tape company was doing there at all.

The news for Elan is not all bad, however: it doesn't intend to let America have the machine until late autumn, and the price, when it does, is expected to be half the cost of a Commodore 64. So if it comes back in June, it will still not be too late.



Bicycle riding is dangerous, but good exercise. Exercise bicycles are safe, but boring. So Exus Corporation has bought the Exer-Bike game which first appeared at the West Coast Computer Faire last year, and launched it for $69.

It's an obstacle game, which doesn't work unless you pedal. Then you have to dodge trees, people, buildings and animals and keep going for as long as possible. No cheating on how far you 'travelled', either.

And a jogging mat, which counts the number of steps you take running on the spot, is also available at $99.

They run on Atari computers now, but Exus says other machines will be used, too.

The only frightening thing about this neat idea is the man behind it. George C Coakley, president and chief executive officer, is the man who dreamed up the original 'pet rock' fad.

Exus is on (408) 942 8750.

Leaders in concurrency

ACT gets the award for the first computer company to provide a test machine running Concurrent CP/M, together with some applications to test under it.

It's very good fun indeed, being able to switch from WordStar to Supercalc, from dBase II to Basic, just by touching a button.

For everybody using anything else, it involves a tedious, time-consuming ritual. For concurrency users, no more close-down, find-disk, load-prog, setup and start. Just use.

The question that needs answering (which only time will answer) is: Can Digital Research live with the exposure that the Apricot is going to give it?

ACT was confident enough of the performance of Concurrent on the Apricot to let me have the first review version. It lived up to expectation—that is, it worked at least as well as an early version of an operating system might be expected to—at the beginning.

Ah, but wouldn't it be nice if it really worked as well as it sounds?

In point of fact, programs may run under Concurrent CP/M-86, but they don't (yet) run all that well. For example, some programs use the diskettes a lot. While that is going on, other diskette-using programs have to share time, and both slow down.

Again, some programs, when reading files, fool the operating system into believing that they are planning to alter them. Other programs, needing the same files, won't run—even though they are only reading the files, not altering them at all.

So, new versions of the program will have to be produced, capable of living with the stricter disciplines of Concurrent CP/M.

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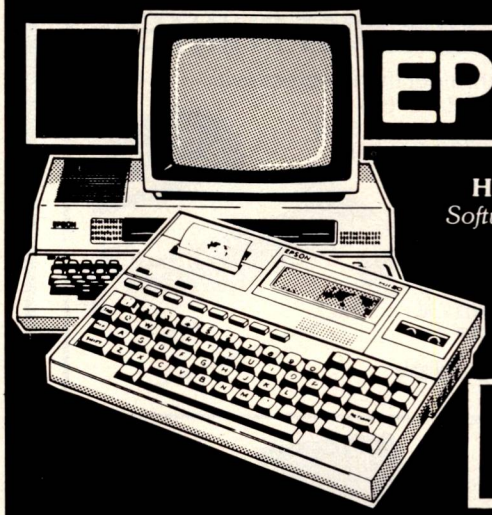

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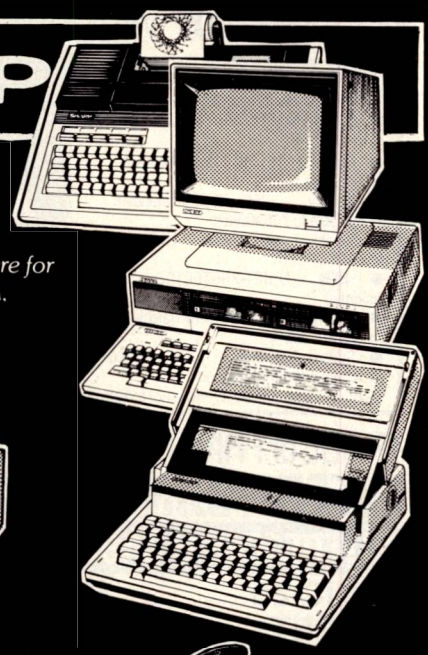

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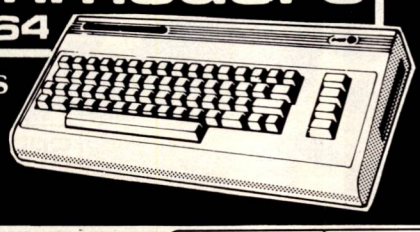

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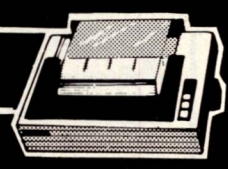

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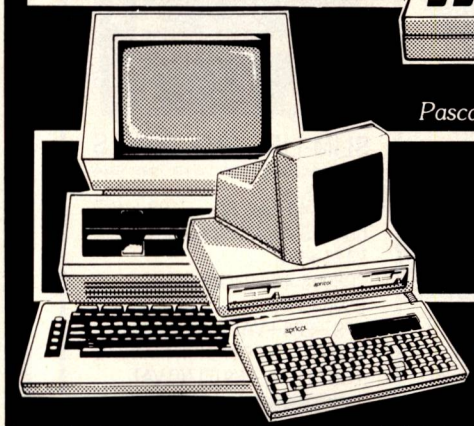

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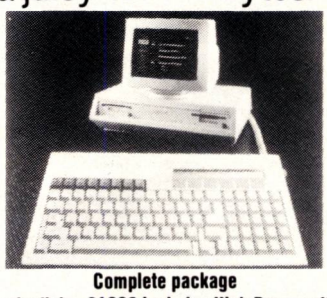

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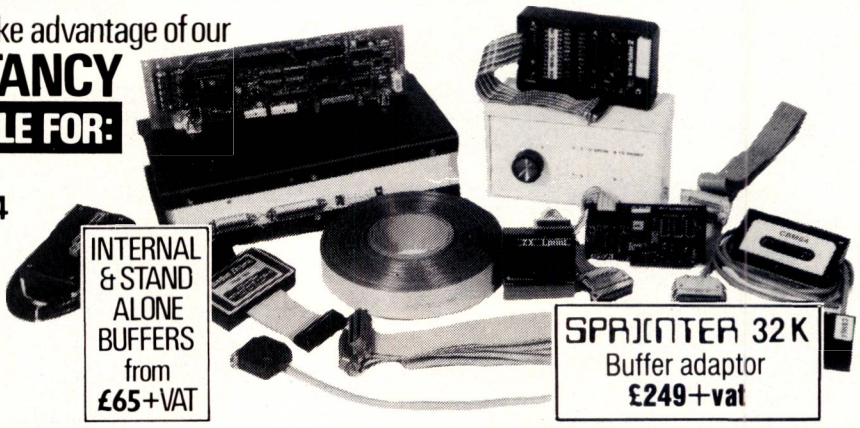

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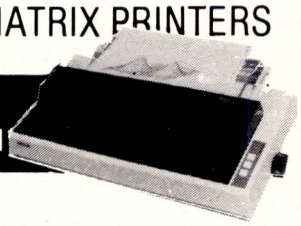

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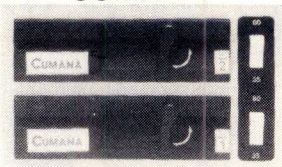

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On my (early, test) version, the system crashed — inexplicably, irretrievably, and often.

And some of the most irritating computer functions actually won't let you switch tasks. For instance, my pet hate is formatting diskettes, and getting them ready for use. This is a tedious sequence of operations.

Firstly, you have to format the disks. It takes nearly a minute for each disk, and nothing can be done while you wait. Under Concurrent, I had hoped, I could leave one disk to get on with formatting, while the other could start running my database.

But no. Formatting is a program which 'locks' Concurrent, and turns it into a single-task computer.

Similarly, with the bothersome jobs of copying system tracks (the operating system code, without which a diskette can't be used to start up the system first time, or after reset) and the tedious business of making backups. You can't do anything else while waiting for a diskette to be copied.

My overall impression of the system was that it still reeks of programmers. It is a piece of code which any programmer would love to have, and would be able to use fluently, with little more than a couple of hours of experimentation.

This explains why Digital Research is not resting on the laurels of this version. The average newcomer to disk systems would go out of skull space within minutes of seeing the complexity of the options available.

The company has predicted a new version, coming out soon (an optimistic prediction, I think), which will repair many of these problems. It will also, says Paul Bailey, head of Digital Research in the UK, 'make Concurrent CP/M more like IBM's PC-DOS, than Microsoft's MS-DOS is today.'

Over the past few months, Microsoft has been winning the credibility battle with everybody except the retailers who want to sell Microsoft products and haven't been able to get deliveries.

Paul Bailey's outfit has been fighting back with the 'everybody else' syndrome. Digital Research may not have IBM, but it is trying to sign up everybody else.

The list of people DR has found to stand up in public and be quoted is long — but until the Apricot there was little danger of any of them being a best-seller. So when Future Computing, Future Technology, Graffcom and so on, all said that Concurrent was the way to go, it was safe to nod wisely, or shake your head in amusement, and order another pint.

But the Apricot is absolutely fated to be the best-selling micro in the UK this year, and in three months' time, there will be a lot of people struggling with Concurrent CP/M, supplied free with the machine.

At that point, Digital Research says, it will have Version 3.1. 'This will include multi-user support, high level network software, dynamic window management, the ability to run IBM PC-DOS applications directly, a high speed file system, the Intel 8087 maths co-processor support, shared code support, and GSX graphics as standard.'

Frankly, I'm worried. A lot of people naïvely believed that half that list was already catered for. The other half, I fear, I don't believe.

Just for one example: networking.

'Networking is supported by DR Soft/Net, which is included with the system,' says Digital Research. 'Soft/Net provides networking for 8-bit and 16-bit CP/M operating systems and, using Concurrent CP/M, allows multiple server networks to be configured. It allows diverse microcomputer workstations to be tied together using local area networks such as Ethernet, Arcnet, and Omninet. File sharing with full password protection, record and file locking and peripheral resource sharing is supported.'

It's possible that, by April, DRI will have a network somewhere with two or even three different types of micro (as long as the micros are based on the Intel 8080 and 8086 architectures), talking to each other via different networks.

But if you think that this is going to let you buy a system with a bit of wire to connect your Apricot to the boss's IBM PC and somebody else's Corvus Concept, then you are a lot less sceptical than I have become over the years. This isn't the first DRI network product I've been fed with ballyhoo about, but when I see it working, it will be the first.

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Time to catch up

There is no doubt that the diskettes on the Apricot are still not as fast as they will be, one day.

Customers can take reassurance from the fact that they are now much faster than they were when the machine was first released. In those days, it could take over half a minute to find and load the text editing program, WordStar. And another to prepare to edit a file.

However, it is still obvious that under MS-DOS, things are not quite right.

The test to try is the program called Install.

The purpose of Install is to let the user produce a version of WordStar that best suits the specific purposes of whatever functions it is going to perform. If it is going to be used for writing programs, Install can adjust it to start up automatically in program-writing mode. It can also do things like sending the right codes to a printer, provided you tell it what printer you're using.

Now, Install has a list of different printers, and it will print them on the screen, so that you can choose the one you want to use (preferably, the printer you actually have) with WordStar.

On the Sirius, you have to wait nearly a quarter of a minute for all the different types of printer to appear on the screen.

On the Apricot, even with the latest release of the system, and even though the



In the old days, radio freaks used to tune slowly through the dial, marking the glass with the name of interesting broadcasting stations (such as the Police transmitter, or a Coast Guard wavelength, or an airline flight control frequency).

These days, however, the enthusiast uses a scanner radio, connected to a Commodore 64 computer. When you want a frequency, the computer selects it. When you get there, the computer displays a description of what it is (or should be) based on what it was last time.

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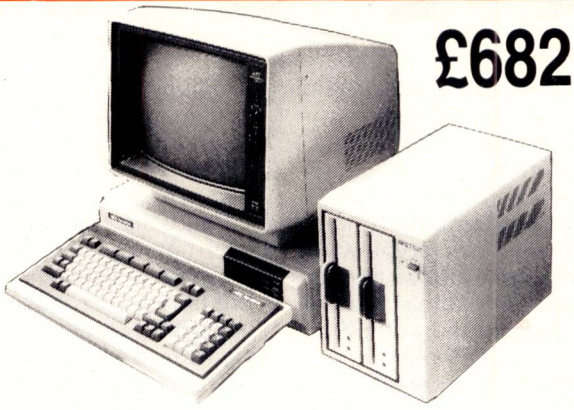

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two machines are startlingly similar, you can grow quite a beard waiting for the same list to be found.

And all the excuses about 'You have to set up the diskette directory for better access' and 'We now find that the slew factor of the diskette heads is much quicker than we thought' and 'It needs to move the head across the disk surface' are only excuses.

The Sirius is not the fastest machine in the world with its diskettes. Even the IBM Personal Computer can beat it on some operations, though obviously the Texas Instruments Professional can't. But the Apricot, with more advanced technology, should be noticeably faster, and it is instead, (very) noticeably slower.

This column was written in early January, and things will undoubtedly improve for the Apricot, week by week. They have so far, and there is obviously room for such improvement. Maybe (by the time you read this) things will be better.

But in the meantime, it is obvious that either Microsoft or the designers of the diskette control circuits will have to do something like get their act together.

➲➲➲

Persuasive talk to save Osborne

So, as Adam Osborne predicted, the company was revived, and before Christmas, too.

The genius behind the scheme was Ron Brown, head of international operations, who persuaded creditors that they would get more out of setting him up to run the company, than from selling off the components.

Key to his proposals was the amazing support of the US and other Osborne user groups.

They have gained the right to buy Osborne 1 models direct from the factory, and to distribute them — something they are well qualified to do, as enthusiasts. As an Osborne enthusiast myself, I understand why they feel they have a good story to tell. The machine is still far quicker than any big-selling rival, and far more capable of expansion than duller 'improvements' like the Kaypro.

My own system has just been enhanced by the addition of a RAM-disk — nearly 400 kbytes of memory, pretending to be Drive C: under CP/M. If you want to see speed, use Drive C: — it's amazing!

The question, however, is not 'Will enthusiasts continue to like the One' but 'Will anybody else really be distracted from the choice between IBM, Sirius, Duet, Apricot, Macintosh or Sage?'

The new Executive and the possible Vixen are the answers so far. The Executive now has available an add-on board to turn it into a portable IBM machine 'more compatible than the Compaq' according to UK boss Mike Healy. The Vixen will be (one day) a much more portable version of the One.

For the future, the hopes of the company rest on Ron Brown's ability to buy designs in, and put the Osborne badges on. There are lots of innovations coming onto the market, and bearing an Osborne label, they could do well. On the other hand, bearing a Tandy label, they might do better.

Adam himself, oddly enough, remains on the board of the new company, as chairman. How long he plans to do this is a mystery, which will no doubt be resolved before the question of how the company will fare.

Lovers of Adam's style of self-doubt will treasure his latest snippet 'My mistake was simple, the one thing I should not have done was to step down as president of the company, and hand over to Jaunich,' he said.

As to whether Adam would really have coped better than Jaunich, I prefer not to offer an opinion. That Jaunich was plunged into a job which he simply wasn't equipped to handle, I don't doubt at all. And Adam's theory: 'Jaunich was trying to step back and get a look at decisions which were already overdue when he was asked to make them, and things were just not getting done,' is certainly true.

But the real crunch was the chain store crunch and that is going to hurt bigger people than Osborne over the next couple of years.



Prism Microproducts has launched its first own brand micro. It is known as 'Wren', is transportable and costs £1000. The main technical highlights are a Z80 processor with 64k of RAM (expandable up to 256k), 8k of ROM and 50 bytes of battery-backed CMOS RAM. Other features include an integral 7in amber screen, twin 5.25in floppy disks and an integral audo dial modem. Software includes CP/M version 3, Perfect Writer/Filer/Calc and BBC Basic. Also included is a program called Executive Desk Top which includes a calculator, diary, notepad and address book.

Prism has previously been best known for its range of modems and home micro hardware/software distribution. Under normal circumstances, a portable computer with all the bits (including a modem and bundled software for £1000) would appear to be good value. However, in the light of Sir Clive's latest offering it looks rather puny.
Peter Bright

➲➲➲

Lesson in protocol

Something to connect all sorts of computers to IBM mainframes has been announced by ISG Data Sales. It is a protocol convertor.

The microprocessor based box emulates an IBM 3278-2 terminal. It can do rather more than that: it can also connect your micro to an asynchronous host computer such as DEC, Data General, Wang, and so on.

Details on this box, the Avatar PA 1000, from the factory on Reading (0734) 884666.

➲➲➲

Rising from the ashes

The NewBrain is now the most-travelled micro of all. It started out as a Sinclair design, then became the BBC Micro, then a Government-sponsored

lame duck at the National Enterprise Board. It then became a dead duck at NewBrain, was bought by Grundy, collapsed and was just about to be buried (or cooked) when Dutch firm Tradecom International stepped in (see 'Long Live the NewBrain' on page 200).

Now it's a Dutch micro.

The Dutch company which bought it had orders for several, and its own survival, say observers, rested heavily on being able to fulfil those orders. Rather than see the machine crash, it bought the company.

UK distributor these days is Brainwave Software (not to be confused with Brainstorm, the software program reviewed in *PCW*, January) with the un-British sounding address of Tilbury-Juxta-Clare, near Halstead, Essex CO9 4JT. Call Allan Mann on (0787) 237831.

➲➲➲

Top marks to Sinclair

Amazing how, if you ride a hobby horse yourself, you can spot one a mile away on the M1 motorway. That is why I got so warm and friendly towards Clive Sinclair's new QL number.

My hobby horse is concurrent operating software. A computer which has to 'load and run' one program, then unload, find the next program, load and run again, and so on, has no future.

Sinclair's computer has a future. The Apricot has a future. Lisa has a future. Possibly even the Macintosh has a future.

Clive's new QL, however, takes the prize. It is a quarter of the price of the best of its rivals, and it can run, not just one, or two, or even three, simultaneous jobs, but ten, or even twenty (says Clive).

In the month when Apple and Sinclair both launched low-cost machines with a Motorola 68000 inside, most reviews will completely overlook this concurrency aspect.

Instead, you will read a lot of arguments about whether the 68000 is or is not a 16-bit or a 32-bit processor. People will discuss the relative merits of Clive's new Basic, compared with BBC Basic. And sages will debate the performance of the Microdrive, Sinclair's answer to costly floppy disks.

But a machine is not the Basic interpreter supplied with it. And it really isn't easy to say exactly what a machine is, nor (more important, sometimes) what it is not.

It takes a very long time indeed for the limitations of a computer to become apparent.

People scoffed at Clive's claim that the Spectrum was more powerful than the BBC Micro. Most people couldn't write programs for the Spectrum to match the programs that most people could write for the BBC Micro — because the BBC Micro has so many software functions built in, and so much specialised hardware. You could use a built-in function like a *FX call, and cause colours to flash, sounds to appear, the whole display to change mode, and many other things.

But the proof of the pudding, perhaps, came when The Hobbit was finally available on Spectrum, Commodore 64 and the BBC Micro.

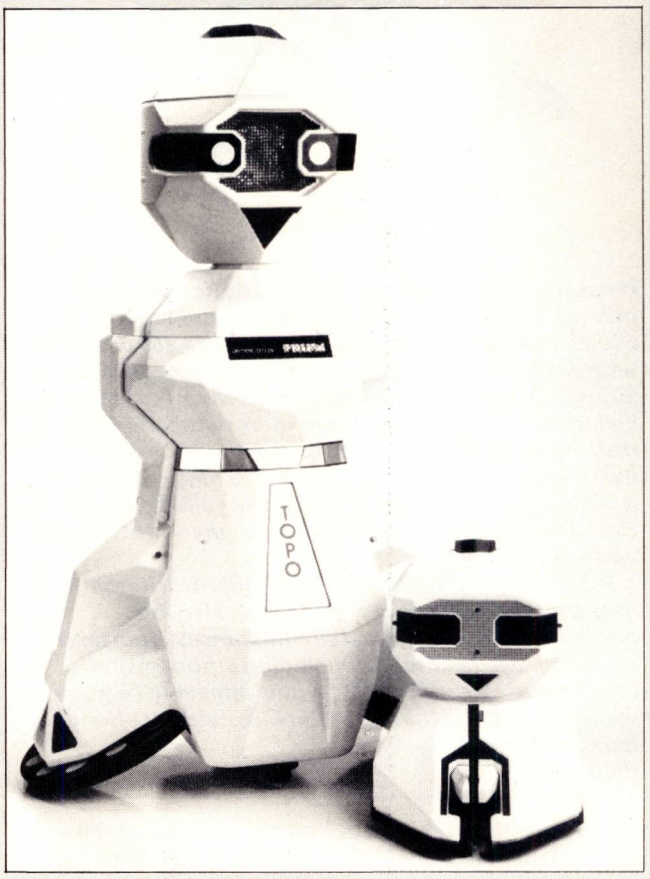
On the BBC Micro, alone, it couldn't cope with the graphics. It needed more memory than the BBC had spare.

And when Quicksilva released Bugaboo and Ant Attack, both programs showed (in very different ways) that the graphics and animated graphics of the Spectrum were at least as clever as those of the BBC, if a clever enough programmer tackled the job.

So we can expect people to rave about the QL, on the strength, mainly, of its very nice SuperBasic. SuperBasic 'puts right all the things that are wrong with Basic,' said Nigel Searle when launching the QL, and what he particularly meant was 'the things that are wrong with Spectrum Basic.'

SuperBasic is not just the programming language, but the command language for the QL operating system, QDOS(!). It does the job, with commands like GROW, of setting windows, controlling display modes and scrolling.

And it does provide some instructions which



If you're looking for something different to do with your Apple II, and have £1500 to spare, US robotics firm Androbot thinks it has the answer.

Topo is the first 'domestic' robot to arrive in Britain. It stands a little over three feet tall, and is controlled from an Apple II via an infra-red link. Topo has a built-in speech synthesiser, and can be programmed to voice direct text input from the Apple. It has a top speed of around two feet per second (about walking pace).

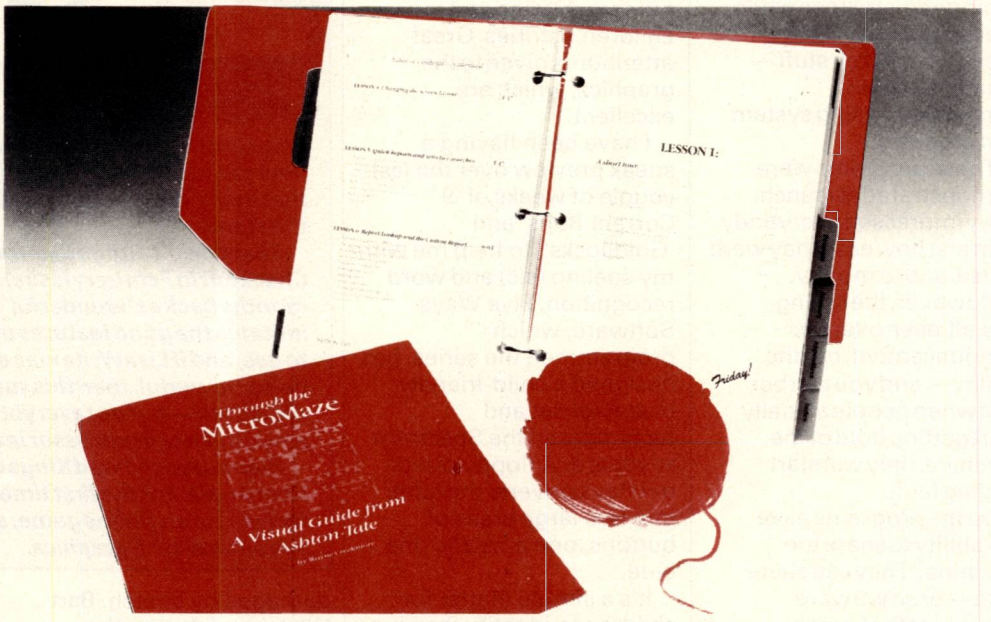
Distributors Prism admits that Topo is little more than a toy. When I suggested that the price made it a rather expensive toy, managing director Bob Denton compared the price to the Apple and commented that 'people will want Topo just because it looks so friendly'.

Along with Topo, Prism will be distributing another Androbot product, Fred, which apparently stands for Friendly Robot Educational Device (I wonder how long it took them to think of that).

Fred is a turtle which can be controlled either from a micro or from the infra-red controller supplied. Fred also has a built-in speech synthesiser, with a 45-word expandable vocabulary. It's expected to retail at around £200.

Topo is expected to be available sometime in February and Fred by April. Details of either on 01-253 2277.
Surya

The easy way out of the micromaze.



If all Theseus needed to find his way out of the maze was a ball of thread, why hasn't the computer industry come up with something just as simple to navigate the micromaze?

At last it has. Ashton-Tate's book Through the MicroMaze is as valuable to the novice computer user as that ball of thread was to Theseus. It takes you right through the maze and back out again, arming you with the knowledge to protect your business against the evil forces of poor software.

Through the MicroMaze comes with FRIDAY!, software that demands no prior knowledge of computers. With FRIDAY!, you quickly turn your paper files into electronic files. It handles Mailing Lists, Invoices, Cheques, Sales, Inventory, Reports and just about anything that needs to be done.

With FRIDAY!, understanding is immediate. Through the MicroMaze provides the first stage in getting a computer to run your day to day activities. FRIDAY!'s manual takes up the story with a step-by-step tutorial. By the time you've worked through that, you will be running your own applications.

First-rate documentation, simple menus and masses of help on the screens gives you a desktop file management system that is both powerful and easy to use. It works with other software too – with WORDSTAR, with 1-2-3 and, best of all, with dBASE II. So as your business grows your investment in computer software is protected.

If ever there was a complete package for the beginner it's. . . .

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N·E·W·S·P·R·I·N·T

aristocratic programmers always ask for: especially in loop controls.

For example, the IF . . . loop test command now includes not just THEN, but ELSE, and ENDIF, to eliminate ambiguity.

REPEAT and ENDREPEAT, FOR . . . IF . . . END FOR, and SELECT ON commands give extra loop controls.

However, the software that most people will see when they unpack their QLs will be the Psion-written stuff—word processor, spreadsheet, filing system and graphics.

These programs were demonstrated at launch. They impressed everybody with just how easy they were to use, and to modify.

However, the raving has all been over the announcement, not the reality—and you can bet that when people actually start getting hold of the machine, they will start finding fault.

Do the programs have the ability to share the machine? They can share data—or so we were assured at the launch—but can I actually run the QUILL word processor in one window, the spreadsheet in another and the filing system in a third? Or do they use common system variables?

Sinclair and Searle didn't know. 'Can't see why not,' was their response, which means that they haven't tried.

Will these programs work without microdrive wafers in the slots?

Or do they need them there for overlays? What file locking mechanisms are there? If both spreadsheet and word processor try to adjust the same file, which wins?

In the long run, it doesn't matter.

Clive Sinclair's new machine is so cheap for its capacity that, supposing all these questions have the wrong answers today, somebody will see a way clear to putting them right within a year.

Learning with delight

Learning Box is the title of a new series of programs for children under six and their parents. The programs have been designed with care and imagination around nursery rhymes and children's stories. Great attention is given to the graphics, which are excellent.

I have been having a sneak preview over the last couple of weeks of '9 Currant Buns' and 'Goldilocks', to help me with my speling (sic) and word recognition. Five Ways Software, which programmed the series, has designed a child-friendly character set and reconfigured the Spectrum keyboard. A floppy plastic overlay converts the latter into two large areas of buttons, one pink and one blue.

It's a simple matter for children to identify the blue and pink keys and press any from that block in response to prompts from the screen. Animation effects are most endearing and incorporate a veritable Noah's Ark of little creatures, crawling and hopping around the screen.

Each of the program tapes has an audio track on the reverse containing the appropriate tales and rhymes delivered in *Jackanory* diction. Each Learning Box also includes a story book for the child and a help book for the parents, which incorporates setting up and using the computer as well as advice on how parents can best join in the 17 activities on each program tape.

The programs were tested by kids, mums, teachers, Spectrum owners and computing novices. The test tapes were subjected to a week's continuous winding and rewinding to see if either the audio or the program material could be damaged by stretch. Bart Ullstein, of Arrow, the publishers, said: 'Although the programs might *teach* sums and reading, they are designed to provide an enjoyable medium for practising and consolidating skills.'

Learning Boxes are now available in Boots and W H Smith, priced £9.95. Contact Bart on 01-387 2811 if you have any difficulty.

Jerry Sanders



Pioneers they may have been: Sierra Online's release of new games at the CES was disappointing to the point that many visitors declared the company had nothing on the stand.

That wasn't altogether true: HomeWord (see Checkout in February issue), greeted in preview a few months back as 'wonderful' is a word processor that imitates the good features of Apple's LisaWrite. It's easy to use, and if LisaWrite was easy to use at the expense of being powerful, then this suffers from a similar drawback—but not everybody wants the most powerful word processor imaginable.

Sierra also showed Kings Quest, on machines other than Apple. For the first time, UK players can start to look forward to an Online game, and this one is not a bad adventure, with graphics.

Christmas Crossword

PCW received an overwhelming number of entries to the December Crossword Competition. The first correct entry out of the bag was Mr J Luby of Berwickshire.

Congratulations, Mr Luby, your £10 prize is on its way.

END

PCW Show '84

Exciting news for PCW readers . . . the Personal Computer World Show 1984 is moving to Olympia 2, London's new exhibition hall located next to Olympia's older Grand and National Halls.

Olympia 2 gives the show 50% more display space for exhibitors and much more space for more visitors. So, the Personal Computer World Show 1984 promises you more space, more interest, more features, more business!

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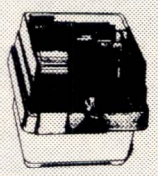

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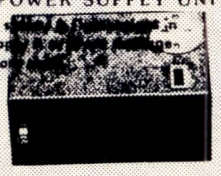

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BRITISH MICROCOMPUTING AWARDS 1984

THE SUNDAY TIMES

Here is the final short list of nominations for the 1984 British Microcomputing Awards (BMA), and we think you'll agree it's very exciting.

The Central Judging Panel has selected the finalists in each category but all nominations should, by now, have received a certificate to record their achievement.

Before you all take to your keyboards to protest at what we've left out, remember that to qualify for the 1984 BMA all products must have been available in retail outlets by 1 November, 1983 — we have to draw the line somewhere!

It was a shame that owing to the qualifying dates we had to exclude some interesting products. Neither Brainstorm, Visi On, DesQ, Everyman, Melbourne Draw nor the more recent Ultimate games qualified. We also had to leave out the very excellent computer game Scrabble because its author Peter Turcan works on a sister publication. Then there were the machines that didn't quite make it in time for our dates: Macintosh, Elan, Sinclair QL, Spectravideo, Memotech ... Not to mention the microdrive!

Never mind, they'll be hot contenders next time round at the 1985 BMA. Meanwhile watch out for next month's issue when we'll be giving details of the finalists.

The British Microcomputing Awards are organised jointly by* The Sunday Times *and* PCW*'s publisher, VNU Business Publications.* Thames Television*'s* Database *is sponsoring two of the awards and there will be other sponsors, too.* PCW *is hosting the awards for Micro of the Year. The other awards will be hosted by* PCW*'s sister publications.

Central Judging Panel

The judges of the BMA are:
David Fairbairn, director, National Computing Centre
David Firnberg, president, British Computer Society
Alison Newell, president, Computing Services Association
Professor Margaret Boden, author, *Artificial Intelligence and Natural Man,*
Philip Virgo, manager, NCC Microsystems Centre

Category 1. VLI Computer People Business Microcomputer Award
APC — NEC
Apricot — ACT UK Ltd
FX20 — Future Computers
Fortune 32:16 — Fortune Computer Systems
Hyperion — Bytec
IBM PC — IBM
Lisa — Apple
Pied Piper Communicator 1 — Semi-Tech Microelectronics
QX10 — Epson
Sage IV — Sage Technology Inc
Sirius — ACT
Torch 700 — Torch

Category 2. Micro Decision Business Software Award
Calcmaster — Sapphire Systems
CLIP (CP/M, MS-DOS) — Keele Data Systems
Datamaster — Sapphire Systems
dBase II — Ashton Tate
Delta — Compsoft
Friday! — Ashton Tate
GSS Graphics — Digital Research
Gresham Computers Bill of Materials — Gresham Computers
Lotus 1-2-3 — Lotus Development Corporation
Multiplan — Microsoft
Pick — Pick
TK!Solver — Software Arts
WordStar (CP/M, MS-DOS) — Micropro

Category 3. Home Microcomputer Award
Aquarius — Radiofin
Atari 600XL — Atari
BBC Micro Model B — Acorn
Commodore 64 — Commodore
Sinclair Spectrum — Sinclair Research

Category 4. Thames Television's Database Home Software Award
Conversational French — Atari
Fifth — Computer Rentals
Home Finance for the Spectrum — Consumer Association
Micrel Word Processor — Micrel
Quill — Gilsoft
Simons Basic — Commodore
Tasword II — Tasman Software
Ultisynth 64 — Quicksilva
View — Acornsoft
Vu-File for the ZX Spectrum — Psion
Vu-Type — BBC Publications
Wordwise for the BBC — Computer Concepts

Category 5. Computer Answers Creative Software Award
Ant Attack for the Spectrum — Quicksilva
Atari Logo — Atari
Corplan Business Game — Understanding Ltd
Fancy Font — Softcraft
Flight Simulator — Microsoft
The Hobbit for the Spectrum — Melbourne House
Lisa's Operating System — Apple
Mainframe — Mainframe
Pinball Construction Set — Budge Co
Sprite-gen — DACC
Valhalla — Legend

Category 6. Game of the Year Award
Ant Attack — Quicksilva
Blue Max — Synapse
Bugaboo — Quicksilva
Fort Apocalypse for the Atari/64 — Synapse Software USA
The Hobbit — Melbourne House
Hovver Bovver — Llamasoft
Lunar Crabs — Micromega
Manic Miner — Software Projects
PSST — Ultimate
Planetoid — Acornsoft
Soccer — Thorn EMI
Valhalla — Legend

Category 7. Consumer Award
Nominations will be announced shortly

Category 8. Personal Computer News Peripheral of the Year Award
Brother EP22 — Jones & Brother
Colne Armdroid robot arm — Colne Robotics Ltd
Currah Speech Synthesiser — Currah Computer Components
Dataline 1200DL Printer — Dataline
Edinburgh Turtle — Edinburgh University
Epson RX80 dot matrix printer — Epson
Lisa's Mouse — Apple
Printer Plotter — DEM
Prism VTX 5000 Modem — Prism
Sussbox — Duplex Communications
Torch Disk pack — Torch

Category 9. Thames Television's Database Software of the Year Award
BBC Basic II — Acorn
Calcmaster — Sapphire Systems
Concurrent CP/M — Digital Research
Database — Sapphire Systems
Delta — Compsoft
Friday! (CP/M, MS-DOS, CP/M 86) — Ashton Tate
Gresham Computers Bill of Materials — Gresham Computers
IBM Flight Simulator — Microsoft
Lotus 1-2-3, — Lotus Development Corporation
MS-DOS — Microsoft
MSX Basic — Microsoft
Multiplan — Microsoft
Pinball Construction Set — Budge Co
Quicksilva Games Designer — Quicksilva
Valhalla — Legend
Forth — Aberforth
Wordwise — Computer Concepts

Category 10. Personal Computer World Microcomputer of the Year Award
APC — NEC
Apricot — ACT
Atari 600XL — Atari
Electron — Acorn
Epson QX-10 — Epson
Fortune — Fortune Computer Systems
Lisa — Apple
Model 100 — Tandy
Commodore 64 — Commodore

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a CP/M™ micro

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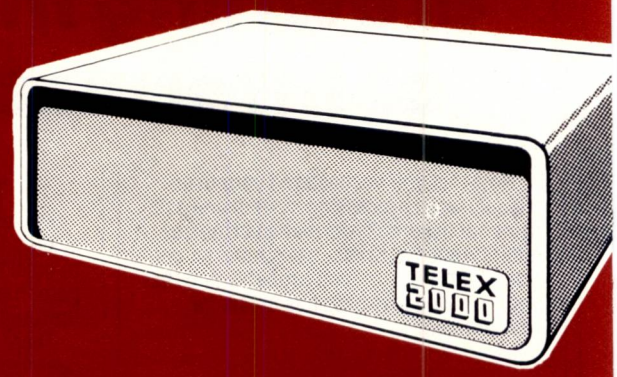

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CP/M IS A TRADE MARK OF DIGITAL RESEARCH INC.

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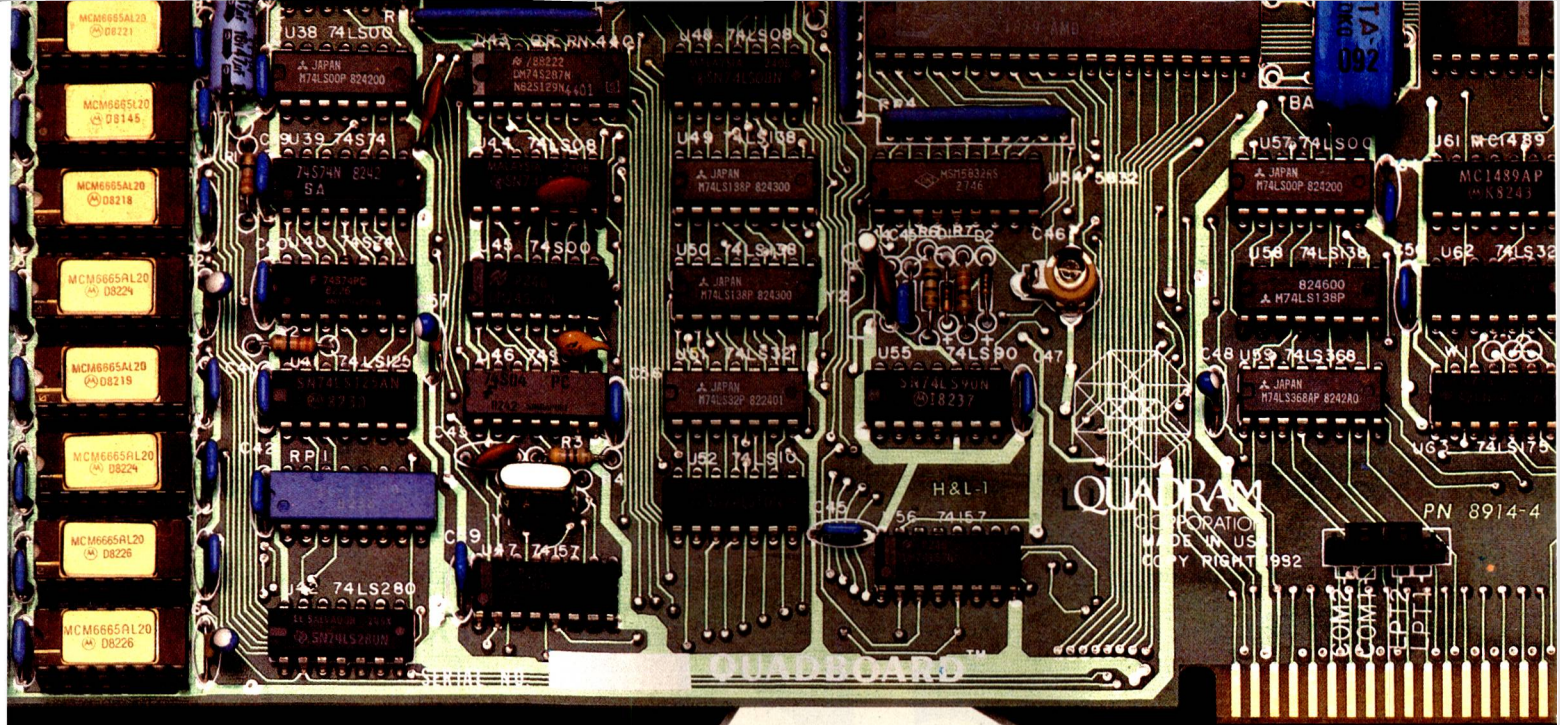

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Quadboard is the multifunction board that lets you get the most out of your IBM Personal Computer, PC XT, and PC II. Because Quadboard combines six of the most-needed PC functions onto one card using just one expansion slot.

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Quadboard comes with a parallel port designed to operate most printers and other parallel devices.

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Quadboard also comes with an on-board chronograph. A real-time clock/calendar that always keeps your system's clock up to date. Even when your PC's been off for months!

Plus there's plenty of memory space available. Quadboard is expandable in 64K increments to give you up to 256K of RAM. The memory rows are fully socketed. With parity and checking standard.

Plus QuadMaster Software, too
Quadboard comes with a complete software package. The QuadMaster disk. With programs that let you use part of memory as multiple solid-state RAM Drives. Super-fast drives that let you store information for easy access.

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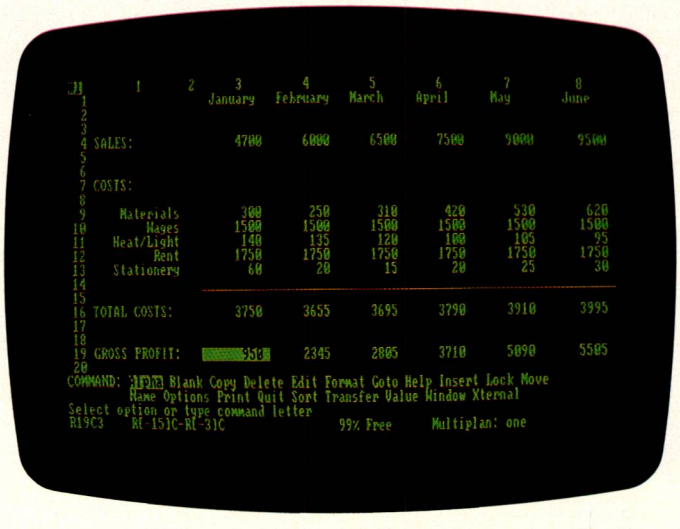

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a CP/M™ micro

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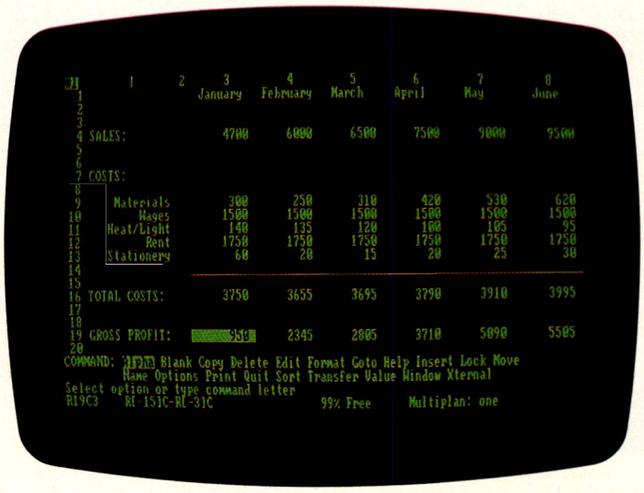

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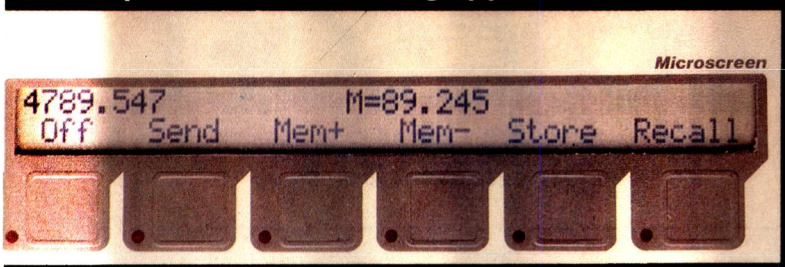
As you'd expect with a 4th generation system, Apricot offers true 16-bit processing, multi-processor architecture and 256k RAM as standard.

With Pulsar 16-bit business software and compatibility with the best selling ACT Sirius 1 and IBM PC, Apricot already has the largest available software library.



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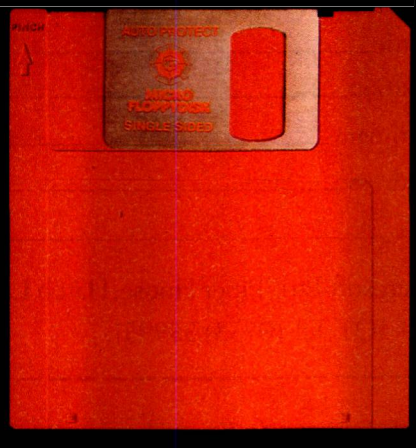



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Apricot includes over £750 of software—SuperCalc spreadsheet, business and communications software—to ensure that your system is immediately effective.

And because executives are not office bound, Apricot offers portability, a further feature aimed at improving efficiency.

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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.

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PCW 3 DMP

The MTX Series described; straight from the author's mouth

MANUAL

The first section (of the manual) is a basic tutorial. The grass roots information is here and I could not find any major mistakes. The second part is on Noddy giving a good guide as to how it can be written. . . . The third and fourth sections are on graphics and sound. Both are quite detailed and easy to follow. The fifth section is on how to interface Assembler to Basic.
Personal Computing Today Feb 84.

The provisional manual, which runs to some 250 A4 size pages, has a wealth of detail for the machine-code specialist.
Electronics and Computing Monthly.

INTEGRATED INTERACTIVE SOFTWARE

The MTX ROM has been designed to allow the maximum interaction between components of the software. A single program can be written which uses NODDY to display text and graphics, and a BASIC control program which calls routines written in assembly code. This is a feature of future generation computers not available on any other micro.

BASIC

The Basic is fast and accurate, all the calculations being done in floating point maths, so that you don't lose accuracy to gain speed.
Personal Computing Today Feb 84.

The latest addition to the Memotech range DMX80 Matrix Printer – 80 characters per second print speed, eight character formats, dot addressable graphics, **£295.00 including VAT.**



Integrated Software – a five to one advantage. Assembler/Disassembler, High resolution Graphics, Arcade style games, Noddy for easy text handling and Front Panel for testing and debugging machine code.

NODDY

A language new to me called Noddy is included in the MTX which is designed to make text handling easy, especially for beginners.
Hobby Electronics.

Also provided is the easy to use beginner's language (Noddy) and a child oriented learning language Logo.
Practical Computing Dec 83.

(Noddy has only 11 commands) that need to be mastered before some quite complex question-and-answer-type programs can be written.
Your Computer Nov 83.

Noddy's . . . main use is for displaying text and I can see applications in the computer assisted learning (CAL) field. Writing in Noddy is like a mixture of Logo and Forth.
Personal Computing Today Feb 84.

ASSEMBLER/DISASSEMBLER

The Assembler can be accessed through BASIC. When used in conjunction with the PANEL it enables the programmer to single step through and test machine code programs. This is not new to computing, but it is to a home micro.

As well as being able to modify and disassemble sections of code, you can set break points, examine and alter register values, and even single step through code. I hope other Z80 micro manufacturers (particularly in the Cambridge direction) take note of these debugging aids.
Popular Computing Weekly Nov 83.

The Assembler is called from Basic, and it assembles the code in situ, as part of the Basic listing.
Hobby Electronics.

Z80 BOARD

The MTX Series is a more powerful tool for education than the 6502 because it produces a more powerful assembler, allows the PANEL function to be used, and enables integrated software to be written.

RML's 450Z has a (PANEL) function but that is a computer which costs considerably more than the MTX 500.
Hobby Electronics.

FULLY INTEGRATED AND EXTENDED GRAPHICS

The only aspect of the series where extensions to standard language are allowed is in the most comprehensive and integrated graphics available on a home micro.

32 Sprites are supported either 8 × 8 or 16 × 16. They are easy to use and define and do not use extra memory as in the BBC B because they have their own area of RAM.
Personal Computing Today Feb 84.

Graphics are very easy to create and manipulate, even for beginners.
Which Micro Jan 84.





MTX512 plus twin 5 1/4" disc **FDX**. A CP/M based business system – **£1245 inc VAT.**

SOUND

The simplification of the sound commands for ease of programming has in no way compromised the quality of the sound produced.

Sound is of great importance for use in games but on many microcomputers it is inadequate. Not so with the MTX . . .
Your Computer Nov 83.

As well as good graphics capability the MTX boasts the same sound chip as the BBC micro – the Texas 76489. It has three tone channels and one noise channel, and is easily controlled from Basic. Volume and frequency can also be controlled, using a much easier method than the 14 parameters needed by the BBC.
Popular Computing Weekly Nov 83.

The commands are sufficiently complex to enable the computer to be used as a synthesizer.
Electronics and Computing Monthly.

CP/M OPERATING SYSTEM

The Series is designed to run under the CP/M operating system. This is the Disc Filing System used on the vast majority of microcomputers in business. Since a program written on one CP/M machine can be transferred and run on almost any other, this makes available 15,000 CP/M based business programs. The powerful LINK program can give access to any device operating under CP/M. With its excellent software support and because of it's modular nature, the series is a cost-effective and efficient entry to serious business and educational computing.

FULL-TRAVEL KEYBOARD

It has a professional quality keyboard. This and its elegant styling make it suitable for word processing and business use.
Your Computer Nov 83.



Input/Output Monitor, Hi-Fi, Power, TV, Centronics, Cassette Mic and Ear, and two Joystick ports all come as standard; the twin RS232 ports are available as expansions.

HARDWARE

Inside the case is what one comes to expect from Memotech – a very neat PCB that holds all the components including the main chips – namely a Z80A processor and TMS 9929 graphics chips as well as about 30 others.
Popular Computing Weekly Nov 83.

If you are familiar with the ZX81 peripherals that Memotech also make you will know that the company has an eye for good design and does not skimp on materials it uses.
Electronics and Computing Monthly.

NODE RING

MTX computers can operate together without expensive network systems. Units linked via the ring can share software peripherals and communicate with each other. Many other makes of computer can be interfaced with the ring as terminals.

EDUCATIONAL USAGE

There will be many people who have seen a front panel display on the 380Z computer in secondary schools or colleges, and the MTX panel is very similar.
Hobby Electronics.

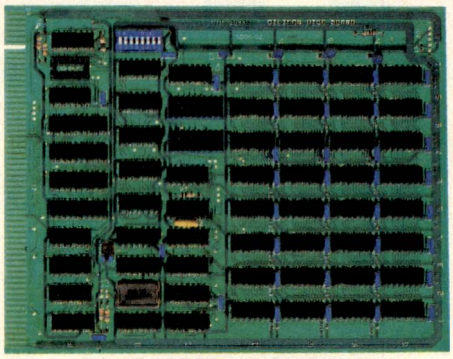
The new language Noddy and the Logo type Turtle Graphic commands would appeal particularly to the growing education market.
Your Computer Nov 83.

Applications are obviously going to suggest themselves in areas of the school curriculum, the fast-training of personnel in commerce, and in adventure-game writing.
Hobby Electronics.

The MTX expansion potential is well thought out. The key to both the MTX Ring system and to the Disc Drive systems is the communications (RS232) board mentioned earlier.
Electronics and Computing Monthly.

UPGRADABILITY

The MTX 500/512 is part of an existing range of products which can be bought separately and integrated into a single powerful system, now.



Silicon Disc RAM Board 256K fast access RAM

There is plenty of room for expansion with the MTX and Memotech have planned a progression up to their small business machine with 80 column display (instead of the standard 40 × 24) Floppy discs, Silicon (or RAM) discs, and a hard disc under development.
Personal Computing Today Feb 84.

There are a multitude of sockets along the back consisting of two Joystick sockets, cassette connections, Centronics printer circuit, aerial socket, power socket and audio and video output. There is also provision for two RS232 sockets . . . in addition the left hand end of the case has a large expansion socket with all the CPU signals on it – Memotech thoughtfully supply a plastic Blanking Plate to protect and conceal it when not in use.
Popular Computing Weekly Nov 83.

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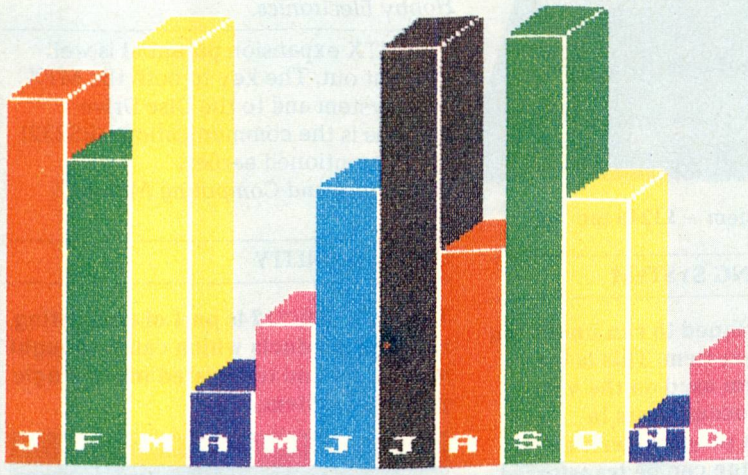

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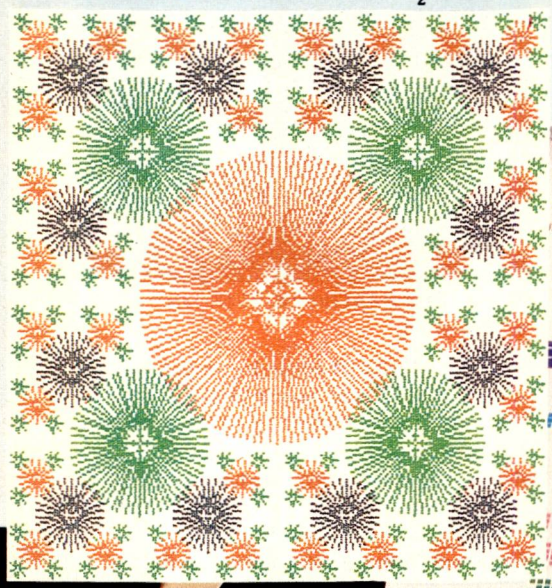



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It beats its immediate competitors like the Sinclair Spectrum, Dragon 32K, Vic 20 and Atari 600.

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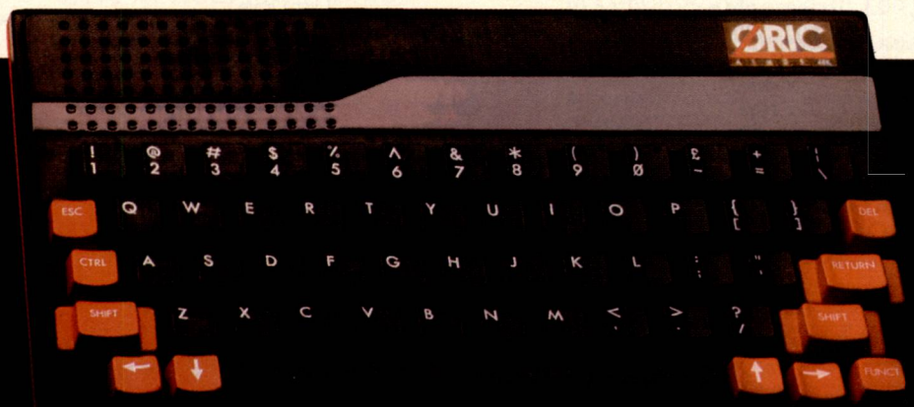

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BENCHTEST

Canon X-07

The rapid growth of the portable micro market has precipitated a move towards increasingly smaller machines, but at what cost to computing power? Peter Jones looks at the Canon X-07, which boasts some very innovative features . . .



Photographs by Crispin Thomas

BENCHTEST

In the spring of 1983, at the Hannover Messe (the enormous trade fair held in Northern Germany every year), Canon Incorporated demonstrated, next to its AS 100 desktop computer (Benchtested in the December 1983 issue of *PCW*), its brand new portable computer, the X-07. As happens so often in this industry, it has taken from then till now for this machine to reach the European market in any quantity. To paraphrase Harold Wilson, a week is a long time in the computer business, and a machine which eight months ago looked attractive, with some interesting and novel ideas incorporated, now looks much more ordinary. That said, the X-07 is still a machine which should find a place in the portable market, given what it offers for the price.

It is certainly an attractive machine to look at, with its silver and black body contrasting nicely with the white keys and their black symbols. With the dimensions of a thickish paperback book, the machine is possibly the smallest portable on the market. It comes in a sturdy, silver-coloured plastic carrying case which hinges open to allow operation and has cut-outs at the sides to give access to the various interfaces provided on the computer. The keyboard (Qwerty) is not full-size, nor are the individual keys, but it has a nice feel (albeit calculator-style). It does not, however, permit efficient touchtyping. I think that a slightly larger computer to make room for a proper keyboard, along the lines of the Epson HX-20 or the NEC PC-8201A, would have been a better choice.

However, its small size does mean that it can be slipped easily into a suit pocket or tucked away in the corner of a briefcase, so it should appeal to the travelling businessman wanting instant computing facilities.



Possibly the smallest micro on the market, the Canon X-07 runs on four AA penlight batteries.



The 4-colour graphic printer/plotter plugs directly into the X-07.

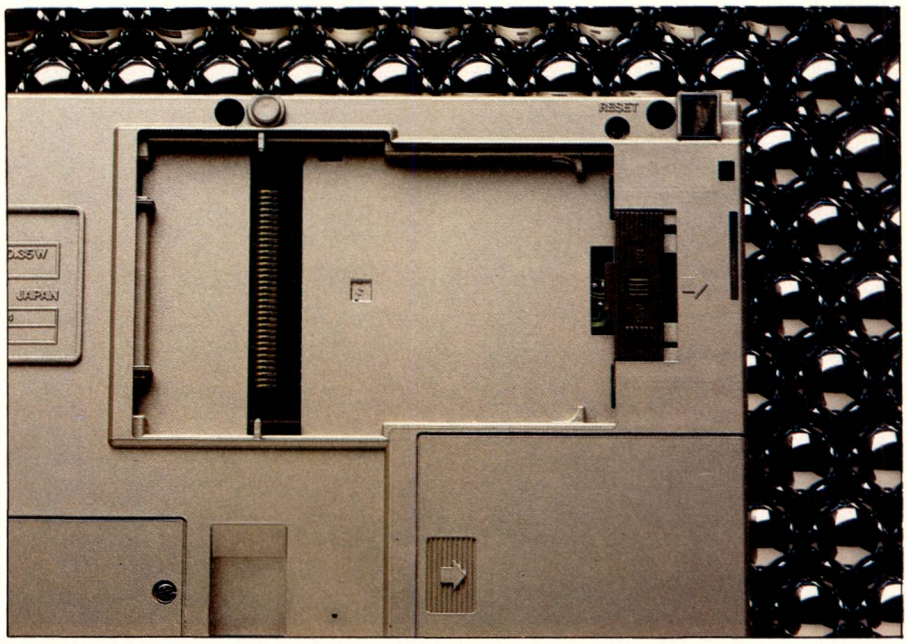
Hardware

The machine measures 200mm × 130mm × 26.5mm and weighs only 480g without the four AA penlight batteries. On the left hand side is a serial interface, the back has a volume control and an expansion interface, and on the right hand side is a parallel port, a contrast control for the LCD screen, an AC adaptor socket and a cassette plug. Underneath there are three covered compartments: one to hold the four batteries; one to give access to the socket which receives the 8k extension RAM chip, and the third to hold the memory cards (of which more later).

A four line by twenty character LCD screen is mounted in the top left hand corner. Next to this is the grille for the tiny piezoelectric speaker and then what looks at first sight to be a stylised flower logo but on closer examination proves to be a square white function key surrounded by the up, down, left, right cursor control keys. Then there are five blue function keys mounted under the screen and labelled F1 to F5; to the side of these are four white keys marked respectively INS(insert), DEL(delete), HOME/CLR(home cursor, clear screen) and OFF; and finally an orange coloured ON/BREAK key. Underneath this line of keys is the keyboard proper, in almost standard Qwerty layout. There is only one SHIFT key, which has been placed below the keyboard to the left of the relatively small space bar; two extra keys have been placed between the SHIFT key and the space bar — NUM (numeric keypad) and GRPH(graphic characters); and lastly, to the extreme right of the space bar is the RETURN key, white on blue.

The basic machine comes with 8k of RAM, but the Basic steals some of this, so that when you switch it on you are told that you have 6761 bytes free. The RAM can be expanded to a maximum of 24k. Since all the RAM is battery-backed CMOS, whatever is in the memory is retained when the machine is switched off. The processor is the NSC800, the CMOS version of the Z80 and there is also a second processor, the T5834, a custom made CMOS chip for screen

BENCHTEST



Underneath the machine a recessed compartment allows the insertion of 'memory cards'.

and keyboard control. The Microsoft Basic interpreter is held in 20k of ROM, and the ROM area can be increased to 42k. 12k of memory has been set aside for use by an expansion box which will, among other things, drive a full-size screen.

A tiny piezoelectric speaker has been built into the machine but, mercifully, has a volume control, so that the beep which emanates from it every time you hit a key can be turned down low or even below the threshold of hearing. The sound can also be turned off by a Basic command, CONSOLE. The LCD screen displays four lines of twenty characters which now seem rather small in comparison to the NEC PC-8201A with its 40 × 8 format. Each character is formed in an eight high by six wide matrix, giving a pixel count of 120 × 32.

Graphics are also possible on the display, with each point being individually addressable. A contrast control is also provided for the screen, so that it is possible to view it from different angles, which is a useful touch on a hand-held (or lap-placed) machine. The display scrolls vertically but not horizontally. This is a shame, since a window onto a larger screen (Osborne style) would have gone some way to offset the disadvantages of the small LCD. Six function keys (with the aid of the SHIFT key) make it possible to have twelve programmable functions available. Five of these keys are situated under the screen and the last line can be used to display the function of each key. These five keys contain default functions which can be changed. These are: PRINT TIME$, PRINT DATE$, CLOAD, CSAVE, LOCATE(X-Y cursor control), PRINT, LIST, SLEEP (turns the machine off but retains contents of screen), RUN and CONT(inue). The sixth function key, in the middle of the cursor control cluster, is empty. Use of the NUM and GRPH keys extends the keys available. The NUM toggles on and off a numeric keypad. This is formed by the original 7, 8 and 9 keys plus the U, I and O keys which become 4, 5 and 6, the J, K and L keys which become 1, 2 and 3, and the M key which becomes 0. I do not regard this as a facility that I would greatly miss, but perhaps there are people who have entered so much numeric data in their time that their fingers automatically stray to the right and this might be of some use to them.

The GRPH key brings into play a whole range of special characters, a generous sprinkling of the Greek alphabet, all the accented characters needed in French and German, the pound sign, the hearts, clubs, diamonds and spade symbols and one or two others. To show you the character on each key, Canon has provided an overlay which I have managed to lose twice already. It seems to me that it would have been a lot simpler to have printed the graphic characters at the side of each key directly on to the body of the computer. The effect would be exactly the same and would prevent a lot of swearing on the user's part!

The ASCII codes from 128 to 255 are used for special characters and two blocks of these — 128 to 159 and 224 to 255 — can be redefined by the user with the Basic function FONT$. The block in the middle is reserved for Japanese characters.

Cassette

Saving to, and loading from, cassette proved to be no problem. I was using a small Tandy model and it quite happily cooperated at the 1200 baud transfer rate used by the X-07. The volume control was set around the half-way mark, but there was a fair margin either side at which it continued to work. The standard commands CLOAD and CSAVE are used, plus a verification command, CLOAD?. Given the small amount of storage (8k) available on the removable RAM cards, cassette tape must remain the best storage medium for the X-07, unless Canon intends to come out with some form of microdrive.

Memory cards

One of the innovative features of the Canon X-07 is the facility to add to, or change part of, the memory by means of a memory card. This card, which has similar dimensions to a 'credit-card' calculator, and looks like one with the display and keyboard removed, is held in a compartment underneath the X-07. The cover of the compartment has a spring-loaded latch on which is mounted a power ON/OFF switch. Only



The X-721 optical coupler facilitates communications with other peripherals.

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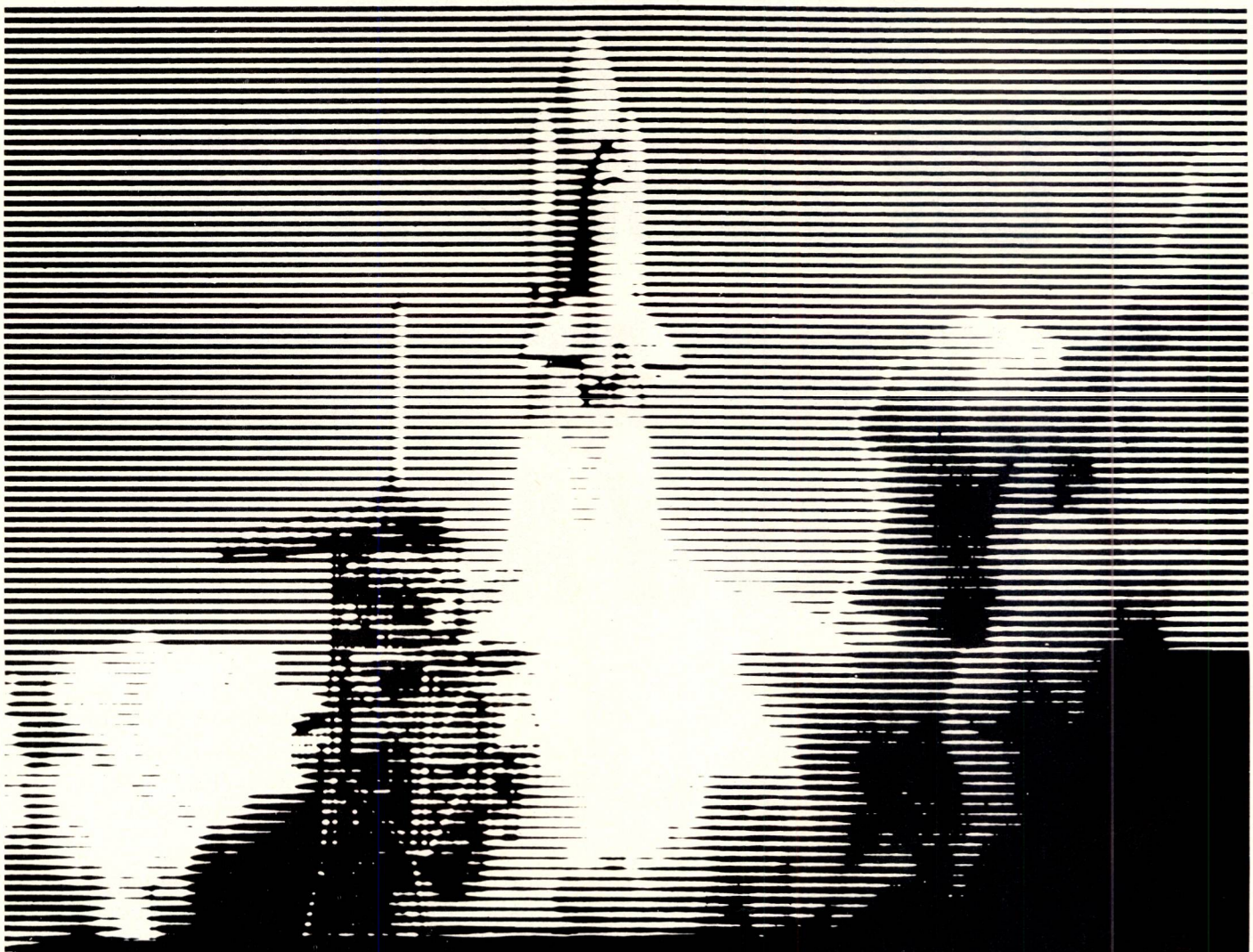

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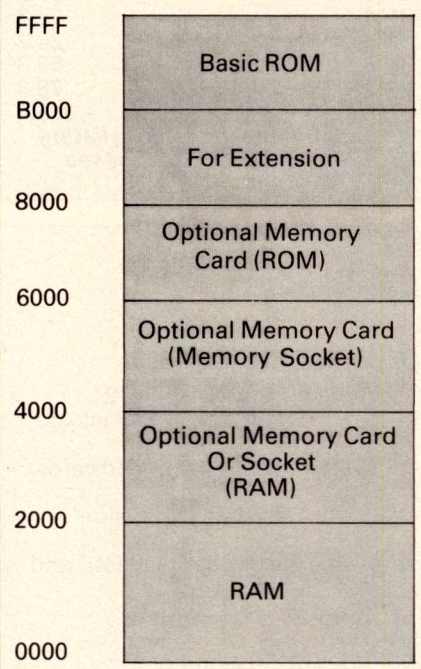
when this switch is in the OFF position is it possible to slide the latch to one side and remove the cover. The card is then simply placed in the recess, connector side down, the cover replaced and the power switch set to ON. There are four different types of cards available: 4k and 8k CMOS RAM cards, each containing a lithium battery for back-up when the card is removed from the computer; 8k ROM cards; and 8k ROM/4k CMOS RAM cards, also lithium battery-backed. The ROM and ROM/RAM cards are used to provide pre-written programs and applications.

It is possible to set aside part of the RAM of the X-07 to hold files. Logically enough, this is called a RAM FILE area in the manual. Using the Basic command FSET,parameter, one can reserve any amount of RAM to this purpose up to the total RAM available less 87 bytes. This area is always taken from the top of RAM downwards. A 4k or 8k RAM card will always sit on top of the built-in RAM, and be contiguous with it, so the FSET command can be used to ensure that all the files you create will be held in the RAM card. For example, with a 4k RAM card in place, the command FSET 4096 will turn the card into a RAM FILE area. SAVE filename will place any program you create in the card, which can then be removed from the machine and stored safely for up to eighteen months, protected by the lithium battery-backup. Just as in CP/M, the DIR command will list all the files in the RAM FILE area. The programs can be run by typing LOAD "filename" and then RUN, or simply RUN "filename".

Memory map



Peripherals

One of the features that is still unique to the X-07, as far as I know, is the capability to communicate with peripherals or, indeed, with other X-07s, without physical connection. This is accomplished using the X-721 optical coupler, which plugs into the serial interface at the side of the X-07 and provides infra-red communication with a similarly equipped X-07 or, via a second X-721 and an RS232C level convertor (X-722), with a peripheral device, such as a printer. Transmission speed can be set between 100 and 2400 bauds and the maximum range is approximately five metres. Unfortunately, this device was not available at the time of the Benchtest, but I did see one in action at the distributors linking an X-07 to a printer and it did appear to be performing faultlessly at a distance of about three metres. (See the photos here.)

Two printers are available for plugging directly to the X-07. There is a 4-colour graphic printer/plotter, with specifications remarkably similar to that of the Oric MCP-40: prints in red, green, black and blue; 114mm wide plain paper, up to eighty characters per line; X-Y plotting; a printing speed of ten characters per second; and a Centronics interface. There is also a small thermal printer which prints up to 35 characters per line at a speed of 20 characters per second onto 57mm wide paper through the serial interface.

I mentioned earlier the RS232C level converter, model X-722. This is used to provide a standard 25-pin serial interface for connection to various peripherals. It is needed since the serial output from the X-07 has only the minimum nine pins needed to conform to RS232C specifications. It also provides power to the optical coupler used at the peripheral end of an infra-red link.

Finally, there will be an expansion box principally to provide output to a full-size monitor screen, but this is not yet available.

Basic

The version of Microsoft Basic implemented on this machine lacks one or two things that I miss, like AUTO and RENUM, but it does have a screen editor, even if it is a little screen. It also has a few additions which are worth describing:

TIME$** and **DATE$. These take advantage of the built-in clock.

**START$**. This is an auto-start string, and is best demonstrated by giving an example of its use. By putting the commands RUN and RETURN in the START$ and then turning the machine off not with the normal OFF button but with an OFF1 command, any program left in the text area of RAM will be run whenever the machine is turned on. This function can be suspended with the OFF2 command.

ALM$. This is an alarm which can be set for the year, month, day, day of the week, hours and minutes. It will sound for one minute and functions even if the computer is switched off. It is set by one of the parameters of the CONSOLE command.

SCREEN (X, Y). This returns the ASCII code of the character located at the position indicated by the X, Y parameters.

STICK. This returns the status of the cursor keys. 0 will be returned if nothing is depressed, 1 if the UP key is depressed and 2 if the UP key and the RIGHT key are depressed simultaneously, 3 if the RIGHT is depressed and so on around the clock up to a value of 8.

LOCATE. This positions the cursor at one of the eighty character positions on the screen.

CONSOLE. This has several parameters allowing you to: set the line at which you wish scrolling to start and the number of lines you want to scroll; display the labels of the function keys below the keyboard; activate or silence the beep which accompanies a key press; and activate or cancel the key auto-repeat.

CONSOLE@. This has parameters to turn the alarm on and off and to set the keyboard to the normal alphanumeric mode, Kana mode (Japanese characters), graphic mode or ten-key mode.

STRIG. This is an unusual one. It returns the status of the space bar and function key 6 (the one in the middle of the cursor control cluster). A = STRIG(0) will put −1 in A if the space bar is depressed, 0 if not. A = STRIG(1) works similarly for function key 6. I assume it is to be used in conjunction with STICK for games programs.

Finally, there are several graphic commands and one sound command:

CIRCLE. That's right, it draws a circle.

LINE. You've got it!

PSET. Puts a dot at a specified X-Y coordinate.

PRESET. Erases same.

POINT. Checks for a dot.

BEEP. This is the sound command. It has only two parameters, tone and duration and covers four octaves. Despite its single-note limitations and restricted range, my wife had a lot of fun entering and running a program from the manual which turned part of the computer keyboard into a piano keyboard.

As the Benchmarks show, the Canon

version of Microsoft Basic is not particularly sparkling, being considerably slower than the Hewlett Packard HP-75C, the Epson HX-20 and the Tandy Model 100, and being positively put to shame by the results obtained by David Tebbutt with the NEC PC-8201A.

This is even more surprising when one considers that the clock rate of the X-07 is 3.84MHz. This is, I feel, a serious drawback to this machine, since the type of customer who is prepared to pay out the money to have computing capacity at his/her fingertips is also likely to be the person who wants quick results from said computer, and a Basic this slow is not going to give it.

Documentation

The documentation takes up more room than the box in which the computer was delivered. There are three glossy-covered A5-size manuals: *Programming For Beginners, User's Guide* and *Basic Reference Manual.* There is also a 16-page folding card for quick reference to the Basic commands and functions. *Programming For Beginners* contains 210 or so pages, clearly laid out in two colour (light blue and black) text, diagrams and 'amusing' sketches. Chapter one explains what a program is, encourages the use of flowcharts, gives a few tips on writing efficient programs, and shows how to save in the RAM file area and on cassette. Chapter two runs through *basic* Basic. Chapter three describes several practical programs to consolidate what was learned in Chapter two, while Chapter four contains programs which demonstrate the different features of the X-07: sound; graphics; colour printer; optical coupler, and so on. Chapter five is dedicated to a games program of interplanetary commerce called, appropriately enough, 'Space Trader'. It provides a listing of the complete program and also explains in detail how the program works.

The manual is clearly written, in good, if not absolutely perfect English, and is much better than some Japanese-written 'English' manuals I have read.

The User's Guide, which is the thinnest offering at 136 pages, starts with the unpacking of the machine and then goes on to explain its functions. It also contains details on the internal workings of the Basic, listing things such as the addresses for each pointer and the pattern and format of the variable area. At the very back of the manual can be found all the interface specifications, which include the pin-outs for the serial, parallel, cassette and expansion interfaces.

The Basic Reference Manual, 180-odd pages long, is fairly standard issue, with a couple of chapters dedicated to the 'grammar' of Basic, then a description of the commands in alphabetical order, followed by the functions. A useful index, which groups instructions and functions under headings such as 'Graphic Instructions', 'Variable Related Instructions' and 'File Related Instructions' is also included.

Overall, I think that the documentation is more than adequate and a welcome relief to someone who has suffered the rigours of CP/M manuals.

Applications software

There are three application programs which will be available initially for the X-07, all of them on the drop-in memory cards: File Card — a file management program; Table Card — for the preparation of table layouts; and Graph Card — for the graphic presentation of data, pie charts, bar charts, line graphs, and so on.

Prices

	£
Canon X-07 hand-held computer (8k)	265
8k memory extension (CMOS RAM)	80
4k memory card (CMOS RAM)	45
8k memory card (CMOS RAM)	85
8k memory card (RAM)	47
12k memory card (8k ROM/ 4k CMOS RAM)	N/A
X-721 optical coupler (infra-red)	86
X-722 RS232C level convertor	53
X-7104-colour graphic printer	170
X-711 thermal printer	82
XP-110 File card	48
XP-120 Table card	48
XP-130 Graph card	48
8k memory extension (CMOS RAM)	45

The X-07 is not yet available in the UK. Sterling prices given here are approximate and have been converted from Dutch guilders.

Conclusions

I enjoyed using the machine, and particularly appreciated its portability. However, this portability is severely restricted by the life of the four AA batteries, which only allow about eight hours of operation. (With the machine switched off, they provide a back-up capability for the CMOS RAM of about one thousand hours.) An AC adaptor is available, but then the machine is no longer truly portable.

The RAM cards are a good idea, but their limited capacity prevent them from being a viable alternative to other storage media — that is, tapes and disks.

The infra-red communication capability is also a good idea, but its usefulness would seem to be limited to a medium-size office where you need to switch frequently between two different printers — say, a daisywheel and a dot-matrix, otherwise a cable would do just as well. The size of the machine makes it very convenient to slip into a briefcase but prevents it from taking a full-size keyboard. This precludes its use as a word processor, which is another application that Canon is claiming for it.

Canon talks about one of the applications of the X-07 being its use as an 'electronic notepad'. This, I think, is the best description of it. If this idea is pushed then, with Canon's well-known name in the industry, it should sell, but will hardly set the world alight. END

Benchmarks

BM1	3.9
BM2	11.5
BM3	32.0
BM4	35.8
BM5	38.1
BM6	58.3
BM7	78.9
BM8	379.6

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

Technical specifications

CPU	NSC800 (CMOS Z80)
RAM	8k (expandable to 24k)
ROM	20k (expandable to 42k)
Display	Four lines of 20 characters, 32 × 120 pixels
Keyboard	68 keys, including six function keys (giving 12 functions with SHIFT key). Graphic character access via GRPH key
External storage	RAM (interchangeable lithium battery-backed cards). Cassette (600 baud)
I/O	Centronics parallel, RS232, Cassette, Expansion
Built-in software	Microsoft Basic
Applications	File Card (Database); Table Card (Spreadsheet); and Graph Card (Graphics)
Dimensions	200mm × 130mm × 26.5mm
Weight	480g (excluding batteries)
Power supply	Four AA penlight batteries or AC adaptor

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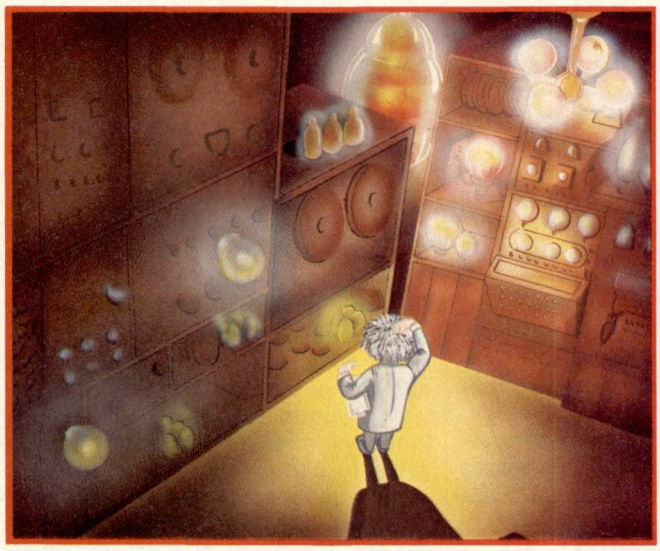
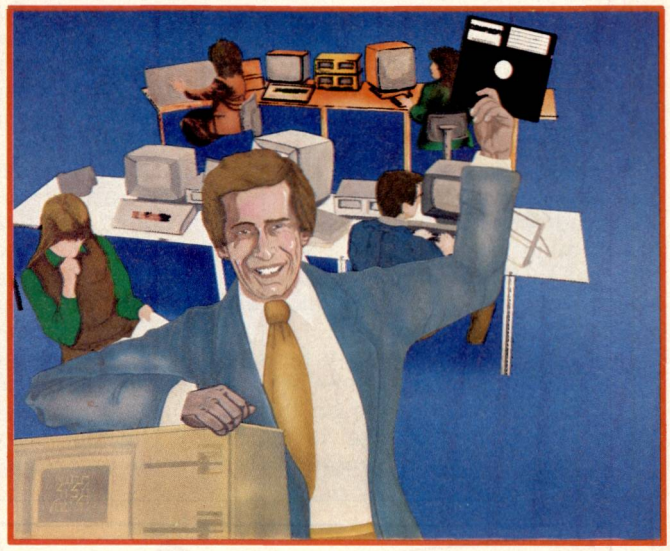


And man's knowledge was vast. – And so were his problems. But he was no nearer solving them ...



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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.'

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.

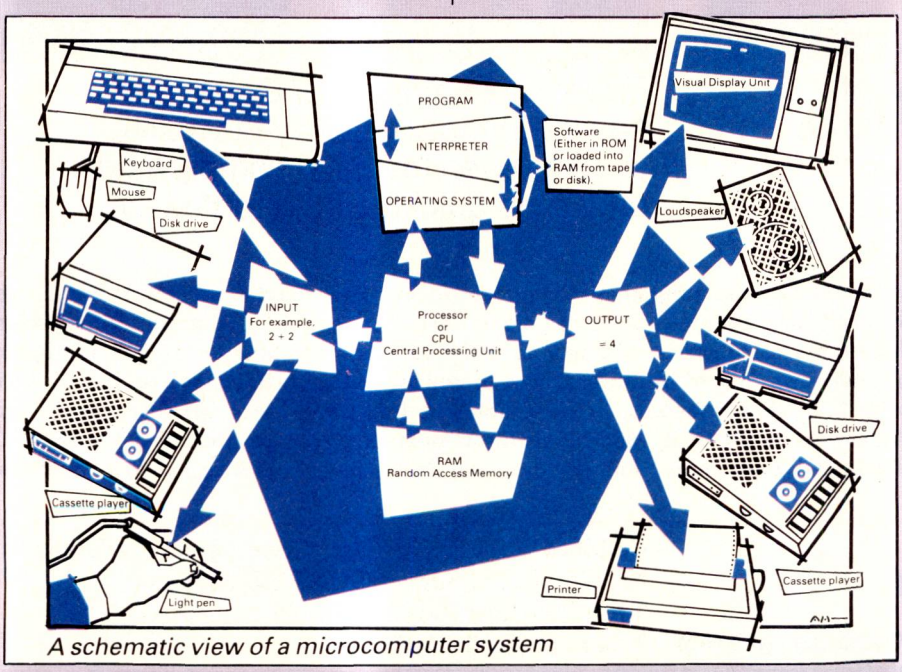
Between high level languages and machine code is a low level language known as assembly language or, colloquially, **assembler**. This is a mnemonic code using symbols which the processor can quickly convert to machine code.

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 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



A schematic view of a microcomputer system

Illustration by Tony Hannaford

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.

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.

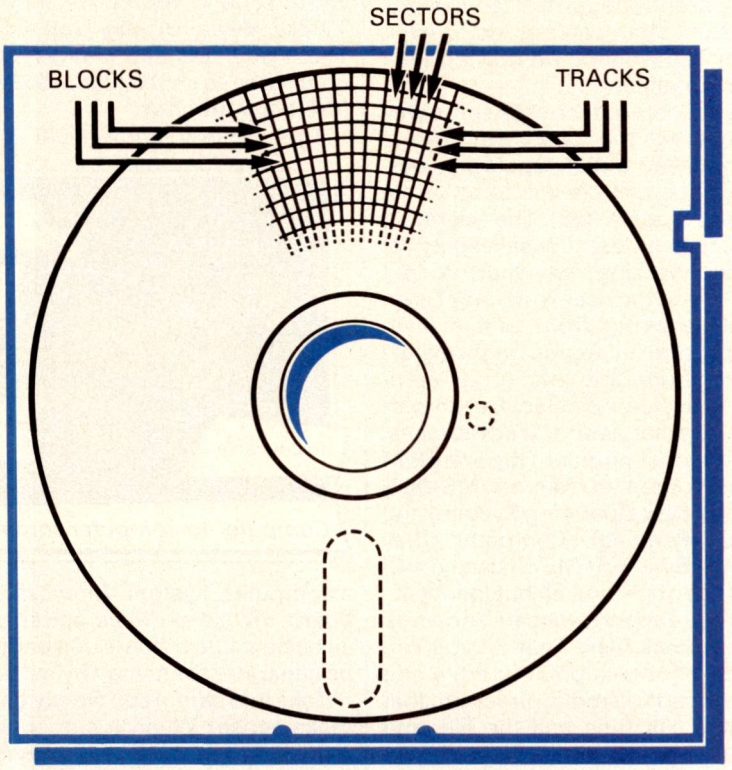
The result of the calculation has to be placed into the appropriate memory location, passed to the screen or whatever is required. The transfers to and from the processor are often made in 8-bit form; this is why you'll hear people arguing that certain processors are not 'true' 16-bit. If the problem 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.

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



Cross-section of a floppy disk

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.

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.

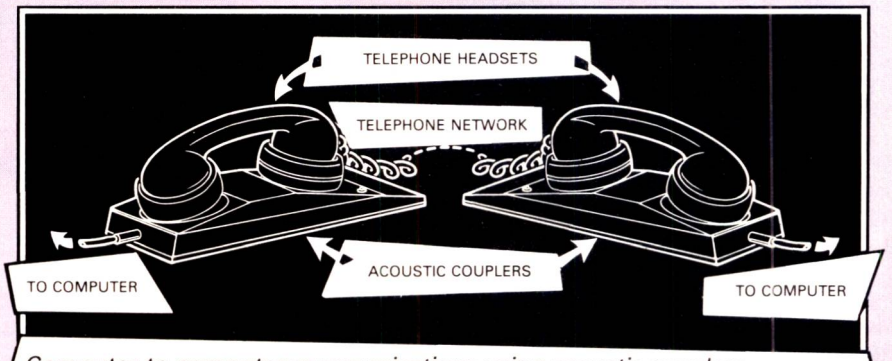
Take this paragraph slowly and it will make sense! When a computer communicates with an outside device, be it a printer or another computer, it does so in one of two forms — **parallel** or **serial**. Parallel **input/output (I/O)** requires a number of parallel wires. Each wire carries one bit, so 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 standard serial interface is the **RS232** (or **V24**) while the Centronics standard is popular for parallel interfaces.

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.



Computer-to-computer communications using acoustic couplers.

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.

Now that you know the jargon, you'll excuse me while I go and initiate a file transfer from secondary memory to RAM in order to engage in some real time interactive processing with 32k 8-bit micro, using a direct entry input device and cathode-based visual feedback system. I never could resist a game of Pacman.

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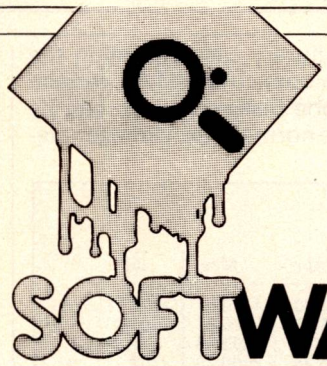

PeachCalc

Mike Liardet went back to the classroom for a thorough lesson in Peachtree's PeachCalc, a high quality and inexpensive financial modelling system.

When selecting a software package, the pedigree of the company producing it can act as a valuable barometer for your expectations.

Peachtree's pedigree extends back to the stone age of micros (1975). The company is named after its home state, Georgia, which is evidently even more famous for its peaches than its peanuts. Starting life as the US's fourth Altair dealer (historical note: the Altair, sadly no longer with us, was the world's first commercially available micro), Peachtree quickly moved into accounting software development and in 1981 was awarded a contract with IBM for the PC's accounting software. In the same year it was taken over by the world's largest software house, MSA, and its UK operation, now housed in substantial and elegant premises in Maidenhead, began.

Peachtree has recently introduced product training courses for all its products. It claims to be the first software supplier to do this, although there are already many independent software training establishments. These courses will not be some sort of peripheral and occasional activity, but represent a major new direction for the company. Peachtree has invested very heavily in setting up a training department, currently based only at the Maidenhead head office, but shortly to be spread across the country in regional centres. With this move, Peachtree obviously aims to achieve a reputation for support that is second to none.

In this month's article we will not only take a look at Peachtree's spreadsheet system, but also comment on Peachtree's spreadsheet training. Since PeachCalc is being offered at a bargain price of only £95, it's possible to have both training and product for less than the cost of some spreadsheet systems on their own.

The course

Having concentrated on this series for over a year, I decided it would do me no harm to remind myself of what it's like to know nothing at all about spreadsheets or computers. The PeachCalc course is aimed firmly at people in this position.

The emphasis of the course is on informality and hands on experience. Four Altos micros with Televideo terminals are provided — on a normal day there are two users to each computer. The day is broken up by exercises, lecturing and the inevitable breaks for refreshment.

On arrival, each user is presented with the full course notes, elegantly housed in a ring binder and library box. These notes include photocopies of all the slides used during the day, a particularly useful medium for making your own notes. They are also totally invaluable if, like me, you forget to bring your glasses!

The first session is devoted to an introduction to computers in general, and micros in particular, and then focuses on the specific type of micro used to run PeachCalc itself. The lecturer introduced general instructions for copying disks and handling files, and so on — the minimal information for a new user to get started. The session was interspersed with some review exercises, posing questions such as:

'The term RAM refers to: (a) a back-up process (b) read/write memory (c) a kind of sheep.'

Following this, PeachCalc was introduced for the first time. A general introduction to the spreadsheet concept was followed by a description of

Spreadsheets — a guide for beginners

Spreadsheet software is useful to anyone who regularly uses a calculator.

The VDU screen acts like a 'window' on a large 'sheet' of numbers — neatly laid out rows and columns, occasionally interspersed with text headings.

By using a few quickly learned keystrokes it is possible to shift the VDU window to the desired point of interest. It is possible to enter text, a number or a 'formula' which can, if required, be a complex calculation referring to several other positions on the sheet. The result of the calculation is displayed immediately with automatic recalculations throughout. Frequently an alteration on the top line of a spreadsheet can change everything from top to bottom in just two or three seconds — an exercise that would take several hours by hand!

Each month, the 'Which Spreadsheet?' series analyses and tests a different spreadsheet system. Further information for beginners can be found in the spreadsheet articles in the PCW February and December 1983 issues.

the PeachCalc screen layout, more review exercises and then, the great moment — using PeachCalc at the keyboard.

Assets	Jan	Feb	Mar	Apr	May	June
Acct.s Receivable	1000.00	1050.00	1102.50	1157.63	1215.51	1276.28
Inventory	300.00	500.00	525.00	551.25	578.81	607.75
Other Assets	250.00	262.50	275.63	289.41	303.88	319.07
Total Assets	1550.00	1812.50	1903.13	1998.28	2098.20	2203.11
Liabilities						
Acct.s Payable	1000.00	916.67	840.28	770.25	706.07	647.23
Accrued Storage Cost	50.00	50.00	50.00	50.00	50.00	50.00
Accrued Salary	100.00	105.00	110.25	115.76	121.55	127.63
Accrued Other	50.00	52.50	55.13	57.88	60.78	63.81
Total Liabilities	1200.00	1124.17	1055.65	993.90	938.39	888.67
Earnings before tax	350.00	688.33	847.47	1004.38	1159.80	1314.43
Dept. Allowance	100.00	100.00	100.00	100.00	100.00	100.00
Taxable Income	250.00	588.33	747.47	904.38	1059.80	1214.43
Taxes	75.00	176.50	224.24	271.31	317.94	364.33
Net Income	175.00	411.83	523.23	633.07	741.86	850.10

Fig 1. Tutorial model used on the course

From then on, most of the day was devoted to building up the model in Fig 1. Although a fairly simple model in itself, it acted as the linch-pin for learning all the important PeachCalc commands and interactive techniques. Once these facts have been grasped, it's relatively easy to apply this knowledge to building more complex models. During the practical sessions the lecturer was in among us offering help where needed, so there was no reason for anyone to flounder for more than a few minutes.

The *grande finale* involved PeachCalc performing a consolidation operation. I suspect that real beginners might find this rather difficult, particularly at the end of a hard day, but a fast learner should find this last exercise challenging enough to keep him amused for quite a while.

Overall, the course was very well thought out, expertly presented and also highly enjoyable. The premises and equipment were all top rate and everything went smoothly. My only complaint is that for the price (£115 + VAT) Peachtree could include a lunch, but at least Maidenhead provides a variety of pleasant places to eat.

Software

PeachCalc is a modestly priced spreadsheet system for both CP/M and MS-DOS computers: this review was done on an IBM PC. In spite of the low price tag, Peachtree has not skimped on quality and facilities.

The product is presented in the standard Peachtree style — a ring binder in a library case and all in the company colours. The IBM PC version arrives on one diskette, which can be copied in the normal way. Unfortunately, the manual doesn't provide a great deal of information on how to do this and also commits the unpardonable sin of referring to CP/M, a sign that the manual was not updated when the software was upgraded to the 16-bit micros. Nonetheless, it's fairly simple to create a working disk on the PC. If you don't know how, refer to the PC manuals for guidance.

In some versions of PeachCalc, it's necessary to run an installation program to configure the system for your own particular VDU/computer, but the PC version was already configured so this wasn't necessary — the installation program wasn't even supplied.

Having made a working copy of the master disk it was only necessary to type 'PC' (PeachCalc) to get the system up and running. As soon as it's running you are offered a help screen outlining the fundamental key-strokes, and then the spreadsheet itself.

PeachCalc scorecard
Easy to learn : !!! (excellent, plus training course)
Easy to use : !! (good)
Reliability/error handling : !! (good)
Facilities : !! (good)

The main spreadsheet display is fairly standard. The top line of the screen is highlighted and contains the column identifiers (A, B, and so on), and the row numbers are down the left-hand side of the screen. The screen will display 21 rows by 8 columns at any time, although more columns can be accommodated if the column width is reduced. The current 'action point' or cursor is denoted by an inverse 'bar' occupying a full column width in one row. The bottom three lines of the screen are reserved for status messages, prompts and typed input.

Lessons

The manual is organised into a tutorial section consisting of twelve lessons.

I greatly favour this 'lessons' approach to tutorial material, pioneered by the original Apple VisiCalc but ignored by most of its imitators. Each one of the PeachCalc lessons introduces new commands, but is sufficiently short and simple to avoid deterring the new user.

The first lesson starts at square one with instructions for running the software and moving the action point cursor around the spreadsheet. The manual refers to it rather grandiosely as the 'active block', and outlines the keys that move it (arrow keys if you have them, or the diamond pattern of the control-E/S/D/X keys otherwise). It is also possible to jump the cursor to any named cell on the sheet — simply press '=' then enter the name of the cell required, for example, 'A1' or 'Z99'.

The lesson finishes with general exercises and a review of the material covered — all fairly similar to the approach adopted on the training course.

The next lesson instructs the user on entering formulae and doing calculations, and gradually, step by step, each lesson brings you closer to total proficiency.

Once you know enough to be able to load and save models on disk, the lessons introduce some preworked sample models to load and examine. These are a valuable source of ideas for setting up your own models, and provide good demonstration material. In addition to the expected financial models an engineering air barrier calculation is included.

Working with PeachCalc

When PeachCalc is running, the cursor can be moved freely anywhere over the full extent of the spreadsheet by using the arrow keys, and a formula, text or number can be entered at the current place. Numbers or formulae are simply typed in without further ado, but text must be preceded by the quotation character. If this isn't done, the system will refuse to accept what has been typed.

Apart from these basic functions, common to all spreadsheet systems, PeachCalc has 19 built-in commands to control file handling, display format, and so on (see Fig 2). A command is

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selected by first pressing the '/' key, then the initial letter for the command. The prompt line makes it quite clear which keystrokes are available at any given moment, and if that is not elaborate enough then help is always just a keystroke away — the '?' keystroke, in fact. My only criticism of the help facility is the rather confusing jargon occasionally used — 'blocks', and 'groups', and so on.

Blank	Removes contents of cell(s)
Copy	Copies contents of cell(s)
Delete	Deletes row or column
Edit	Edit contents of named cell
Format	Change format of selected area
Global	Reset display or calculation options
Insert	Create new row or column
Load	Read model from disk
Move	Swap rows or columns
Output	Printout or write to disk
Protect	Prevent alteration of selected areas
Quit	Finish — back to PC-DOS (CP/M, etc)
Repeat	Replicate cell(s) across rows/columns
Save	Write model to disk
Title	Lock borders of sheet for continual display
Unprotect	Reverse previous 'protect'
Window	'Split' the screen into two windows
Execute	Accept commands from a 'batch' file
Zap	Clear all memory

Fig 2. PeachCalc commands

Standard spreadsheeting

Although comparatively inexpensive, PeachCalc includes all the standard facilities you would expect from a 'typical' CP/M or MS-DOS spreadsheet system, making it possible to load and save models, do printouts and replicate formulae.

Let's take replication as a standard feature. The newcomer may not immediately recognise the value of replication, but it can drastically cut the time spent developing a model. You have a typical financial model, organised in 12 columns, one for each month; you develop all your formulae in the January column, and ignore the other 11 months. Once you are satisfied that everything is working correctly in that column, you can replicate it across the other 11 columns with just a few keystrokes. All the January formulae refer to January figures, but we want the February formulae to refer to February figures. To deal with this problem, most replication facilities permit relative replication — this copies a formula and adjusts it for its new position.

This command needs to be supplied with a source range of cells, a destination and some optional adjustment information. For any command, if PeachCalc requests a cell name it's possible to press the 'escape' key and then use the normal cursor move keys to point to it. This is a useful alternative to typing the cell name since it may not be on screen when you start using the command, and it's usually difficult to remember its precise location. Returning to 'repeat', it's possible to specify a range of cells down a column or across a row as the source for a replication. For example, our January formulae may stretch from cell B5 down to B99. The source is then specified as 'B5:B99'. The destination for these formulae is the months February to December, specified as columns starting at C5, D5, . .M5. PeachCalc can handle all 11 destinations in one operation by specifying 'C5:M5'. Following this, you can optionally indicate how the replication is to be performed: with or without formula adjustment, values only, or partial formula adjustment. Replicating values copies only the displayed values in a cell, but not the formulae, and the other options deal with relative/absolute replication. In some instances, most of the cell references in formulae need to be modified during the replication, but some do not. Specifying partial formula adjustment enables you to indicate which are which.

Advanced spreadsheeting

In addition to the standard facilities, PeachCalc has some bonus features, invaluable to the advanced user.

*** Protection.** Cells can be protected so that it's not possible to overwrite their contents accidentally. Once a complex formula has been built up it's wise to protect it. The facility is not high security since it's easy to unprotect cells, but it does protect you from your own stupidity. It's also possible to use cell protection to aid fast data entry. Normally, when a value has been entered you press the 'return' key and the cursor automatically moves to the next cell, but it's possible to modify this procedure to skip to the next unprotected cell. If the whole spreadsheet (except the modifiable cells) is protected, you can very quickly move around the essential points in the spreadsheet by pressing 'return'.

*** Display formatting.** There are a variety of powerful commands that can modify the display in various ways. The screen can be split into two using the window command, and each half of the screen can focus on completely different areas of the spreadsheet; for example, the top and bottom lines of a budget model. The windowing can be synchronised optionally so that the row or column headings are kept aligned in both windows.

Column widths can be individually modified, and numbers can be displayed in a variety of formats, including financial (123.45), scientific (1.2345E2) and integer (123). However the number is displayed, the full value is remembered and it's this which is used in calculations.

It's also possible to switch off the display of row and column identifiers. This is not recommended when developing a model, but does improve the presentation of printouts. It is frequently useful to lock the first few rows and columns of the spreadsheet on permanent display. For example, the month names may be somewhere in the top two rows, but we may be working a hundred rows down. If the top two rows have been locked, then the month names will still be in view.

*** Consolidation.** A consolidation demonstrates some of the most impressive features of the system, in particular the execute command and the ability to stitch separate models together.

For example, you have independently set up an expenses model for your US and UK operations (or it could be two separate departments or even two individuals). You wish to consolidate

A	B	C	D	E	F
1		Jan	Feb	Mar	Tot
2	Salaries	100	110	121	331
3	Travel	600	660	726	1986
4	Rent	400	440	484	1324
5	Utilities	700	770	847	2317
6	Other	900	990	1089	2979
7					
8					
9					
10					
11					
12					

Fig 3. UK expenses model

A	B	C	D	E	F
1		Jan	Feb	Mar	Tot
2	Salaries	200	220	242	662
3	Travel	300	330	363	993
4	Rent	400	440	484	1324
5	Utilities	500	550	605	1655
6	Other	600	660	726	1986
7					
8					
9					
10					
11					
12					

Fig 4. US expenses model

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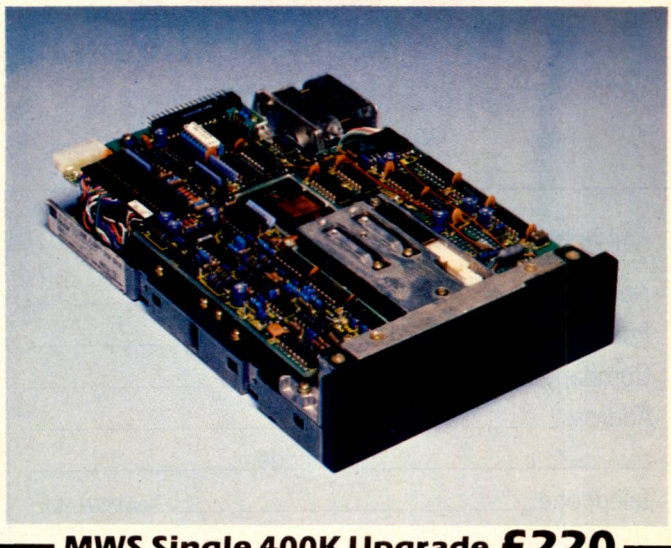

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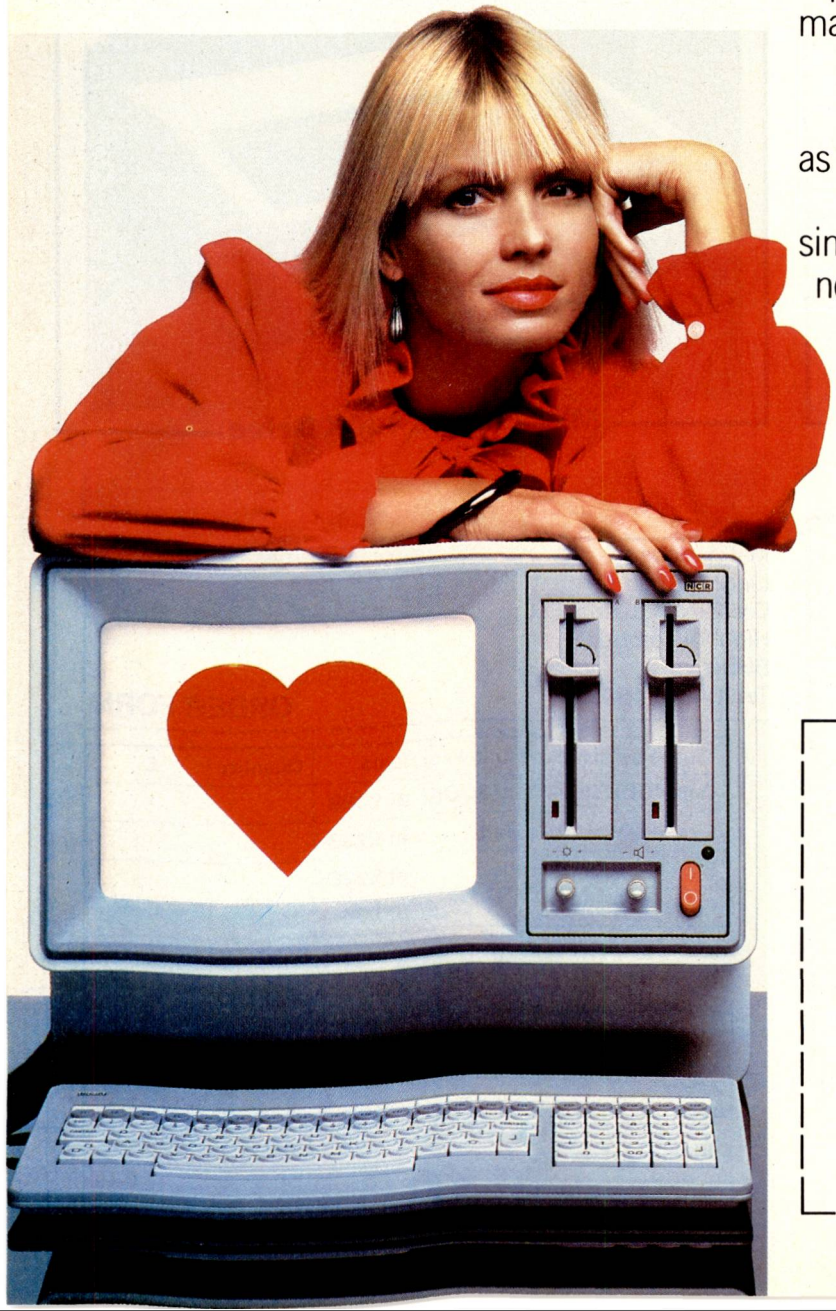

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	A	B	C	D
1	Expenses	UK	US	Tot
2	Salaries			0
3	Travel			0
4	Rent			0
5	Utilities			0
6	Other			0
7	Total	0	0	0
8				
9				
10				
11				
12				
13				

Fig 5. Total expenses model

information from these two models into one total expenses model. Presumably, the models are rather more complicated than those given in Figs 3-5, and you wish to save yourself a lot of tedious retyping.

Having set up the three models, the task is to get the total expense information for each country placed into the appropriate column and used in the calculations for the total expenses model. The following sequence of operations will achieve this (an explanation of each command is given):

/LEXPUK	Load the UK expenses model . . .
PF8:F12	. . . but only part of it (F8 to F12) and
B8,V	place only the values, not the formulae at B8.
/LEXPUS	Load the US expenses model . . .
PF8:F12	. . . but only part of it (F8 to F12) and
C8,V	place only the values, not the formulae at C8.
/LEXPTOT	Load the total expenses model . . .
A	. . . all of it
/ODALL,P	and do a printout (see Fig 6).

It should be fairly obvious that this is a complex sequence of keystrokes and it's easy to make a slip-up somewhere along the way, forcing us to start again from scratch . . . Potentially, we can consolidate many more than two models, but this would mean even more work at the keyboard and even more chance of a mistake. So, enter the 'execute' command.

	A	B	C	D
1	Expenses	UK	US	Tot
2	Salaries	331	662	993
3	Travel	1986	993	2979
4	Rent	1324	1324	2648
5	Utilities	2317	1655	3972
6	Other	2979	1986	4965
7	Total	8937	6620	15557
8				
9				
10				
11				
12				
13				

Fig 6. Total expenses after consolidation

The execute command accepts a filename and then reads and acts upon it as if it were being typed at the keyboard. It's only necessary to set up this command sequence once, and thereafter use the execute command to run it.

Unfortunately, PeachCalc does not provide a facility for setting up this execute file, but, not surprisingly, recommends that you use Peachtext to do so. However, any editor or word-processor can do the job, including the crude text editors supplied free with CP/M, MS-DOS or whatever.

The execute facility can be used in many other circumstances — for example, when an expert sets up a turn-key application for use by novices. With judicious use of 'protect', the execute command can control virtually the whole operation, and the novice can safely work with quite a complex system in total ignorance of what's happening underneath!

Conclusion

PeachCalc is a very solid and robust system, providing all the standard facilities expected of a spreadsheet and a handful of surprises too. At £95, it's extremely good value for money, putting it pricewise in the PlannerCalc class (see *PCW,* May 83), but it is far superior to PlannerCalc and stands up well alongside spreadsheets at any price.

The documentation is very good — so good that it may be doing Peachtree's training department a disservice. However, the complete novice could do well to take a day's training — the combined price of software and course is only £120 + VAT, which is less than many spreadsheet systems with no training.

At the time of writing there was no graphics facility available, although Peachtree's Business Graphics package is due for release shortly and will operate with PeachCalc.

Thanks to Digitus Ltd for the use of an IBM PC. END

Spreadsheet evaluation

!!!	= Excellent
!!	= Good
!	= Passable
?	= Poor
??	= Bad

Checklist

Documentation: 160+ pages, contents, tutorial lessons, reference, index. Also context-sensitive help screens.
Arithmetic facilities: +, −, *, /, logic, max, min, average, sum, trig, logs, lookup, net present value and more.
Installation: PC version preconfigured. Installation program provided for other versions.
Other facilities: spreadsheet overlays, execute commands from file, consolidation, flexible display commands, protected cells, formula printout and editing, automatic/manual recalculations.

Benchmarks & contacts

These tests were run on an IBM PC with a massive 576k of RAM. Available space for the spreadsheet amounted to 478k. On a typical CP/M system only about 30k is available for the spreadsheet.
Spreadsheet size: 63 columns wide by 255 rows.
Numeric precision: 16 digits
Max column width: 756 characters.
(The Benchmark tests are described in Which Spreadsheet?, PCW, Dec 1983)
Benchmark 1(a) Max rows accommodated: 892.
1 (b) & (c) Recalculation time: 490 seconds (1.8 rows per second).
1(d) Vertical scrolling speed 0.5 rows per second. Horizontal scrolling speed 0.5 columns per second.
2 Max rows of text accommodated: 1230
3 Max rows of numbers accommodated: 1230
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Spectravideo

With software standardisation currently being a moot point in the computer industry, the implementation of the much discussed MSX system on the Spectravideo home computer could change the face of things to come. Tony Hetherington looks over the machine and pontificates on its worldwide repercussions.



Photographs by John Mason

The Spectravideo home computer is the first MSX machine to reach these shores. It represents a truly international venture since it was designed at the Spectravideo head office in New York, uses MSX Basic written by Microsoft in Japan and is built by Spectravideo in Hong Kong.

There are two different models available: the SV-318 which features a built-in joystick and the more expensive SV-328 which offers 80k of RAM and a full-size keyboard. In their simplest form they are powerful home computers offering suberb sound and graphics facilities. However, the machines can be expanded into disk systems using the industry standard CP/M operating system.

Hardware

The Spectravideo computer is housed in a white, plastic case which measures 15.5in × 8.7in and slopes from a height of 3in at the back to 1.7in at the front.

The top of the machine is dominated by the keyboard which fills about two thirds of the space with the rest consisting of a raised section housing a cartridge slot. Along the rear of the case is the video output port, the cassette port and an expansion port designed to accept the Super Expander (more

about this later). The nine volt power input is on the right hand side along with an on/off switch and two joystick ports.

The Spectravideo is connected to a standard television set by a generous 5ft cable travelling via an external TV modulator to a video switch box. The power is supplied by a heavy duty unit which supplies nine volts at 1.5 amps, which is sufficient to drive the computer, a cassette recorder and one other peripheral.

The SV-318's keyboard consists of 71 rubber keys and a built-in joystick. The keys are well spaced out which makes them easy to use and a great improvement on the other rubber-keyed computers currently on the market. This ease of use is enhanced by the inclusion of a space bar and two shift keys.

In addition to the standard keys found on a machine in this price bracket are five function keys, three program control keys and six miscellaneous keys.

Each of the five function keys can execute one of two functions depending on whether or not the Shift key is pressed. The functions to be executed are displayed at the bottom of the screen display. All are user-definable but the keys are preset to functions such as RUN, LIST and CLOAD.

The three program control keys are: ENTER; STOP to halt a program; and the CONTROL key which facilitates the CTRL commands (for example, CRTL-S).

Finally, the other keys are: CAPS LOCK, complete with a red LED, CLS/HOME, which clears the screen and returns the cursor to the home position; INSERT and DELETE for program editing; and LEFT and RIGHT GRAPHIC. These last two keys are used to select either of the two graphics characters printed above each of the alphabetic keys.

To the right of the keys is the built-in joystick. This is only a four direction stick and is used mainly for editing. The stick itself is inserted into a grey circular pad which can be used more easily without the stick in place.

The SV-328 differs from its cheaper brother in its amount of memory and in the quality of its keyboard. It boasts a full-size, 86-key, typewriter-style keyboard with the SV-318's joystick being replaced by a numeric keypad complete with arithmetic and cursor keys.

Early sales literature from Spectravideo claimed that the SV-328 had a built-in word processor and HELP programs. These were, however, discarded in favour of full MSX status but have left their mark in some now useless keys. The SV-328 has an unresponsive PRINT key and both machines have a select key which has no apparent use.

The size of the top of the keys on the SV-328 is the same as SV-318's rubber keys, but since the plastic keys taper out, the keyboard of the SV-328 seems to be rather cramped. Also there is no room to show the available graphics characters.

The inside of the machines is definitely a 'no go' area since it is encased in a metal box, held in position by several screws which are in turn sealed by dollops of red plastic.

Cassette player

The cassette player is a dedicated recorder which connects to the back of the computer via a cable which houses power, audio, digital and motor control lines.

The player itself is a rather ugly looking machine. Its straight front and angled sides give it a distorted appearance and the dull brown keys and cassette cover do nothing to improve this image. However, this doesn't stop it being a very good cassette player which is just as well since it's the only recorder you can use with the Spectravideo.

As it's a dedicated recorder it doesn't require any tone or volume controls and therefore avoids the loading problems which plague other home micros. It is under full computer control which is ideal for tutorial style programs as is the facility of a parallel audio track. This can be recorded using the built-in microphone, and play back relevant instructions as a program is loading in.

I generally don't like dedicated cassette players since they add to the expense of buying a micro, but this is quite a good one, and, as I said earlier, it's the only game in town.

Super Expander

Should you wish to expand your Spectravideo computer then you will undoubtedly need the Super Expander. The Expander can be used with both the SV-318 and the SV-328 and it plugs into the large expansion slot at the rear of the machine.

It's slightly larger than the Spectravideo itself but sits neatly behind the computer. Constructed out of the same sturdy, white plastic and consisting of



The SV-328 boasts a full-size, 86-key, typewriter-style keyboard



The SV-318 keyboard consists of 71 rubber keys and a built-in joystick

two symmetrical halves, the top half is easily removed to allow access to the insides. It has its own power supply — sufficient to drive up to seven devices — which occupies the right-hand third of the internal space.

Next to the power assembly are seven expansion slots. These are numbered 0 to 6, with slot 6 being reserved for a floppy disk controller.

To the left of these slots is an area designed to store the TV modulator and any excess aerial lead. The lead is fed in through a hole in the front and out via a slot in the back panel. This is particularly convenient since the top of the Expander is strong enough to support a 15in television.

There are seven other slots cut out of the back panel for any other cables or wires from cards plugged into the expansion slots. Corresponding holes in the front panel are created by removing clipped on plastic panels which can be replaced should the cartridges be rearranged. The front of the cartridge is visible through this opening for ease of use.

Expansion cartridges

Four expansion cartridges were available for review: the floppy disk controller, 16k and 64k memory expansions and a Centronics interface.

Each of the cartridges is enclosed in a standard dark grey case, the bottom of which has a section removed so that the cartridge can be plugged into an expansion slot. The top and front panels have an identifying label. The front panel has an additional LED to show that all is well. The back of the case is open which spoils its appearance since the enclosed electronic card extends out of the back of the case. This, however, allows easy access to any ports or interfaces for connections to peripherals.

The floppy disk controller has two of these ports since it can support two floppy disk drives. The Centronics interface has a printer port but since no Spectravideo printer was available for review, this wasn't tested.

The 16k and 64k RAM cartridges can be used to extend the computer's memory up to 128k. This is beyond the addressable memory supported by the Z80 processor and therefore a system of banked switching must be employed. This is done manually by the setting of dip switches on the front of the 64k cartridges.

Floppy disk drive

The hardware available for review is completed by the inclusion of the floppy disk drive. This plugs into the floppy disk controller via a ribbon cable through which it draws its power and transmits and receives data.

The disk drive uses standard 5¼in single-sided, double-density disks and has a formatted capacity of about 164k.

The drive is quite noisy but this is excusable in a machine in this price bracket.

Up to two drives can be included to form a powerful CP/M-based system capable of many serious applications.

The expandability of the Spectravideo computer extends beyond the hardware supplied for review. Other products include a games adaptor to run Coleco games, a dot-matrix printer, a graphics tablet, an RS232 interface, an 80-column card and a modem.

System Software

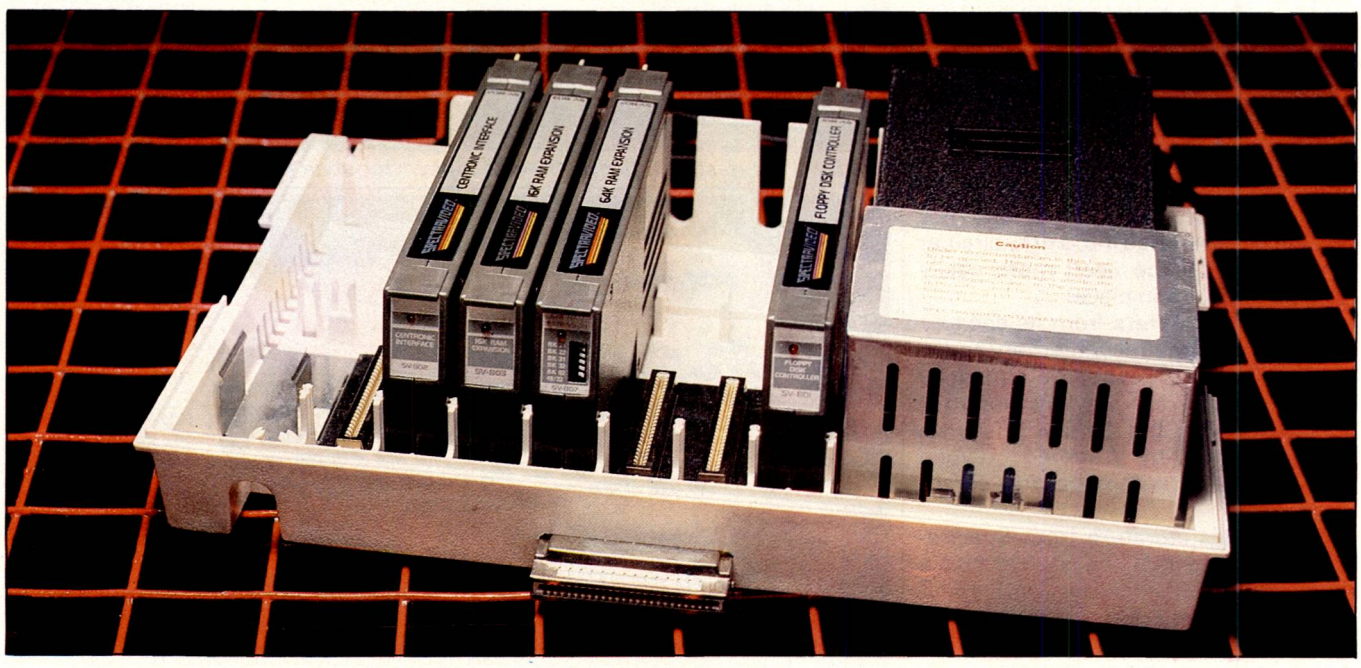
When you switch on the Spectravideo the logo is displayed in three colours as the machine performs a diagnostic check. Once completed the screen reverts to its standard display of white text on a light blue background and reports the number of memory bytes free.

The SV-318 has 32k of RAM, although 16k of this is used for the graphics display. A further 3k is used with other system overheads leaving just under 13k for the user.

The SV-328 has just over 29k of user memory displayed but more is actually available. This is because the SV-328 has 80k which is beyond the addressable capacity of the Z80 processor. Therefore memory bank switching has been used so only 48k is in the machine at any time.

MSX Basic written by Microsoft is the operating language used and the facilities described here will be present in any MSX machine.

Writing your own programs is easy with MSX since it includes some features to ease the programmer's burden. AUTO automatically generates line numbers and RENUM renumbers a finished program. The Spectravideo features a full screen editor which dramatically speeds up editing and correction of errors. Simply position the cursor over the error using the cursor keys or the joystick and correct the mistake.



The Super Expander can be used with both the SV-318 and SV-328 and plugs in at the rear of the machine

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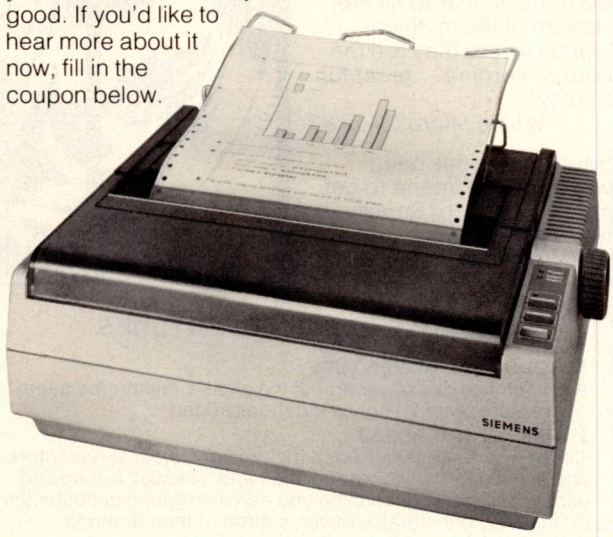
As we said, the PT88 is easy on the ears and what you do hear will be very good. If you'd like to hear more about it now, fill in the coupon below.



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LEVEL 9 COMPUTING

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Please describe your Computer

The preset functions are set to aid the programmer and include RUN and LIST options, even LIST — to list the last line entered — and a colour function to reset the colours to their original setting.

MSX Basic includes most of the usual program structures but there are one or two curious omissions. The oddest of all is the exclusion of the WHILE-WEND structure since the Spectravideo's manual includes two error messages for this structure.

The error messages, should they occur in your programs, are typed out in full on the screen which is a great improvement on Microsoft Basic.

MSX includes a number of very useful interrupt control commands which can be used to great effect in programs. The most common of these is the ON ERROR GOSUB command which defines the subroutine to be executed should an error be detected. The others have a similar format and include ON INTERVAL which defines a routine which will be executed at set time intervals. ON KEY directs control to one of several destinations depending on which function key is pressed, ON STOP executes a routine when a program is halted by a user and ON SPRITE can be used to resolve collisions between sprites (for example, objects in a game). Finally ON STRIG calls a routine depending on the direction of a joystick.

Each of these interrupt commands can be turned on or off or reset after it has been triggered. Triggering these commands is automatic once they have been initiated and requires no further Basic commands. This will obviously speed up program execution since no Basic statements need be interpreted.

Arithmetically, the Spectravideo is extremely accurate as variables are automatically set to double precision. The price for this accuracy is loss of speed.

The Spectravideo supports a superb range of graphics commands. A single command performs a whole series of operations. For example, the command LINE(10,10)-(100,30),,bf draws a rectangle between the two points specified and then fills it in. The coordinates in the example refer to the high resolution graphics screen which consists of 192 × 256 pixels. Each of these pixels can be PSET (set) or PRESET (reset) in any of the sixteen colours.

When the computer is switched on the screen resolution is in low resolution mode (40 × 24) in which only the block graphics characters can be selected using the left and right graphics keys. The SCREEN command is used to switch between screen modes.

Other advanced graphics facilities which you would normally expect to find in an extended Basic cartridge include: the CIRCLE command which can draw circles and ellipses; PAINT which fills in a graphics shape in a specified colour; GET which stores a specified area of the screen in an array for printing anywhere on the screen using PUT.

The Spectravideo also supports up to 32 sprites at any one time. These sprites can be of two sizes: 8 × 8 or 16 × 16 pixels. The size to be used is selected as a field in the SCREEN statement.

Creation of sprites on the Spectravideo is a lot easier than on other machines, such as the Commodore 64 where details of the sprites' design must be entered into the computer using a series of POKEs. To define a sprite on the Spectravideo all you need do is use the SPRITE command which assigns a sprite with the pattern held in a string of characters that can be easily created through READ and DATA statements.

The Spectravideo also possesses two Macro languages: a graphics macro language (GML); and a music macro language (MML). These are separate mini-languages existing with Basic.

The GML can be regarded as a graphics language similar in nature to Logo's turtle graphics. It consists of a series of single letter commands which are incorporated into the Basic command DRAW. These commands are directions given to a cursor that draws a line on the screen. Each command is followed by a number to complete the instruction. For example, U10 tells the cursor to go up 10 pixels. Other commands include: E,F,G and H to move diagonally; B, to move without leaving a line; A to set an angle; and C to set the colour of line drawn.

MML is similar to GML and provides the Spectravideo's sound capabilities. Quite simply the sequence of notes you wish to play is stored in a string and performed using the PLAY command. The command PLAY"CEG" would play the notes C, E and G. These basic notes can be tuned and modified by additional commands which include O to set the octave, T and L to determine the tempo and length of a note and S and M to control the shape and tone.

Up to three strings can be included in a PLAY command, separated by commas to set the notes to be played by each of the three sound channels.

The sound is generated by a separate chip which means that music can be produced without slowing down execution time.

This separate sound processor probably explains the difficulties I had in tuning in a television to use with the machine. I found it almost impossible to tune it so that the picture was sharp and the sound still audible. Eventually I was able to reach a balance between sound and vision and had no further problems.

Supplied with the floppy disk controller are two disk-based operating systems, MSX disk Basic and CP/M 2.2.

To be honest I really can't see the point of this version of MSX Basic. It contains only a few additions to the ROM-based version for accessing disks. Besides, the Spectravideo also supports a modified version of CP/M 2.2 which will be more than adequate for the needs of most users.

It can be implemented on a reasonably priced system with the minimum requirement being one floppy disk. To cater for this the CP/M utilities have been rewritten with a 40-column screen display. Additional utilities have been added for the user with only one disk drive including 1COPY which will copy a disk using only one drive. A whole disk is copied in four passes with clear instructions telling when to swap the disks.

Other Software

Commercial software is available for the Spectravideo in three different mediums: tape, cartridge and disk.

The cartridges are enclosed in dark grey cases which extend past the connecting port on three of the four sides. This guides the cartridge into the slot on the top of the machine. The cartridges fit firmly into their slots without being difficult to use by a child.

The cassette tapes are of high quality although any computer tape can be used to save your own programs.

Both the cassette and cartridge programs are supplied in attractive boxes complete with full instructions.

Four programs were available for review: three games, or rather entertainment programs, entitled Crossforce, Armour Assault and Frantic Freddy, and one Basic tutorial program.

Crossforce is a blast-the-aliens type of game and is a mirrored version of Galaxians. Mirrored, because you control two laser bases, one at the bottom and the other at the top of the screen. The object is to catch the attacking aliens in crossfire between the two laser bases. There are three different ways of controlling the bases, parallel where they move together, diagonal where they move in opposite directions and dual control in which two players can play — each controlling a base.

Armour Assault is a variation of the old tank battle game but it has been

HISOFT PASCAL DEVPAC

Quality ZX SPECTRUM* Software

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". . .I haven't seen any other compiler that could match Hisoft's Pascal" . . . *Using the Spectrum Micro – Autumn 1983*
"This is a very impressive product . . . of benefit to any Spectrum programmer . . ." *David Bolton ZX COMPUTING Aug/Sept 1983*

Just two comments from full length reviews of our powerful and virtually full implementation of Standard Pascal. The advantages of using Pascal are well-known — fast, self-doumenting, and above all, structured programs and now, with Hisoft Pascal, you can reap all these benefits on a wide range of home computers, including the 48K Sinclair Spectrum! Hisoft Pascal produces programs that run typically 40 times faster than equivalent ZX BASIC programs and, sometimes, up to 1,000 times faster!

Hisoft Pascal supports FOR . . . DO, WHILE . . . DO, REPEAT . . . UNTIL, CASE . . . OF, INTEGERs, REALs, CHARacters, RECORDs, POINTERs, SETs, ARRAYs etc. etc. — it is not a Tiny Pascal but a virtually full implementation of the language allowing the user to develop true high-level language skills while attaining execution speed close to that of machine code. Complete with a 70-page manual.
Hisoft Pascal is also available in a variety of disk formats, including sequential FILE handling.

HISOFT DEVPAC 3

". . . DEVPAC is most highly recommended. The documentation is first class." *Your Computer May 1983*
". . . if you write programs in machine code, buy DEVPAC – it is the best currently on the market." Adam Denning, ZX SOFT in Which Micro September 1983

Two comments from reviews of earlier versions of DEVPAC — **now** we have DEVPAC 3 available: a powerful Z80 assembler with conditional assembly, assembly from tape (to enable generation of very large code files), ORG, EQU, DEFB, DEFS, DEFW, DEFM, labels of any length — in fact all you need for fast (3,000 lines per minute) and powerful assembly programming. But it doesn't stop there: DEVPAC 3 also includes an incredible debugger/dis-assembler giving you a 'front panel' display of the Z80 system and allowing extensive debugging of your machine-code program, including single-stepping programs **EVEN IN ROM!!** Open up the secrets of low-level programming with DEVPAC 3.

Prices:

Hisoft Pascal 4T (ZX SPECTRUM) £25 inclusive
(NewBrain, SHARP MZ700 etc) £35 plus VAT
Hisoft Pascal 4D, many disk formats £46 inc.

Hisoft DEVPAC 3 (ZX SPECTRUM) £14 inclusive
(NewBrain £25 inclusive

★★★**STOP PRESS**★★★ Hisoft Pascal for the SPECTRUM now comes complete with a Turtle Graphics package allowing fast and easy production of complex graphic displays
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Tel: (0296) 668995



**and others*

brought up to date to form an enjoyable two player game. Eight different variations of the game exist, each different from the others in fuel, ammunition and tanks available to the players. Some options include hospitals to repair tanks and depots where you can refuel and rearm. Others include ghost tanks that try and destroy you.

Frantic Freddy is a rather curious game where you control the fearless fireman Freddy as he trys to put out a blazing building. According to the cover of the instruction book our hero Freddy looks like a hotdog sausage wearing boots, and with a funnel for a nose. Through this funnel Freddy squirts water to extinguish a normal orange window fire but six to put out a purple fire that chases and tries to corner him. Freddy must also dodge flame particles or he will lose a life. The same fate awaits him should he fail to catch a cat as it tries to jump to safety.

All the games reviewed are controlled by joysticks, either plugged into joystick ports or built into the SV-318.

Benchmarks

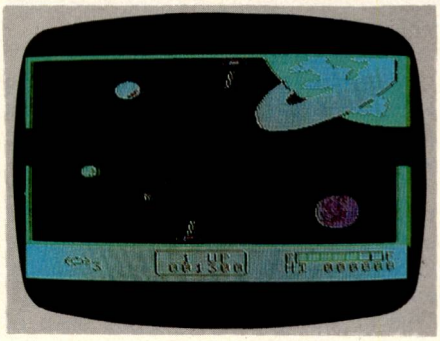
BM1	2.3
BM2	5.7
BM3	18.2
BM4	20.0
BM5	20.9
BM6	32.8
BM7	45.1
BM8	235.7

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

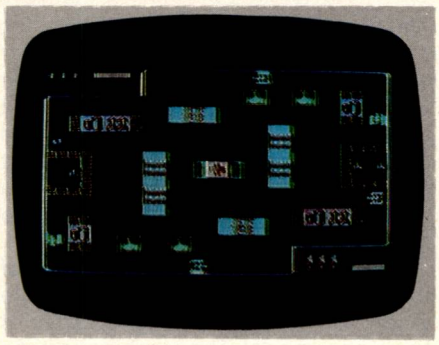
The cursor keys of the SV-328 can be used but this makes the games even harder than they already are.

The tutorial tape is billed as an introduction to programming in Basic and consists of a tape and a booklet. The idea is that the user can read through the booklet while working through examples on the tape. The examples given are interesting as is the explanatory text; however, it is dogged with errors. These are particularly bad since the package is designed for the beginner who will be confused by the mistakes. For example, having explained the difference between the Commands SCREEN 1 and SCREEN 2 the text refers to SCREEN + which is obviously wrong to all but a beginner.

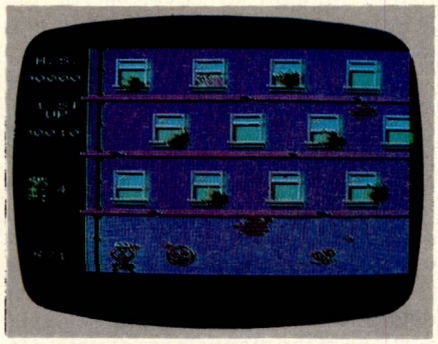
At the time of writing the software available to users of the Spectravideo machines is limited. However, this situation will gradually improve for three reasons. Firstly, Spectravideo will undoubtedly increase its own range of programs. Secondly, the incredible array of CP/M packages will be converted for Spectravideo use. Finally programs written for other MSX machines will run on the Spectravideo.



Crossforce



Armour Assault



Frantic Freddy

MSX — What is it?

The MSX system was proposed by Microsoft in Japan in an attempt to bring the standardisation of the record industry to the computer market. Such a system of standardisation is being welcomed by manufacturers, software houses and shops since they will all benefit from it.

Manufacturers of hardware, particularly of add on peripherals, will be able to produce goods for more than one machine at a time resulting in massive savings on research and production costs. Similar savings will be enjoyed by software houses with the additional benefit of a longer shelf life for their programs, since it is less likely that the machine for which they write will be superseded.

Invariably shops have serious shelf space problems since each computer needs a separate software display. MSX will solve this by requiring only one display for all machines.

MSX plans to achieve this standardisation by having at the centre of all computers Microsoft Extended Basic running in a machine using a Z80 processor and featuring 16 colours and three sound channels. Since they will all have this standard format the software they use will be available for other MSX machines.

There are at present fifteen companies supporting MSX with Spectravideo being the only non-Japanese member. A full list of these is given below: it reads like a directory of Japanese electrical companies.

MSX is open to any company which wishes to join the scheme and is prepared to pay the admission fee. This may become an attractive package to companies thinking about entering the computer market since the computer design, particularly Basic, has been done for them.

This may be good for such companies but is it good for the computer market? Such standardising may seriously restrict developments and stagnate the industry as a consequence. Microsoft claims, however, that this will not happen since MSX is a very loose system allowing room for development. But the question is: Will these developments be compatible with other MSX machines? I think not. I have seen literature written in Japanese claiming that the Sanyo MSX machine will be able to grab and store television pictures but the software required to run this probably won't work on a Spectravideo.

One final thought on MSX is: If there are many machines using the same software then software copying might become an even bigger problem than it is already. This is because copying will be possible where it is now impossible due to machine incompatibility.

Companies supporting MSX

Canon	NEC
Fujitsu	Sony
General	Pioneer
Hitachi	Sanyo
JVC	Spectravideo
Kyocera	Toshiba
Matsushita	Yamaha
Mitsubishi	

Documentation

At first sight the documentation for the Spectravideo seems plentiful and adequate. In fact there seems to be too much of it — even the RAM packs come complete with their own user manuals.

The manual which accompanies the computer itself is a 3-holed ring binder containing a loose leaf manual and a quick reference booklet. It is pleasantly organised, complete with separator cards between chapters which allow easy access to the information. Unfortunately the manual wants to keep the machine's secrets safe from the prying user which it does by ploys such as example programs that don't work, directions to tables that don't exist and, as mentioned earlier, error messages for program structures that aren't supported.

Small chapters may make the manual easy to read but they are inadequate for teaching Basic. Eighteen pages is hardly enough to cover all of the Spectravideo's excellent sound and graphic capabilities.

By far the best manual included in the review package was the CP/M manual which was mostly written by Digital Research. The section referring to features converted or specially written for the Spectravideo is concise and easy to understand. The more advanced features of CP/M will no doubt remain a mystery to all but the most determined user since the relevant sections of the manuals are daunting to the beginner.

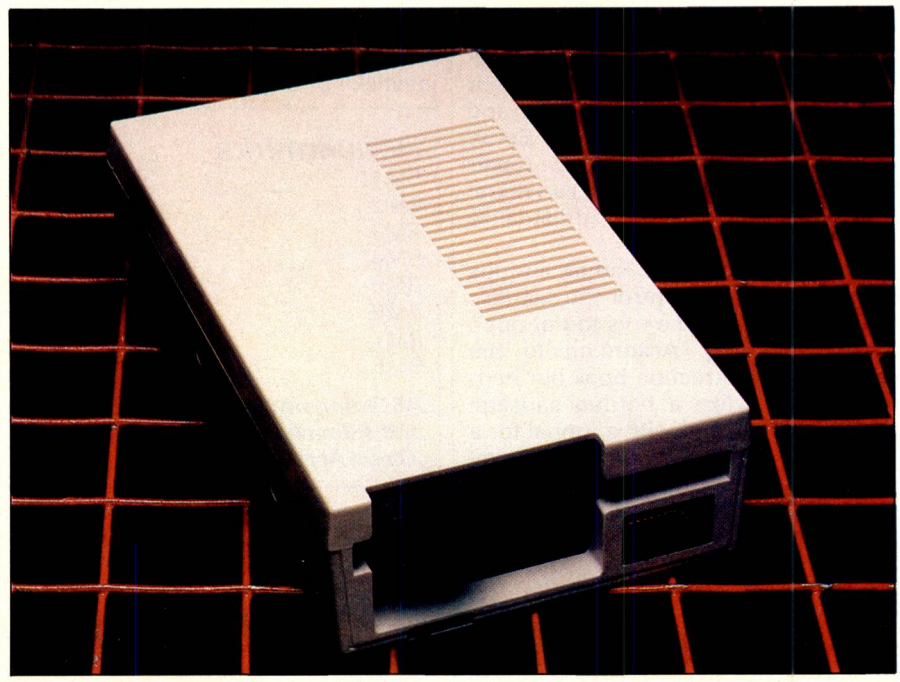
Prices

	£
Spectravideo 318 including power supply leads and manuals	173
Spectravideo 328	239
Super Expander	99
Disk drive controller and CP/M 2.2 and MSX Disc Basic	66
5¼in floppy disk drive	199
Cassette unit	39
16k RAM cartridge	29
64k RAM cartridge	89
Cassette programs	5.90
Cartridge programs	16

Conclusions

Since the Spectravideo is the first MSX computer to reach the UK, my assessment of the machine is at two levels: as a machine in its own right and as the pioneering MSX micro.

The Spectravideo is priced to be in direct competition with the Commodore 64 and the BBC Micro. It costs too much to be a serious threat to the cheaper Spectrum and Oric end of the market. For the money it offers good value — bearing in mind its advanced sound and graphic capabilities. In fact these facilities are more often found in an advanced Basic cartridge costing up to £30.



The disk drive uses standard 5¼in single-sided, double density disks

The difference between the cost of the SV-318 and the SV-328 is negligible when you consider the advantages of the bigger model. The combination of a full-size keyboard and 80k of memory will be irresistible to most people.

The Spectravideo is an incredibly easy machine to write programs for as it seems to be designed for programmers. Indeed it is to this area of the market that it will particularly appeal. The consumer games players will no doubt wait until there is a lot more software available for it. This will improve with the arrival of more MSX machines.

As an advert for MSX the Spectravideo is ideal but the system itself may encounter one or two problems which I shall outline below.

I have reservations about the scope for future developments should MSX become the standard. And will such developments supersede the existing generation of MSX making it redundant and incompatible, so defeating the whole principle behind MSX?

To become accepted as the standard throughout the world, MSX will have to extend beyond one non-Japanese company and include such companies as Sinclair, Acorn and, of course, IBM. This is highly unlikely since each of these companies is trying to make its own dialect of Basic the industry standard. It is even less likely that Acorn will join MSX since the BBC Micro and the Electron use the 6502 processor as opposed to the MSX standard of Z80.

Clearly, MSX will not become the only system for home computers and I envisage a situation similar to the video recorder market where not one but three different systems (VHS, Betamax and Sony) compete for supremacy.

To summarise: MSX represents a road to the future but it won't be the only one.

END

Technical specifications

Processor	Z80 running at 3.6 MHz
Memory	32k ROM SV-318 — 32k RAM SV-328 — 80k RAM
Keyboard	SV-318 — 71 rubber keys, built-in joystick SV-328 — 86 key full-size keyboard
Display	40 × 24, high resolution 192 × 256 pixels, 16 colours
Sound	3 channel sound via television speaker
Operating systems	MSX Basic, MSX — DOS, CP/M 2.2

There's another thing our Printer can do faster than a Daisy Wheel

The Toshiba P1350 turns out immaculately printed documents and letters at about twice the speed of a daisy wheel.

Using a single-pass overlapping dot technique our P1350 Dot Matrix Printer produces high definition characters at the rate of 100 every second.

And there are two speeds to choose from. In its draft quality mode our machine prints even faster–192 characters per second at 10 characters per inch.

Software commands switch the Printer effortlessly between print modes and enable you to choose from three different character fonts.

But when the chips are down and you have to make your final choice of a printer to match the speed and accuracy of your computer system (needless to say it's compatible with your T100 or T300 system from Toshiba), there's another vital factor besides speed that gives you a definite edge.

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Add to this complete flexibility of paper handling systems–Friction Feed, Pin Feed Tractor or Auto Sheet Feeder – and you'll see why the Toshiba P1350 has already notched up a considerable number of successes – more than 7000 installations where the P1350 has proven its worth against hardware with some pretty hefty reputations and price tags to match.

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PRINT METHOD	Impact wire dot matrix
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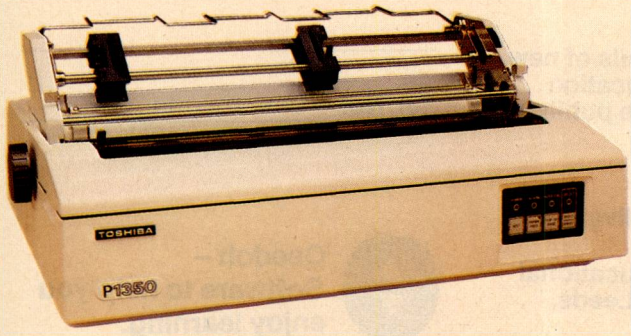
PRINT MODES	Letter Perfect quality: Average 100 CPS Draft quality: 160 CPS (12 CPI) 192 CPS Graphic mode
LINE LENGTHS	163 CPL (12 CPI) 136 CPL (10 CPI)
CHARACTER SET	96 ASCII character set (standard)
PAPER	From 5" to 15" wide. Single sheet (standard) or continuous forms (optional)
COPIES	Up to 4 parts, including original
PAPER FEED	Friction roller is standard. Options include pin feed tractor or automatic sheet feeder
RIBBON	Cartridge ribbon; black
OPERATING ENVIRONMENT	Temperature: 41 to 104°F (5 to 40°C) Humidity: 20 to 80% RH
POWER REQUIREMENT	AC 220 V, 240 V, 50 Hz
DIMENSIONS (WxHxD)	21.7" × 5.9" × 15" (550 × 150 × 380 mm)
WEIGHT	44 lbs (20 kg)
INTERFACE	Parallel interface (standard) or serial interface RS-232C (optional)



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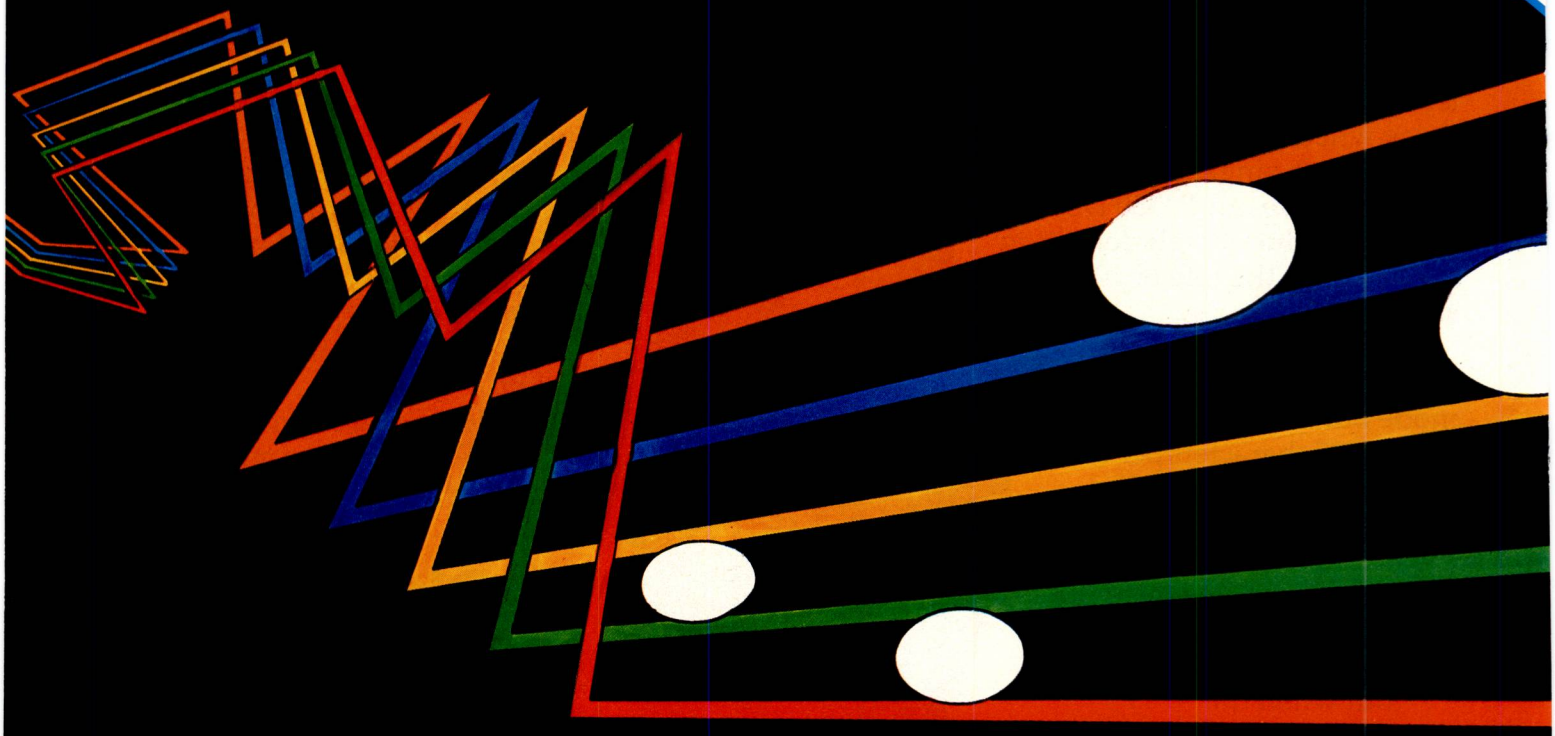

The Geedoh musical education software series has been developed by musicians in close collaboration with educational computing specialists. Each program in the series covers one or more aspects of musical practice by means of arcade game techniques. The full colour graphics and sounds are excellent. Available now are:

Music Reader
You have to identify a note which moves across the screen on a musical stave. Succeed and you go on to higher levels – fail and you lose one of your five lives. Level 1 is slow and fairly easy – but by level 9 you are reading music fluently.

Pitch Game
At level 1 you move Geedoh up a staircase to match another note. Success leads on to further levels covering fifths, thirds, fourths, seconds, sixths and sevenths. Fail and Geedoh loses a life – blown up by a hidden bomb.

All cassettes are well-packed and come with full instructions and a booklet explaining the relevant aspects of musical teaching.

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Pitch Game	☐	_____

Indicate computer you will use

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Sinclair Spectrum ☐

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ANSWERS



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

Olivetti interface

I own a NewBrain computer which I have been very pleased with for over a year, and recently I reached a stage where I wanted a printer for it. This was in March '83. At the same time my wife wanted to buy a typewriter. It seemed logical, therefore, to buy one that would interface with the computer, so we purchased an Olivetti Praxis 45D.

We were told that a serial interface was available for this machine. The information with the machine mentioned that an interface was available and Olivetti has since advertised it as being suited to computer printer use. When in April/May '83 we decided to buy the interface, however, we found it was unavailable.

Three local Olivetti dealers were unable to find out anything about the interface from Olivetti (and all told stories of poor service). After seeing an advertisement blatantly plugging the 45D and its non-existent interface I sent a letter of complaint to Olivetti. I also complained to the Office of Fair Trading.

I would therefore be very grateful if you, or any of your readers, could help before we are forced to trade-in for an alternative typewriter.

As far as I can make out the typewriter is open, having a 50 way edge connector on the side. Does this information give any clues?

I must thank you for your continued faith in the NewBrain. You are the only monthly that gives it any attention. Along with your sister weekly, *Personal Computer News*, you have saved me from switching to another (inferior — for my purposes) machine.
Brian Lockey, Stockport, Cheshire

The Olivetti RS232 interface for the Praxis is called the IM45S. It became available in December of last year, costs £150 and should be available from most Olivetti retail outlets. In case of difficulty, phone Olivetti on (0908) 311555.

A spokeswoman at Olivetti said that the company had not claimed the interface was available prior to its launch. For information on how to connect up the RS232 interface see Mr Weaver's letter.
Surya

?????

protection

As a London based American lawyer who deals with software copyright and licensing, I was interested in the first part of Surya's answer to R. Thomas's query regarding pertinent legislation (*PCW*, December '83). The statement that the situation was largely unsettled was correct but perhaps too brief.

Two international conventions provide copyright protection: the Berne convention Kathy Lang mentions in her January *PCW* article, and the Universal Copyright Convention. Britain is a signatory to both, the United States only to the latter.

My advice to clients seeking copyright protection has been to register programs in the United States where legislation specifically recognises the copyrightability of software. Copyright registration in the US should, in most cases, provide adequate protection in all other signatory countries, including Britain.
Richard A Carruthers, JD

?????

VIC 20 prompt

There is a much simpler solution to the problem of suppressing the '?' prompt to an INPUT on the VIC 20 than that given by Brian Grainger in your November column.

The VIC keyboard is designated as device 0. This can be utilised for I/O purposes, allowing the use of INPUT# which accepts data without the '?' prompt.

```
10 OPEN1,0
20 PRINT"HOW
   MUCH-£";:INPUT#1,A
30 PRINT:PRINT:PRINTA
40 CLOSE1
```

Alan Thomas, London SW18

?????

First purchase

I have been saving for my own computer for a few years and I now have £300. I am wondering which computer to buy — I would like a Commodore 64 or a VIC 20.

Could you give me some advice as to which computer would be best for me to purchase, bearing in mind that it will be my first computer and that I'm hoping to become a member of a computer club.

I am looking for one with ease of use and good graphics. Software is not a problem as my Mum and Dad have promised to help me out.

Games are not so important as I think a computer is for more than games, although I would like your opinion on the range of games available for the computers which you might suggest.
Andrew McLeod, Darlington

A few years ago, questions such as yours didn't exist because you simply bought the computer you could afford and did all you could with it. However, the market has dramatically changed and there are several machines within your price range. It is therefore impossible for me to glibly pick a single machine out of the air and recommend you spend your hard saved money on it.

Having said this, I'll give you some general pointers to help you make this decision.

You have already made the most important decisions you must make when choosing a micro, and they are how much you are prepared to spend on it and what you hope to use it for. Having decided what your ideal machine is, you must see which of the available machines most closely fits your requirements. This may be a lengthy process and involves reading reviews and Benchtests, and talking to anyone who will listen. A good source of information are our own Computer Towns. You should find a full list of these in this issue of *PCW*, but I'm afraid the nearest one to you is in South Shields.

When looking at a micro you should consider the following: how much memory is available for you to use and can it be expanded cheaply? This is important because the more memory you can use, the more information your computer can store, and therefore the more it can do

for you. Are its graphics adequate for your applications, and if so, will these graphics use up too much of your memory?

Take a close look at the manual that comes with the computer before you buy it to see if you can follow what it's trying to tell you. This is of vital importance, particularly if it's to be your first computer.

Finally, take a look at the range of software and hardware add-ons available for your machine, since your present needs and requirements may change. Unfortunately, you will probably find that your ideal machine doesn't exist, so you may have to compromise, or wait. It's generally better to compromise and buy one now, for if you decide to wait you may never find a machine to fit your specifications.

You specifically mention in your letter both the VIC and the Commodore 64. I would suggest the 64 as a better buy for you because of the additional memory. However, both the VIC and the 64 have an unfriendly dialect of Basic, particularly the graphics commands, which may make another machine a better choice.

You can find full details of the other machines in your price range in the In Store section of this issue.

Tony Hetherington

?????

Prompt change

With reference to Martyn Adams' letter in Computer Answers, *PCW*, November, I would like to inform him of a technique for changing the prompt on the VIC 20 that I've been using for a while. If location 19 is set to 1 prior to the input statement then the '?' prompt disappears. However, this location must be restored back to zero after the input statement, otherwise a crash may happen later in the program. To replace the '?' prompt with a £ sign the following may be used:

```
100 POKE
19,1:INPUT"HOW MUCH
      £";A:POKE19,0
```

WR Ord, Whickham, Tyne & Wear

?????

Software protection

This problem may be of interest to readers who have written software which they think is good enough to sell.

I have a software protection system for the BBC Electron that is virtually unbeatable (that is, a 1:10^21 chance of getting the correct code). I understand it's only possible to take out a patent on a method of manufacture — I don't think copyright covers ideas.

Could you give some advice on what to do with ideas like this? How should software houses be approached on selling the idea? They will probably want evidence that it works, but in this case the idea is so simple that almost anyone could spot it.

Ken Booth, Broadstone, Dorset

You could try offering your software protection method to software houses, but you will have to reveal exactly how it works if you expect anyone to buy it. If you feel the method is valuable, then you could get a solicitor to draw up a contract for you prior to offering it to anyone, but I feel you may well be disappointed. No protection method is impossible to beat, and any method which is obvious once the method is known is doomed to failure: if one person can discover it, so can others. And a lot of people have in-depth knowledge of the BBC MOS.

Your method sounds from your letter as if it's based on some kind of key which must be correctly entered. If I were trying to break into a key-protected program, I wouldn't waste time attempting to crack the key — as you say, the odds are too great. I'd work on bypassing the key.

Copyright covers a 'physical device' or a design for same. It could be argued that since a computer program physically creates a circuit in the computer's RAM, the circuit design and hence the program which creates it is covered by the copyright laws. Whether anyone will succeed in explaining the subtleties of this argument to a judge remains to be seen.

Surya

?????

Upper case

I have a simple Basic program for inserting machine code in HEX into a RESERVEd area. At the start of the program:—

```
10 DIM b$(15)
20 For I = 0 to 15
30 Read b$(I)
40 Next I
50 DATA
0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F
```

Later in the program keyboard input is obtained thus:—

```
300 Get # 6, a$
320 For I = 0 to 15
330 If b$(I) = a$ then . . .
```

and hex input is recognised.

The program works well and I'm happy with it. However, trying to avoid having to press 'SHIFT' for A-F, I used CONTROL/1 before running to speed entry. I was surprised to find that the loop does not recognise upper case, leaving blanks every time A-F is typed. Similarly, POKEing 43D, 145D does not recognise A-F.

Therefore, it appears there is a difference between the upper case when obtained from the SHIFT key and when CONTROL/1 or POKE43D, 145D, (Bit 7 SET?), is used.

It will be much appreciated if you can elucidate this mystery.

C E Williams, Cockermouth, Cumbria

The answer is straightforward. When you open stream 6 as keyboard input, the stream gets lower case, whatever you type. If you want to get upper case, then you must set the stream by adding a 'PUT#6,1' instruction immediately after you open the input stream.

Tony Armitstead

?????

PET club choice

I have to program a CBM PET 400 as part of my job, and I already have Raeto West's excellent book. Can you advise me, please, if there are any magazines/journals/newsletters/clubs dealing with the CBM PET? I tried writing to CBM, but they sent me a sales catalogue.

Dave Wilkinson, Edinburgh

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UK PET user club is at:
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These clubs should be able to help.

Peter Bright END

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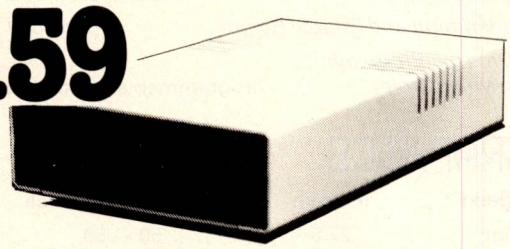

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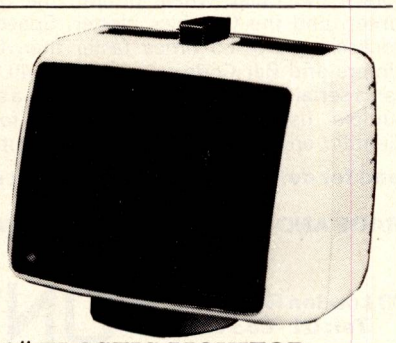

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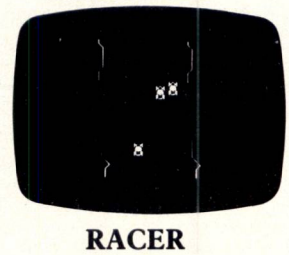

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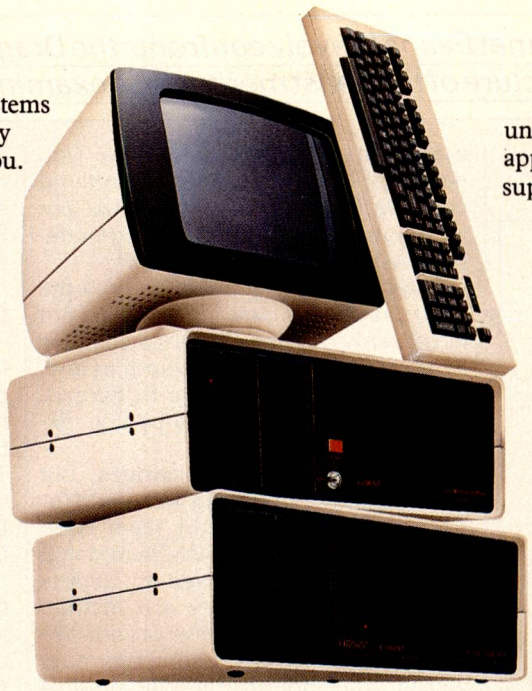

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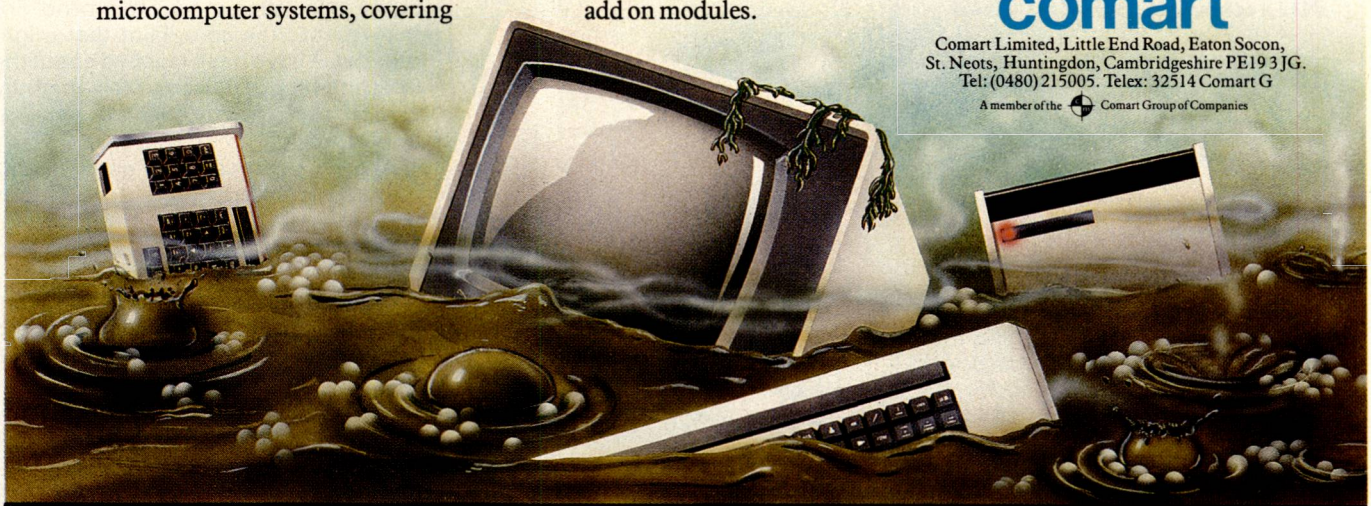

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BIBLIOFILE

This month Linnet Evans bravely confronts the Dragon and finds the structure of the beast merits close examination.

The Dragon Trainer



Subtitled 'A Handbook for Beginners', *The Dragon Trainer* is exactly that. Brian Lloyd assumes a raw readership, fingers still unburned by the beastie, and takes them by degrees (Fahrenheit, methinks) through everything you need to know. Virtually everything could be smoked out of the manual, but with Sunshine's dedicated Dragon department, who needs manuals?

Lloyd's guidance, particularly in the early chapters, is clear and calm but not necessarily concise. There's a sensible level of worked/working examples and, later on, the usual plunge to gargantuan listings with a line-by-line explanation.

The simplicity has its virtues, but more reference to the big bad world (or even the manual) might have been kinder in the long term. We're told that IF and OR can't be used to denote variables 'because they are instructions'. This is true, but why not add: 'We sometimes call them reserved or buzz words.' And, though IF and OR may live forever, there isn't even a token warning of the peculiarities of Dragon Basic overall. PUT and GET, used here for manipulating screen displays are, in most higher dialects, used for data file handling.

Quite some time is spent on sound and colour graphics generally, with one or two dodges on offer but not so much detail and illustration. The treatment of PLAY, for example, is little more than a run-down of controlling parameters. A small puff of smoke back to the manual (or some other source) could help continue the support of the early pages.

Mathematical and other dodgy functions (the forgotten DEF FN is one) get distinctly ambivalent treatment. Similarly, the various glossaries and indexes in the latter part of the book could have been considerably strengthened by cross-reference or amalgamation. The reader is offered the odd half of lager and lime by way of experiment, but Mr Lloyd firmly douses his own Dragon in perpetual Perrier water.

The Dragon Trainer, while a useful book in some ways, isn't the most fervent in its class. Compared to some of the material on the market, its *bona fide* protectionism is perhaps too clouded at the edges for all but the most lounging lizards . . .

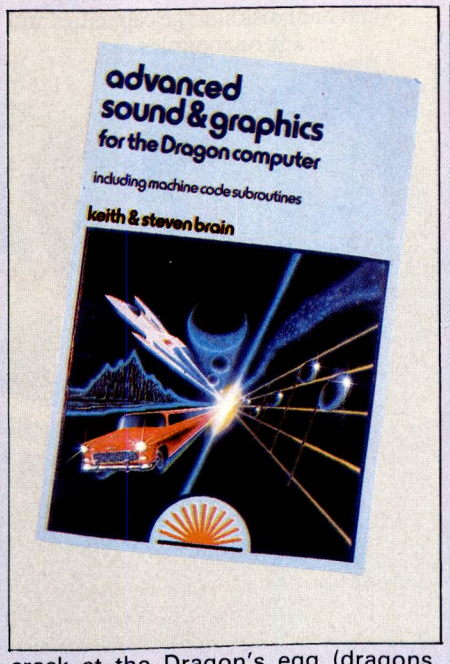
Anyway, a free fire bucket of sand to anyone who can outsit Barbara Woodhouse on the training of dragons.

The Dragon Trainer
Author: Brian Lloyd
Publisher: Sunshine Books
Price: £5.95

Advanced sound and graphics for the Dragon computer

The father and son team of Keith & Steven Brain are to the Dragon what Tim Hartnell was to Sinclair: big brothers and easy writers. I don't wish to labour the point, but if *The Dragon Trainer* was a ground-floor affair, then *Advanced sound and graphics* scales some quite different heights for the Dragon. In the familiar blue Sunshine format, it's a physically fatter volume than its stable-mates, requiring a physically fitter reader to get the best from it — not least with a sturdy typing finger and a roving eye.

Advanced sound and graphics arrives with both authority and dignity. Basically, it's a handbook of tricks and devices, showing ways of building different patterns and shapes on the screen; shifting, twisting and exploding them to order, and generally exploring DRAW, LINE, CIRCLE and other Basic friends to the hilt. Animation and 3D representation gets a fair



crack at the Dragon's egg (dragons, being reptiles, do lay eggs).

A cheery Pic-Man, British to the last and complete with Doc Martens and revolving, exploding bow-tie, provides a useful compendium of problem-solving within graphics routines. He is, however, the closest the Brain boys ever come to the listings game: their concern is with a means to an end. For this reason, the complaint that might otherwise have been levelled about the unerring lack of colour in this mightily visual context, really doesn't seem that important.

As well as arcade-type applications, there are pointers to the more serious business of pie charts and (rather jagged) contour maps, so you can offset your six quid against tax.

Sound takes a relatively back seat role here. Envelopes, as pre-packaged on the BBC Micro and shaken out twice daily from every small synthesiser since the Wasp, are duly addressed, stamped and placed in the post. Keyboards are reconfigured and notes placed firmly on staves. The authors don't effervesce with vapid enthusiasm, but their style is so secure and encouraging that no-one should end up playing castanets and triangle on this one. A really nice book to have around and fine value for money too.

Advanced sound and graphics for the Dragon computer
Author: Keith & Steven Brain
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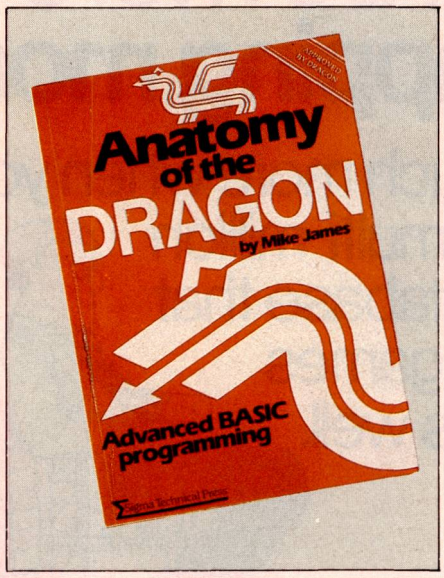
Anatomy of the Dragon



Dragons (of a certain kind) may be mythical. Mike James is by contrast just one of a rather rare breed: an author who is prolific, relevant *and* very likable. The slim *Anatomy of a Dragon*, if a shade wayward here and there, in no way clouds that reputation.

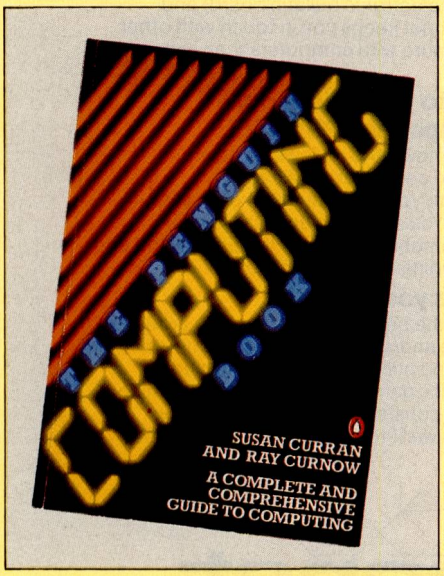
To some extent, there's an overlap between the aims and applications here and in *Advanced sound and graphics* reviewed above. But where Brain *père et fils* reach their targets largely through Basic itself (give or take the odd PEEK and POKE), James takes a harder line. The high level language is now treated more as a kind of handy tote bag to carry the Motorola chips around in. Once this is tucked under the reader's arm, he has an excuse to sidle up to the design of the Dragon itself.

No specific foreknowledge is assumed from the reader, a situation which James takes to advantage when explaining the standard fixtures and natty deviances of the Dragon's architecture (sorry, anatomy). Very occasionally, this conversational tack runs a little wide with the topic getting out of focus, but it's a gambit that generally pays off. No knowledge of assembler is assumed either — not surprisingly with a 6809 — and the final chapter provides an appropriate commercial break before the author's subsequent publication on that matter.

Even more than *Advanced sound, Anatomy* is a toolbox of aims and methods rather than a cook book of ready-made TV dinners. The only listing of any magnitude is a set of variations on a pulsating circle using eight graphical pages in sequence. Even when looking at a very concrete problem, such as use of a light pen, there isn't the usual backdrop of a familiar arcade game or well-known business application. Readers who can't handle the Synchronous Address Multiplexer in dry dock may, for just this reason, seek help from a book such as this after wrestling solo with some memory or interfacing problem. Play it again, SAM.

Anatomy of the Dragon
Author: Mike James
Publisher: Sigma Technical Press
Price: £6.95

The Penguin Computing Book



Penguin's forays into computing have been brief and brusque, a notable contrast to the publishing group's excursions into, for instance, the next-door-neighbours of maths or sociology. And then, just like the small Renault popping up with 'Le Car' emblazoned cheerfully among its go-faster stripes, enter *The Penguin Computing Book . . .* or *PCB* for short. It's almost the size of a circuit board, and its 400-plus pages of closely-packed text make for a lot of words. Computer literacy, indeed.

Its authors, a husband and wife team have one previous joint venture in *The Silicon Factor,* while being quite widely known for solo projects, not least *The Computer Programme* for the Beeb.

The PCB can both be read cover-to-cover, or dipped as the need or fancy takes you. The assertion about requiring no specialist foreknowledge does for once hold good, though the tidy, pithy style is not one for stragglers. However, for a solid non-partisan general background without the frills of, say, Peter Laurie's *The Joy of Computing* reviewed last month, this one should serve almost any reader proud.

The backdrop is in information processing: 'data' occurs more often than any other word. The firmware in your washing machine or the Donkey Kong in your Christmas stocking (r.i.p.) have to be strictly peripheral. Bias is towards what's relevant in small business systems: the TRS-80 and a 6502-based training machine, the EMMA, are examined in terms of architecture, system software and potential application.

This is a thorough overlap with the kind of material covered more explicitly in the Dragon books reviewed above, and the 'hobbyist' shouldn't feel at all short-changed. Big-machine processing is, however, deftly (and reasonably) sidestepped, with an honourable mention of certain trendy or unsung applications such as atmospheric modelling.

Coverage tries hard to be even. I looked up bar coding, a subject which is of course currently high in the sights of the High Street, coming back to you with every can of beans. It got one minor entry and one minuscule one (assuming the index is OK which it appears to be), which is more or less in proportion to the importance of bar coding at the sharp edge of technology. Light pens, by contrast, rightly have more space to say their bit, which is actually very good proof of the strength of this book as a dictionary.

However, I also searched for hand-held computers, and searched in vain.

Hardware, in general, and communications, in particular, are well handled. By contrast, historical background is patchy, and the present structure of the industry — it's a hornet's nest, but so what — is shirked altogether.

Yet when all's said and done, *The Penguin Computing Book* is a sterling piece of work, well written, sensibly ordered and neatly balanced. Value for money is an understatement: well worth the wait.

The Penguin Computing Book
Author: Susan Curran and Ray Curnow
Publisher: Penguin/Allan Lane
Price: £5.95 (Penguin paperback), £10.95 (Allan/Lane hardback)

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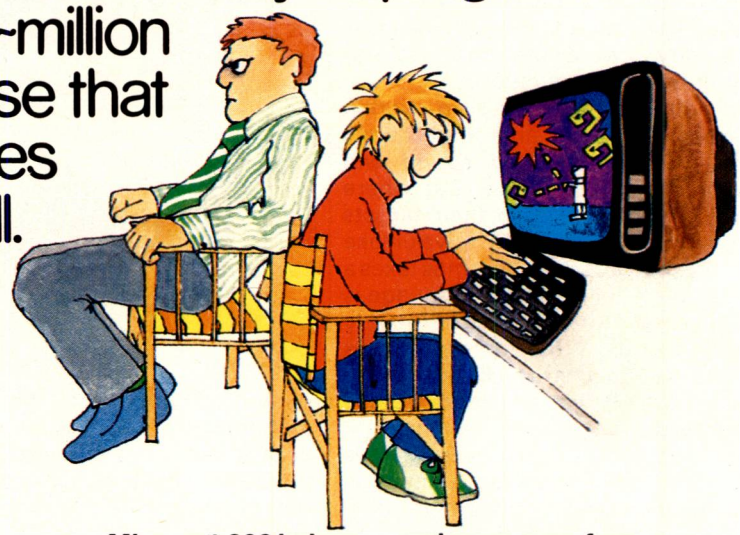

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Micronet delivers to your micro our electronic newspaper and PRESTEL

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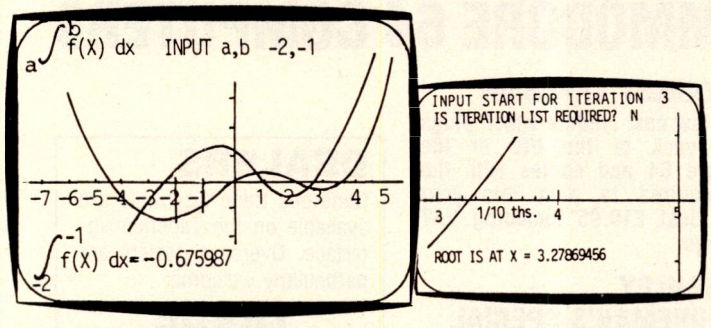

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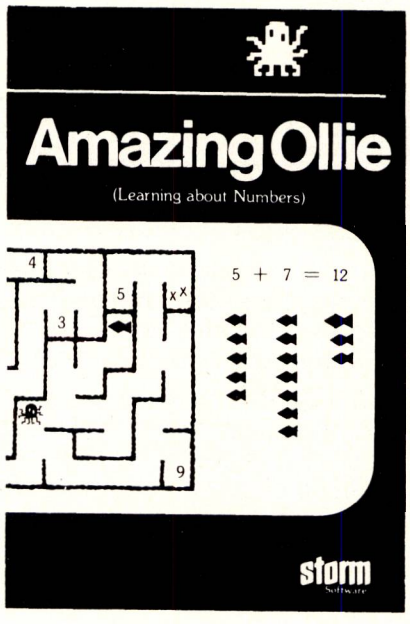

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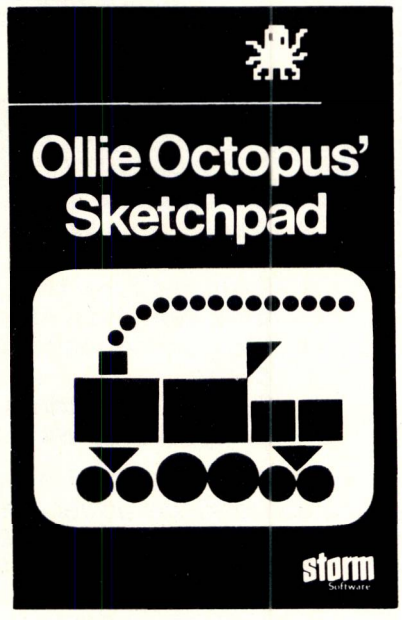

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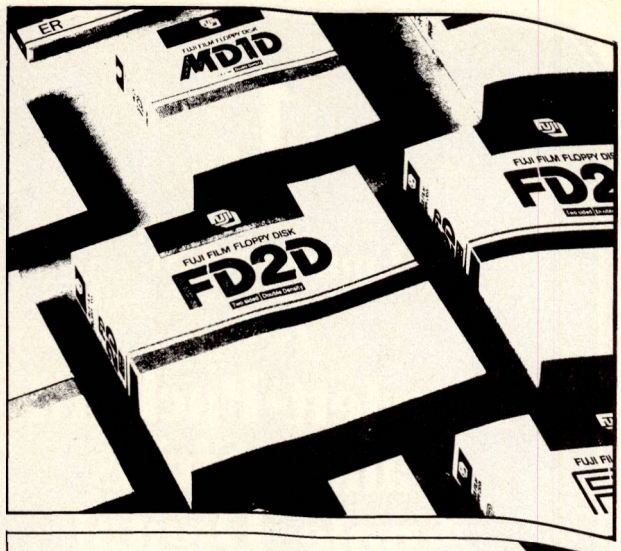

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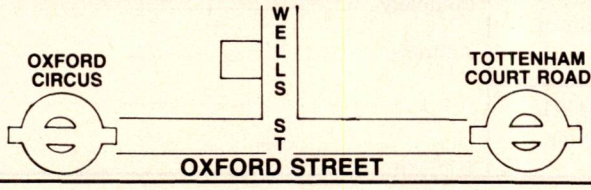

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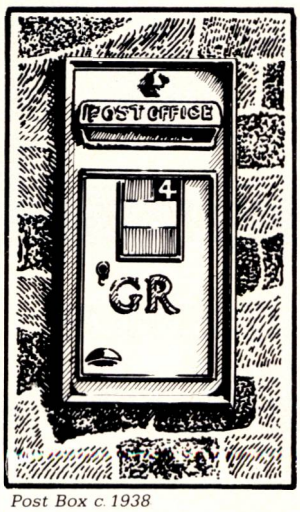

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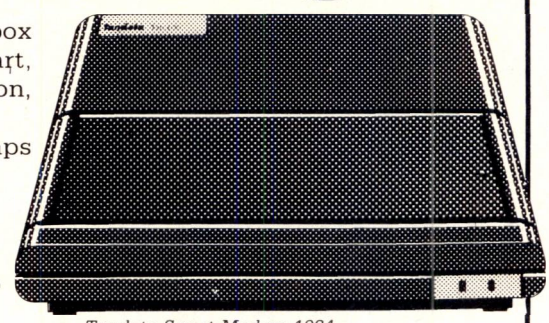

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Number theories

New readers start here. The topics dealt with in this column attempt to reach the frontiers of knowledge in number theory with the minimal background information. The problems posed therefore have no complete solution known to the author, and readers are encouraged to submit their attempts at solution, however incomplete they may seem.

This month we look back and examine some number theoretic results which were making the news around the turn of the century. We ask how these might be established using a digital computer, and in what ways they may be extended.

The results, which require no understanding of mathematics beyond elementary arithmetic, are given in chronological order and readers are invited to respond to some, or all of them!

(a) In 1876 AB Evans found four integers whose sum is a sixth power, and such that the sum of any three is a fifth power.

(b) In 1895 several writers found two integers whose sum, difference and difference of their squares are all twelfth powers.

(c) In 1898 GBM Zerr found six positive integers x_1, x_2, x_3, x_4, x_5 and x_6, such that each, diminished by $(5/2)(x_1 + x_2 + x_3 + x_4 + x_5 + x_6)^5$ becomes a fifth power, and three years later three numbers in arithmetic progression (A, A+d, A+2d, where A is the smallest and d the common difference of arithmetic progression) whose sum is a sixth power.

(d) In 1904 P F Teilhet verified that every integer, A, up to 600, with one exception is a sum of two squares and two positive or zero cubes.

(e) In 1917 R Goormaghtigh stated: 'For A less than 1000000 $A=1+x+x^2+x^3+...+x^m=1+y+y^2+y^3...+y^n$ holds only in two cases, one of which is $31=1+5+5^2=1+2+2^2+2+2^4$.'

Readers are invited to submit a program, or suite of programs, to recreate the news items listed above, and to extend them in any way. Thus in (d) the exception should be displayed and, hopefully, the bound on A significantly extended, while in (e) the second case should be found explicitly and, again, the bound extended on A.

A prize of £10 will be awarded to the 'best' entry received by 1 May, 1984. Please address all entries to Mr M R Mudge, Room 560/A, Department of Mathematics, University of Aston in Birmingham, Gosta Green, Birmingham B4 7ET.

Note. Criteria of judgment include limitations imposed by hardware and programming language chosen, so details of these should be supplied.

Review — October 83

The concept of a *Perfect Number* appears to be well known to many *PCW* readers, hence the peak in response to this article.

The problem of finding the factors of an integer is recognised by many, but few address themselves to it. The use of the Chinese Remainder Theorem may provide a 'best possible' algorithm, but personally I doubt this. Discussions with Dr R Churhouse and Dr AOL Atkin many years ago at the Atlas Computer Laboratories, Chilton, in the presence of my colleague Dr D Ridout, revealed that there was still an unsolved problem in this area.

The Poulet sequence has been displayed by many correspondents — some suggested problems include:

(1) Are all abundant numbers divisible by 15 if they are odd?

(2) Are there any three-ply Perfect Numbers different from 120 and 672?

Therefore, does there exist an n for which $\sigma(n)=kn$, k greater than 2 defines a k-ply Perfect Number.

The winner is Mr J Jones, 33 Vincent Avenue, Nantgylo, Gwent NP3 4PF. He has taken this problem to the limit of his available hardware, changing the programming language on the way.

Once again, it should be observed that many submissions were of the highest possible standards of neatness; however, I claim to recognise valuable work among the other submissions, and ask that you are not put off by the lack of a word processor.

A number ^{m} is said to be:

2-hyper-perfect if $m=2s(m)-1$

3-hyper-perfect if $m+3s(m)-2$; and in general

n-hyper-perfect if $m=n\,s(m)-(n-1)$.

D Minoli has constructed (1980) a list of all n-hyper-perfect numbers (n greater than 1) up to 1500000 using the PDD 11/70 computer.

Can anyone improve upon this situation?

Note. Submissions will only be returned if a suitable stamped addressed envelope is provided.

END



Quickie

Of 50 people interviewed 27 liked cricket, 32 liked soccer and five didn't like either. How many people liked both cricket and soccer?

Prize puzzle

The Smiths and Jones families each have three children who work for the local authority. By coincidence, the salaries of the three Smith children are in the same proportions as those of the three Jones children.

Moreover, Albert Smith and Paul Jones have the same salary — as do Mary Smith and Sally Jones. However, Peter Jones earns £387 per month more than Michael Smith. What is the salary of each?

by J J Clessa

Answers please — postcards or backs of sealed envelopes only — to reach *PCW* not later than last post on 30 March, 1984. Send your entries to *PCW*, March prize puzzle, Leisure Lines, 62 Oxford Street, London W1.

December prize puzzle

Not too difficult to solve analytically, although it's a bit harder to solve by trial and error using a micro. Naturally, it isn't possible to say which of the two scores is for the penalty and which is for the field goal, but the scores must be 4 and 17.

This prohibits scores of:

1 2 3 5 6 7 9 10 11 13 14 15 18 19 22 23 26 27 30 31 35 39 43 and 47 — twenty-four in all.

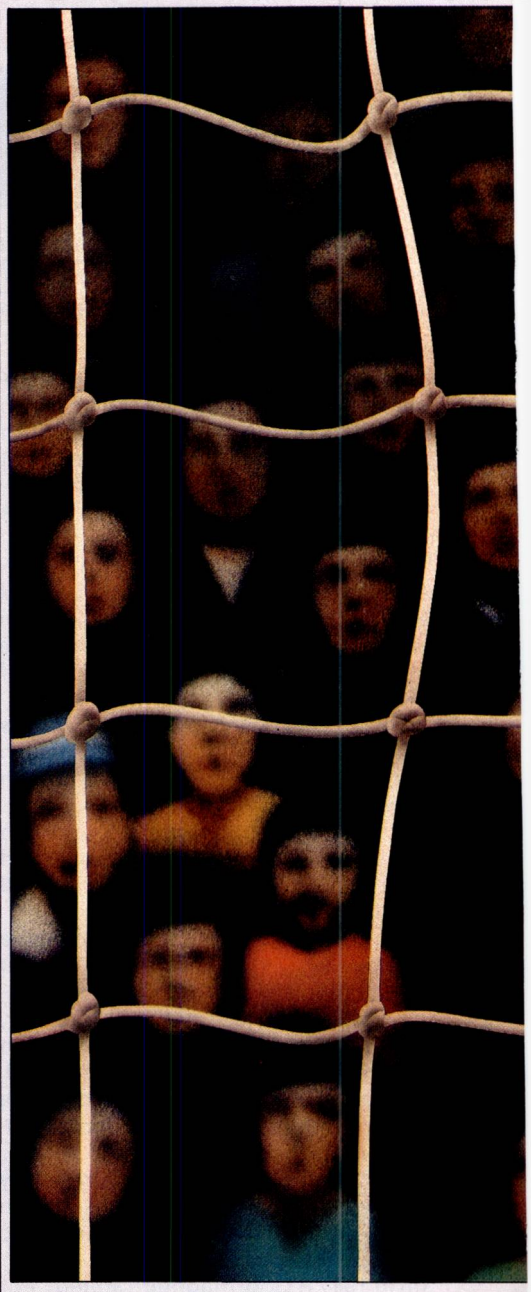
The winning entry, drawn at random from over one hundred, came from C R Hensler of Letchworth, Herts. Congratulations, Mr Hensler, your prize is on its way.

Don't forget — please send entries on postcards (backs of sealed envelopes will do). Letters are immediately disqualified.

END

Pools forecasters

Fortuitous good luck or the law of averages, the chance of winning the pools is considered to be one in a million. Tony Hetherington looks at some packages which profess to bring that 'dream' one step nearer reality.



Anyone who has ever placed a cross on a football coupon shares a common dream: the dream of winning a pools fortune. People have used many systems in pursuit of this dream ranging from sticking a pin in the coupon to using a fixed set of numbers derived from the family's birthdays (often including the cat's).

It is no wonder then that home computers are now being put to the task. After all, they can store the results of thousands of matches and quickly perform calculations that make a human mind boggle.

To evaluate the accuracy of these programs I selected a sample of the products currently available and tested them over a six week period. The programs tested were all for the ZX Spectrum although they are available for other machines. I specifically chose Spectrum versions to allow more meaningful comparisons of the products by removing any machine-dependent factors.

Each of the four packages tested had a different method of predicting the results. It is therefore worth looking at these methods since programs such as these are only as good as the theory behind them.

Hartland Software's football pools program uses a purely statistical approach to the problem by using the Possion distribution method to determine the probability of each of the teams scoring 0, 1 or 2 goals, and so on. The program continues like this until it has calculated the probabilities of every result from 0-0 up to 8-8. Finally, it can calculate a probability of a home and away win or a draw. The calculation used to determine the expected number of goals scored by a team is (for the home team) ½ × (average number of goals scored by home team at home) + (average number of goals conceded by the away team away). Similarly the away team score is calculated by substituting appropriate figures.

Spectradraw 2 by Spectradraw makes use of a large database of results in preparing its predictions. Having determined both teams' recent form, the program then consults its database to find the outcome of matches between teams with similar form. Using this information, probabilities of the various outcomes are assigned while adding a slight bias towards the home side to take account of home advantage.

Z4 Football Forecast program produced by Sporting Forecasts uses a points allocation system to determine its forecasts. A system of points are allocated for various factors including the form of the teams in their last six games, the difference in goals scored and conceded, home and away form, general form and a weighting towards the home side.

Micropools uses a similar system but with one important difference: it can learn from its mistakes. After at least five games you can select an option which asks you to enter details of the accuracy of its predictions. For example, you are requested to enter the number of draw predictions that were actually home or away games. Micropools then uses this information to adjust its subsequent predictions to try and produce more accurate forecasts.

The information the programs provide is as varied as their methods. Z4 and Micropools produce predictions for each match whereas Spectradraw supplies lists of the most likely and least likely draws. Hartland Software's program not only lists the 16 most likely home and away wins and draws but also provides a facility to deal with fixed odds forecasts. All you have to do is enter the match details and the odds offered and the program will advise you as to whether or not it is a good bet and how likely the result actually is.

Prognosis

One of the major problems with pools forecasters is knowing what to do with the results they produce. This is because football isn't as predictable a game as these methods assume.

The Z4 program instruction manual contains a lengthy piece giving advice on how best to use the supplied information. It also advises users that there are occurrences not covered by the program that can affect the outcome of a game. Player transfers and the sacking of managers can drastically influence the way a team plays and therefore a game's outcome. It is left to the user to remember these possibilities and to adjust the predictions accordingly. Only Micropools attempts to cater for these unexpected changes in form by its learning process.

Spectradraw 2 also produces a companion program called Spectrasort which, when merged with Spectradraw

Illustration by Brian James



2, provides a facility to produce ten '8 from 10' predictions using the 14 most likely and 10 least likely draw predictions. These can be directly entered onto your pools coupon. One silly omission totally spoils this otherwise neat package — the draw predictions that Spectrasort uses must be typed into the computer, despite the fact that they are produced by Spectradraw 2 and therefore are still in memory. I accept that Spectrasort can be used without Spectradraw 2 but since the facility to merge them exists, it is ridiculous to re-enter information already held in the computer.

To summarise: pools forecasters will provide accurate predictions providing the teams play in a predictable manner. However, as they don't, it is up to you to judge how to use the predictions to best effect.

Although meaning the difference between winning and losing this problem is totally eclipsed by the headache of keeping the results database up to date. This is the real bugbear of the system since you have to enter every football result throughout the entire season into the computer, including those fourth division matches that are played on a Friday night which everyone misses. This all takes time to enter and is, quite frankly, too much like hard work.

The problem is aggravated when you realise that this task must be done to make the whole exercise worthwhile or for that matter profitable. This amount of work will deter all but the most adamant pools punters but these programs do represent an important step forward.

The workload would be significantly less if the programs were transferred to disk or microdrive. This would reduce the time to load and save the programs. A disk version would also be able to hold a larger database scanning more games and may even be able to store a season's fixture list eliminating the need to create match lists. Such a version may also supply a user with league tables and other information interesting to a football freak.

I would have thought that a pools forecasting program was an obvious application for Micronet and other Prestel-related systems. Then only one person would need to update the database and he would be paid to do it. Every week a user would be able to page up the week's forecasts. These predictions would have to be of the 'most likely draw' type since otherwise there would be thousands of Prestel users sharing the same pay-out.

This leads me to the most important point to remember when discussing pools forecasting programs. If anyone ever creates a truly accurate prediction system you can be sure they will keep it — and the profits — to themselves.

Conclusions

The present generation of pools forecasters available for home machines will give accurate predictions on the

outcome of football in return for a lot of hard work from the user. These predictions only remain accurate if the players behave in a predictable manner. Unfortunately footballers and the game of football are not predictable, which probably accounts for its mass appeal.

The accuracy in predicting score draws, which is the way to a jackpot, averaged around 22% which is better than my own methods or the national newspapers'. Micropools advertises an accuracy of 32%. I found it to be nearer 28% but this is still better than the others. This accuracy is no doubt due to its ability to learn from its mistakes. Even so a prediction rate of 28% does not make you a fortune. It is, however, a step in the right direction.

It would be difficult to recommend which of these products to buy since all the forecasters reviewed here have good and bad points. The best course would probably be to buy one and adapt it for your own use. This is quite easy since they are all written in Basic and it would be a useful exercise for those learning Basic programming.

Reviews

Before reading a review of a program it's usually helpful for a reader to know the qualities a reviewer looks for in a program. To that end I will outline those qualities I looked for in the pools forecasting programs I reviewed.

The most onerous task is updating the results database and therefore any program should make this task as bearable as possible. The process should be made as quick as possible and would benefit from the use of colour coding and the use of code numbers or abbreviations for the team names.

Similarly the creation of a match list and the setting up of the database should be user-friendly and quick to respond. Results and predictions should be presented in a way that is easy for the user to record the information, and again, speed is important.

Nobody likes to be left staring at a dead screen without being able to tell whether the program is alive or dead. Therefore if the computer is performing calculations that will take more than a few seconds, informative messages should be displayed and updated to show the machine's progress and convince the user that all is well.

Z4 Football Forecast

Supplier: Bureau of Information Science, Commerce House, High Street, Chalfont St Giles, Bucks.
Price: £9.95
Other versions available: Apple II, PET, Sharp MZ 80A/K, TRS-80, Video Genie, NewBrain, ZX81, BBC B, CBM 64, Dragon 32.

The Spectrum version reviewed has obviously been directly transposed from the earlier ZX81 since there is no use of colour or sound or any other Spectrum feature. This is a shame since the user has to stare at the screen for long periods so it would be better if it was colourful. As a result the program has a dull appearance which doesn't instil much confidence.

This isn't helped by the omission of error checking. While entering a week's results via an uninspiring process I misspelt a team name giving it more letters than was allowed. Unfortunately the program responded by giving a Subscript Wrong error as it died. This is appalling in a commercial program.

It is only when Z4 reports on its predictions that you realise the program has been working all the time. For each match it says whether it will be a home win (1), away win (2), No-score-x and score-x for draws. When the program is unsure about a prediction it says so and gives the alternatives that it thinks possible. One prediction that it generated for me was 1, 2 or Draw.

Micropools

Supplier: Spencer Software Ltd, tel: 0342 16832.
Price: £7.95
Other versions available: BBC B, CBM 64, PET, NewBrain, Dragon.

Micropools is another black and white special but includes lengthy narratives explaining what the program is going to do. Unfortunately such user-friendly descriptions disappear when the program is running since you are presented with such informative prompts as 'Home team' and 'Away team'.

Despite its curt prompts Micropools is a professional product supporting full error checking. It even checks if you have entered the right score should you input results of the Leeds 27, Arsenal 0 type.

The big advantage that Micropools has over its competitors is its ability to learn from its mistakes by adjusting its algorithm depending on its success rate. As well as improving its performance this encourages confidence in the product.

However, Micropools has one big disadvantage. Due to its file size it can only deal with 92 teams at any one time. This is unfortunate since the pools coupon has entries for 55 games (110 teams). Apparently this is overcome by creating more than one team file and then running the program again — the thought is too horrendous to contemplate. It's probably less work to alter the program to accept these extra teams. The memory space required can be obtained by reducing the number of characters allowed for each team name from 15 to 11.

Football Pools

Supplier: Hartland Software, 8 Penzance Place, London W11 4PA.
Price: £9.95
Other versions available: ZX81 (£8.95).
Other versions planned: CBM 64, Dragon 32, Oric.

Hartland Software's contribution to colourful computing is a somewhat garish bright green border which surrounds the main menu. This is replaced by a soothing dark blue/light blue display which undoubtedly helps you throught the arduous process of results input.

Team entry for creating the fixture list is by code numbers. Unfortunately this is not only very slow but also the numbers are not displayed on the screen and are included on the back of the instruction booklet. The main problem is that the list supplied has the teams in their league positions as at the end of the 1982-83 season. So the first job a user has is to alter the stored league tables and team numbers to reflect the promotions and relegations. This is daft, since to print the end of season standings they must have known which teams were going to change divisions.

The best feature that this program offers is the fixed odds forecast and I feel that this program will be used in the best way possible as a betting aid in a bookmakers rather than as a pools forecaster.

Spectradraw 2

Supplier: Spectradraw, tel: 0844 52426.
Price: £12.95
Only available: 48k Spectrum.

Spectradraw 2 is the most user-friendly of the programs reviewed, making excellent use of the Spectrum's colour facilities. This is particularly apparent when creating a match list which is done prior to the production of the week's forecast.

Fixture entry is via code numbers next to the relevant team names, which are displayed on the screen one division at a time. These names are printed in yellow and are blacked out when a team's number is entered. This helps enormously as it's easy to find teams that are yet to be entered.

The program is even kind enough to report which division it is up to while doing its predictions. The single annoying feature about Spectradraw 2 is its inability to communicate directly with its companion program, Spectrasort (£4.95), when they are merged together.

END

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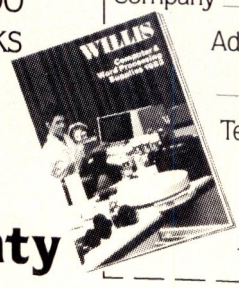

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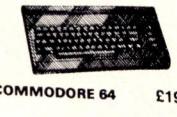

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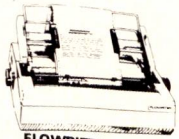

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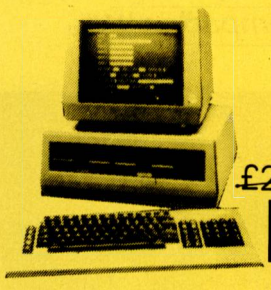

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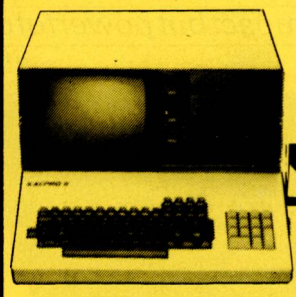

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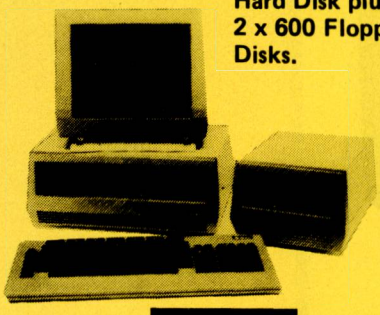

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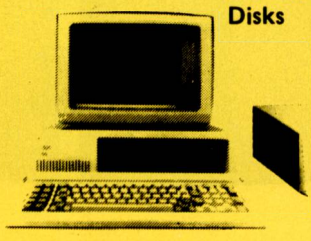

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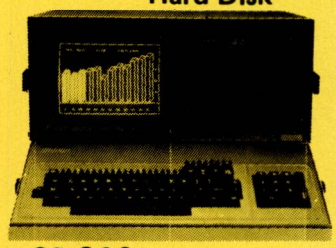

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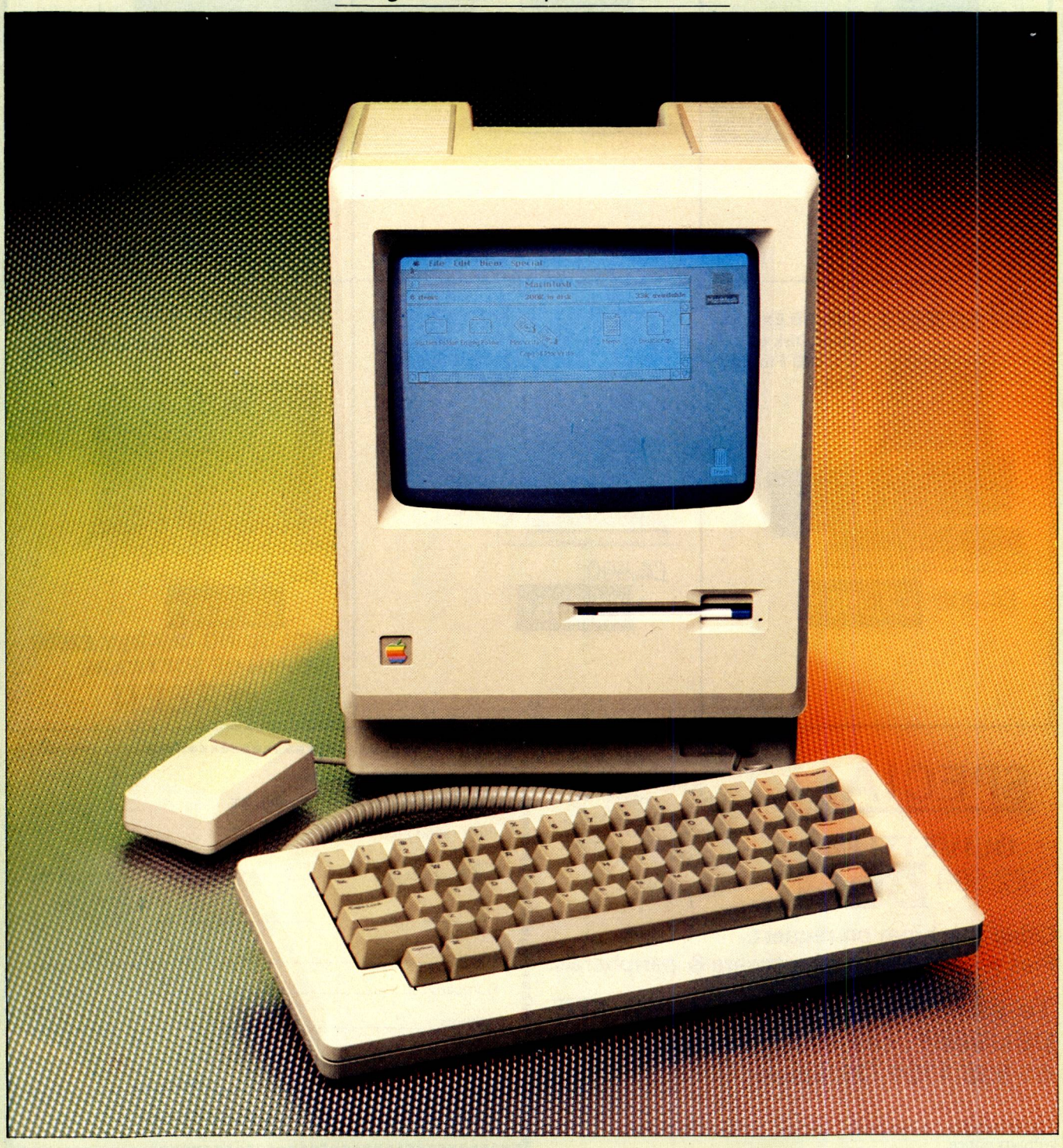
PCW 103

Macintosh

Perhaps it's too early to speculate but many people see the Apple Macintosh as the machine that will succeed in drawing users away from the IBM 'safety net'. Our West Coast contributors, Robin Webster and Leslie Miner, put this compact but powerful computer through its paces while closely comparing it to its big sister, the sophisticated Lisa.



BENCHTEST

Many years ago, a group of researchers at the Xerox Palo Alto Research Centre (Xerox PARC) developed the concept of a small notebook-sized computer capable of showing high resolution graphics on its small flat-screen display. This futuristic machine was named Dynabook.

Today, Xerox is no closer to developing the Dynabook. Instead, Apple Computer has taken the first few steps towards making that particular vision a reality.

With the development of its Lisa office computer system (see the Benchtest, *PCW*, July, 1983), Apple drew upon and enhanced much of the work already carried out by Xerox workers.

Indeed, Apple's new computer, the Macintosh, makes comparisons with the original idea interesting.

The machine is compact, but powerful, and modelled on the Lisa concept — it's described as being part of the Lisa family, or as using Lisa 32-bit technology. Its major features are a transportable system unit including high resolution black and white display, one microfloppy disk drive, 128k of main memory and a mouse.

In contrast to early rumours about the Macintosh, it's *not* a watered-down version of the Lisa. It *does* feature a high resolution black and white display that can show visual representations of files (known as icons); it *does* feature a mouse; and it *does* offer many of the software possibilities of the Lisa.

Probably the biggest surprise is that the Macintosh is totally incompatible with the IBM Personal Computer; moreover, it doesn't even run stripped down, revised or enhanced versions of Microsoft's MS-DOS operating system. The surprise comes to many who see Apple's whole future on the brink, due to IBM's inroads into Apple's market share. Instead, the Macintosh uses its own proprietary operating system called the Finder which operates in much the same way as the Lisa's Desktop Manager.

Another surprise is Apple's decision to standardise on the 3.5in microfloppy disk for the Macintosh. A basic Macintosh comes with one built-in microfloppy drive capable of storing up to 400k, although another external drive can be added for $395.

In the United States, the suspense over the Macintosh's appearance and what it would be able to do almost paralleled the fuss made over the IBM PC Junior. There is a significant difference, however. For most people, the PC Junior signals IBM's journey down into the depths of the home computer market (or at least the non-professional computer market). For others, the Macintosh signals Apple's carefully planned attempt to provide computer users with a viable alternative to the MS-DOS software/IBM hardware duo, *and* to remain a billion dollar computer company. Although Apple denies it, some observers are saying, 'The Mac had better be good, or else the company may not survive . . .'

Since it's intended to be an educational as well as a professional machine, US universities were among the first organisations to see prototypes of the Macintosh. Some have already announced their intention to buy hundreds of them.

On the professional side, Apple says there are about 80 major software developers working on products for the Macintosh. These include standard MS-DOS or CP/M type software packages (which are being outwardly redesigned to make use of the Macintosh's icon-driven and mouse-controlled interface), and new products that will make the fullest use of the Macintosh's facilities.

Hardware

According to one Apple researcher: 'The Apple II was designed in a garage to be built in a garage, whereas the Macintosh was designed to be built by robots.' Apple has therefore built an entirely automated factory in Fremont, California, to meet expected demand.

Rather than follow the conventional design of separate system unit, display and keyboard, the Macintosh has been designed more as an all-in-one product.

The one-piece, injection-moulded, plastic casing houses the 9in black and white display, the single microfloppy disk drive (developed by Sony), the main motherboard and the video circuitry. The only separate part is the keyboard. The Macintosh measures 13.5in high x 9.7in wide x 10.9in deep.

At the top rear of the beige casing there is a recessed area that allows the Macintosh to be picked up easily — not unlike the grip on a telephone. While the machine is fairly light — it weighs in at around 20lb including the mouse and



9in high resolution black and white display

the keyboard — it cannot really be described as portable. That compromise description 'transportable' fits much better. Rather than make the Macintosh a clip-together type of system where the keyboard fits over the display and the casing has a handle on it (like the Compaq or Kaypro computers), Apple has designed a special, padded carrying case complete with straps.

Since Apple intends the Macintosh to become a truly international computer, it has made sure that there's no writing, in any language, on the plastic casing (other than the signatures of the main designers which are moulded on the inside back of the case).

Along the back bottom edge of the casing are five built-in ports that allow the user to connect up various peripherals.

Like the user-interface, the Macintosh uses icons above each interface port to describe their purpose.

Going from rear left to rear right, there is the mouse connection, the external disk drive connector, a serial output port for connecting a modem, another serial port for connecting a printer, and a four-channel sound output connector (the Macintosh does have its own internal speaker, but the additional outlet could be useful for stereo output or if access to a high quality speaker system is available).

At the back of the Macintosh, there is an on-off switch set just above the mains power inlet and, above that, a battery storage area used to provide power to the built-in system clock.

A practical design feature of the Macintosh is a security bracket slot on the back which is used, with an optional security kit, to secure the lightweight Macintosh to a desk.

Like its big sister, the Lisa, the Macintosh uses passive cooling. Vents at the bottom of the casing allow air to enter the machine's circuitry, where it's heated. This warm air then escapes from further vents placed at the top of the casing, on either side of the carrying handle.

When we viewed the system for the first time at Apple's headquarters in Cupertino, California, Steve Jobs, founder and head of the company, said that the Macintosh would be 'the fastest and most powerful computer ever placed in the hands of a large number of people'. Such a statement can, and will, be argued. But what is it about the Macintosh that prompted Jobs to make the claim in the first place?

The Macintosh is based on a Motorola 68000 microprocessor (referred to as a 32-bit chip although it handles data in 32-bit chunks internally and 16-bit chunks along input/output channels) operating at 8MHz. This is very fast for such a low-cost machine.

In comparison, the original Lisa system uses the same 68000 chip running at about 4MHz and the so-called 16-bit IBM Personal Computer uses an Intel 8088 (16-bit internal and 8-bit I/O transfers) running at 4.77MHz.

The Macintosh's faster processor speed is noticeable when intensive work with the various graphics options is in progress.

The 68000 chip sits on a single large board at the bottom of the machine's casing. The five built-in ports extend out of the motherboard's back edge. As well as the 68000 chip, the board holds a 64k ROM, the graphics processor, 128k of RAM memory and a number of other important devices. Semiconductor products have been obtained from manufacturers such as Zilog, Hitachi, Texas Instruments, and Motorola.



The keyboard is well laid-out and very user-friendly

The major criticism of the Macintosh is that it has only 128k of memory. Many people will feel that if Apple is trying to make it the new alternative to the IBM Personal Computer and its growing army of lookalikes, then it would probably have made a lot more sense to enter the market with a 256k Macintosh, instead of a 128k machine. After all, even the IBM PC Junior can be stretched to include 128k of main memory.

When asked about the decision to go ahead with a 128k Macintosh design, Steve Jobs responded: 'When the Apple II was launched it was supplied with 2k of ROM. The IBM Personal Computer has about 6k of ROM. The Macintosh has been supplied with 64k of code locked into ROM that is the most tightly written code I've ever seen. The 64k ROM contains a lot more than just the complete Macintosh operating system.'

The 64k ROM includes the operating system along with the necessary file system and device drivers (printers, displays, and so on) for handling I/O operations, and it includes a number of other software 'layers'.

One layer concerns itself with all the 'management' tasks such as memory management, mouse operations management and keyboard management.

A second software layer contains about 35k of code which is referred to as Quickdraw. Quickdraw is exactly the same program as is used on the Lisa system to handle graphics-oriented operations. When LisaDraw is used to create a box or a circle, it is in fact Quickdraw in control, not the application program.

The application program — LisaDraw in our example — can be thought of as just one way that Quickdraw can present its abilities to the user.

Traditional programming techniques involve the development of fairly large programs built to do some specific task. There's a lot of custom built code to do the specified task, but occasionally these programs will have to reach into onboard ROM memory to access some even more specific routine. Using the hand-held calculator analogy, the functions square root, %, and logarithm are examples.

With the Lisa and Macintosh, Apple designers have reversed the situation. Instead of having programs call ROM-based or library routines, they have made the library routines so sophisticated that they are actually in charge most of the time — it's only when the

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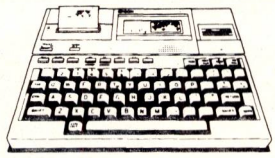

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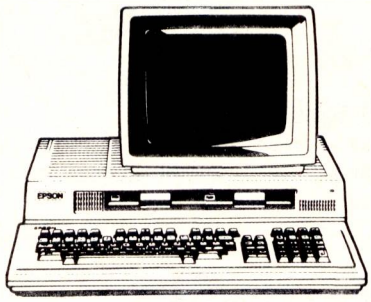

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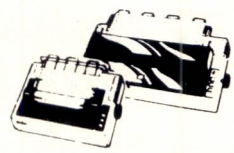

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user tries to do a task, which the applications code is far better suited to handle, that control is handed over to the application.

A third layer is the Toolbox code (the Lisa has the Toolkit). The Toolbox code is a key feature on the Macintosh since it is the means by which independent software developers will learn about the inner operations of the machine. The Toolbox facilitates access to and use of the operating environment 'primitives' including menu management, window management, type font management, window contents scrolling and the generation of dialogue and alert boxes (system and error messages to you).

In total, the 64k Macintosh supports over 500 system calls — and although we're not quite at the join-the-dots stage, the new software development approach practiced by Apple is getting close. The 128k main memory is reserved totally for application programs loaded from the microfloppy disk, and the user data (word processing documents, pictures, graphs) entered at the keyboard.

At right-angles to the motherboard, and running up the left side of the machine is the video and power supply board.

Drawing power from the board is the Macintosh's 9in, bit-mapped screen displaying 512 × 342 pixels. This compares with the 12in, 720×364 pixel display on the Lisa. The screen provides a stable image, with no perceptible signs of flicker or waves, and it's possible to work for hours with the machine without the discomfort of eyestrain.

The Macintosh employs both a brightness adjustment control, located just under the screen at the front of the casing, and a Preference type option called the Control Panel.

Via the Control Panel the user can adjust various settings, such as audio signal levels, the speed at which keys will repeat when held down (presently indicated by tortoise and hare icons), and the background pattern of the desktop, which is normally a grey half-tone. The system clock can also be set on the Control Panel.

Two more differences in design between the Macintosh and the Lisa are the mouse and the separate keypad. The mouse has been redesigned with a larger button. The keypad, which is an integral part of the Lisa keyboard, comes as an optional extra that daisychains onto the Macintosh keyboard.

Software

The Macintosh's proprietary operating system is called the Finder.

The Finder operates in much the same way as the Lisa's Desktop Manager. It maintains the various system icons on the display and reacts to the ways in which the user attempts to manipulate them. If the user selects an icon by pointing at it with the mouse-controlled cursor, and then goes to the menu bar at the top of the screen to 'open' the icon, the Finder must ensure that the operation is successful. If the user selects the litter bin icon and then attempts to put that icon into a word processing document, the Finder must be able to inform the user that such an operation is not allowed by gently returning the litter bin to its original position.

Since the operating system is ROM-resident, the Macintosh comes alive as soon as it's switched on. It checks the microfloppy drive to see if a disk is present and, if it detects one, starts to load its directory into memory.

As soon as the directory information is loaded, a diskette icon appears on the screen. If the disk has already been named, this will appear immediately below the icon. If not, the mouse is used to place the cursor over the disk's default name to select the current text by clicking it once. As a result the new name is typed.

To see the contents of a disk, select the icon by clicking on it once and then use the 'Open' option located in the File pull-down menu. Alternatively, click on the disk icon twice in succession.

The Macintosh does not come with all the desktop icons (Desk Accessories) that the Lisa places at the user's disposal once it's been fully powered up. In some cases, the required icon from the menu bar options at the top of the display has to be invoked. Those available include the calculator (a much simpler version than the Lisa offering), the litter bin (for deleting unwanted files) and a version of the Lisa clipboard (used as an intermediate storage area for data during cut-and-paste operations) called the scrapbook.

It should be borne in mind that while the Macintosh is a very fast 32-bit machine, it only provides single-tasking facilities, but this is not a handicap because the one megabit per second serial ports are interrupt-driven. The user can, for example, run the disk drive, move the mouse, generate music, type a key on the keyboard, and read the serial ports all at the same time. Also, because it's single-tasking, the multiple window capability is less comprehensive than the Lisa's.

MacWrite

MacWrite is similar to LisaWrite, but its designers have decided to implement some of the standard word processing facilities in a new way.

When MacWrite is loaded the user is presented with a blank screen, and a topline menu bar which offers the options: **File, Edit, Search, Format, Fonts, Style.** To the left of the word File is a small Apple logo, which is itself a menu option that will produce a pull-down menu with various sub-options if selected.

The user can start writing straight away, since the MacWrite system is provided with the usual margin defaults. For customising, the margin ruler has to be displayed via the Format menu option. The ruler appears at the top of the current document and the margin/tab settings are clearly marked by small triangular icons. These can be picked up with the cursor and moved around at will.

Below the actual ruler markings and margin setting icons, there are two groups of rectangular boxes.

One group, composed of three rectangles and set to the left of the screen, is used to set the document line spacing. Three options — single, double, and triple — are provided.

The second group of four rectangles is set to the right of the screen and is used to select the current document's layout, or justification. The four options are: text left justified, text centred, text right justified, and text justified. Again, the user merely clicks on the required icon to obtain the desired format.

On the pre-production Macintosh which we Benchtested, the MacWrite program came with a wide selection of typestyles.

MacWrite acts as a fairly sophisticated word processing program in many aspects, but it's not the smartest in terms of main memory (RAM) usage. As data is typed in, MacWrite stores it in memory until there's no space left. This limits document size to about six pages. To write larger documents, close the first document and then open up a second document. The text must be printed out sequentially — juggling with page formatting in each document.

MacWrite is not the only word processing program being developed for the Macintosh — independent software developers such as Microsoft are working on their own versions. Virtually all these word processing programs will be more sophisticated than MacWrite in at least one important aspect: they will employ memory swapping, or paging techniques. This will enable users to create documents that are limited in size purely by the capacity of the microfloppy disk drive

(400k minus directories, damage repair code, and other system necessities).

MacPaint

MacPaint is not a structure editor — it's a bit editor; the position of any single pixel on the screen can be altered even if it's a part of some larger picture. There are a number of ways to do this.

If a square is drawn and filled with a grey pattern, part of that square can be sliced off by selecting the dotted outline rectangular icon from MacPaint's palette. This icon allows the user to grab all or part of a picture by encompassing it with a shimmering dotted outline box. The outline can be expanded by pulling its lower right corner down and to the right, and shrunk by pushing the lower right corner up and to the left.

Once part of a picture has been 'grabbed', the shimmering outline solidifies and the selected area can be picked up and moved to any other location on the display. Any of the normal cut-and-paste type of menu options can also be applied.

The MacPainter can choose from many on-screen options, and even some of these can be adapted if necessary. Down the left of the screen there is the main palette which contains 20 permanently displayed options. In addition to the dotted outline box, there is the lasso icon which is a very powerful addition to a graphics system. Since we are dealing with a bit editor, and not a structure editor, situations will often arise where the user wants to grab a piece of text, or an irregularly shaped object without grabbing any of the surrounding empty space. The lasso icon allows this.

Unlike the Lisa, and unlike the LisaDraw application, MacPaint does not provide a multi-windowing capability and there are no window border controls for scrolling information. Work with one MacPaint document must be completed before another can be opened. Instead of border controls MacPaint's designers have included an icon of a hand in the palette. This can be used to push the screen in any of the four directions.

Text can be included and there are a number of options for drawing geometric shapes. Such shapes can be automatically filled with a pattern if so desired.

The really impressive palette options that show the capabilities of a bit-oriented graphics editor are the airbrush, pencil, paintbrush and eraser. Across the bottom of the MacPaint screen there is a selection of 38 patterns.

The first time the airbrush is used, only a few pixels will be deposited. As a specific area is focused on, the chosen pattern will become more and more prominent.

The pencil icon is used to draw freehand lines, of various thicknesses, and when this is selected the cursor takes on the form of a tiny pencil. It makes signatures and creative artwork quite easy to do, although practice is needed to obtain good results.

The paintbrush is used to paint freehand lines on the screen, and a wide variety of paintbrush textures as well as widths and shapes are available.

A powerful adjunct to the paintbrush is the mirror option. It's obtained from what is currently being called the Goodies menu bar option at the top of the screen. Mirror allows MacPaint to be set up so that it will automatically produce mirror-image copies of anything drawn. With one setting, if an object is drawn in the bottom left hand corner, MacPaint will produce mirror images in the other three corners. With another setting, if a name is written at the top of the screen, MacPaint will produce an inverted image below it.

Fat Bits is another possible selection from the Goodies menu option. At certain points in the use of MacPaint, a method of removing or adding just a few bits here and there from a picture is needed. For example, a line may look a little jagged where it meets another line, and this can be corrected by removing a few pixels from one of the lines. Fat Bits allows you to zoom in on an area of your picture and to add or take away parts of a drawing a pixel at a time. The pencil can be selected to add pixels (click once in a clear area) or remove pixels (click once on an unwanted pixel). The effect of this work is shown in a small box inset at the top left of the picture.

The eraser icon is used to delete any part of a picture. When this is selected, the cursor changes into a small box which can be used to rub away large areas or, if you have a steady hand, a few rogue pixels which are spoiling the picture. At times, the eraser box was too large to fit into all the nooks and crannies of a drawing. It would be preferable to have the option of choosing the size and shape of the eraser, in the same way that the size and shape of the paintbrush can be selected.

By itself, MacPaint is a powerful graphics program; the fact that Apple will soon be releasing MacDraw, which will presumably be a structure-oriented graphics package, makes the Macintosh very inviting indeed.

The initial software packages to be available for the Macintosh from Apple this year include MacWrite, MacPaint, MacPascal, MacBasic, MacLogo, MacAssembler/Debugger, MacTerminal (communications), MacProject (project evaluation) and MacDraw.

Technical specifications

Processor	68000 Motorola running at 4MHz
Memory	128k RAM; 64k ROM
Disk drives	3.5in Sony microfloppy
Measurements	13.5in high × 9.7in wide × 10.9in deep
Operating System	Finder (ROM-based)
Interfaces	Mouse connection, external disk drive connector, serial output port modem, 4-channel sound output connector connector
Screen	B/w 9in bit-mapped, 512 × 342 pixels
Applications	MacWrite, MacPaint, MacTerminal, MacDraw, MacProject, Macintosh Basic, Macintosh Logo, Macintosh Pascal, Macintosh Assembler/Debugger, Toolbox, Quickdraw
Weight	Approx 20lb

Independent software

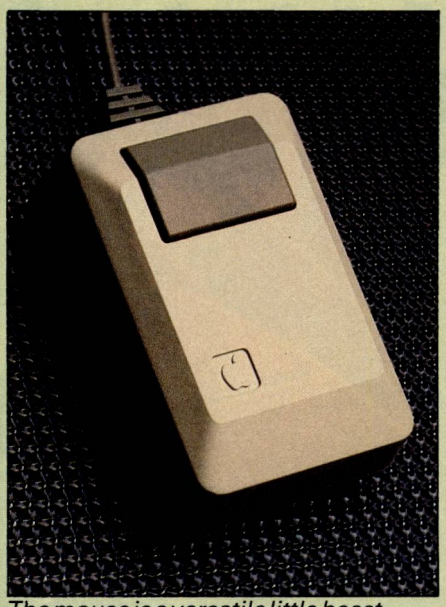
According to Apple, over 100 independent software developers are working on products for the Macintosh. Included among these are Microsoft, which looks as if it will redesign many of its current packages for use on the Macintosh, and Lotus Development Corporation, which intends to produce a Macintosh version of the 1-2-3 package. Allied with the interest from add-on hardware vendors this suggests that users will soon have a wide range of software and/or hardware options from which to choose.

Lisa 2

During the time we were shown the Macintosh, the development team stressed that the machine was part of the 32-bit family of Lisa technology.

This seemed a little confusing at first. Since the machine uses 400k microfloppy drives and the Lisa uses unique 5¼in, double access slot diskettes that can store over 800k, it seems Apple is heading for all sorts of problems with compatibility between the two machines.

The company has dealt with the problem in an interesting manner by launching three new versions of the Lisa: the Lisa 2, the Lisa 2/5 and the Lisa



The mouse is a versatile little beast

2/10. All these machines come with 512k main memory as standard, instead of the usual 1Mbyte of RAM.

Apple has overcome the compatibility problem by making the Lisa and the Macintosh employ the same disk media (the 3.5in microfloppy) and has begun to develop the necessary software to allow the Lisa to emulate the Macintosh. This is a compatibility strategy that few people expected.

It raises the possibilities of software organisations buying Lisa systems to develop code quickly for the Macintosh, and of office workers in general using Macintosh systems at home and then taking disks to use with their Lisa systems in the office.

This seems more feasible than the Personal Computer/PC Junior exchange which people were expecting from IBM.

AppleBus & AppleLine

The recently developed AppleNet, which was built around an Ethernet-type communication protocol, has been supplanted by the simpler AppleBus and AppleLine products. Having decided that there was too much chaos in the local area network (LAN) arena, Apple felt the best approach was to leave such heady stuff to companies like IBM — which appears to have opted for a token ring networking system — and to make sure that Apple products could connect up to whatever IBM brings to the LAN market-place.

Physically, AppleBus is nothing more complicated than a single cable containing shielded twisted pair wires. With the right connectors, this cable can be attached to either/both of the serial ports at the back of the Macintosh and the Lisa.

In the simplest configuration, a Macintosh will communicate with another Macintosh or a Lisa. In more complex, corporate environments, AppleBus provides the ability to link up to 16 devices that are up to 1000 feet apart. Apple is making the full specifications and protocols of AppleBus available to all interested communication software developers and equipment vendors.

AppleLine, on the other hand, is Apple's main way of entering the enemy camp.

It's a hardware add-on with software that will allow Apple computers to hook up to an IBM cluster controller (not unlike the Irma board that turns the IBM PC into a 3270-type terminal). With the equipment installed, and the right data transfer software in use, the Macintosh or Lisa will then look to the IBM controller as if it were an IBM 3278 terminal. In fact, it will be possible to connect up the Apple IIe and the Apple III in a similar manner in the not too distant future.

AppleBus costs will depend on the type of configuration installed, but the cable will be sold on a 'so much per metre' basis. The AppleLine product should retail for about $1300.

Prices

	$
Macintosh	2495
External disk drive	395
Separate keypad	99
Mac carrying case	99
Security kit	49
Imagewriter printer	circa 500
Modem 300	225
Modem 1200	495
AppleLine network product	Under 1300
Box of ten diskettes	49

Documentation

No documentation was available for review but an Apple spokesperson described the Macintosh user manual as only having about 100 pages. It comes with a tutorial disk called Guided Tour (similar to Lisa Guide) and a cassette. All Macintosh application manuals are expected to have three sections: standard textual run-down of the application features, a 'cookbook', or task oriented section and a tutorial. Apple's documentation has always been good when compared with the average burnt offerings and it looks as though the Macintosh technical writers will carry on in this tradition.

No Benchmarks are given as Basic has not yet been implemented on the Macintosh.

Conclusions

There is no doubt that Apple has been suffering growing pains over the last year or so. IBM has been the primary adversary with its office oriented Personal Computers, and now the home oriented PC Junior. The PC Junior will obviously affect Apple IIe sales.

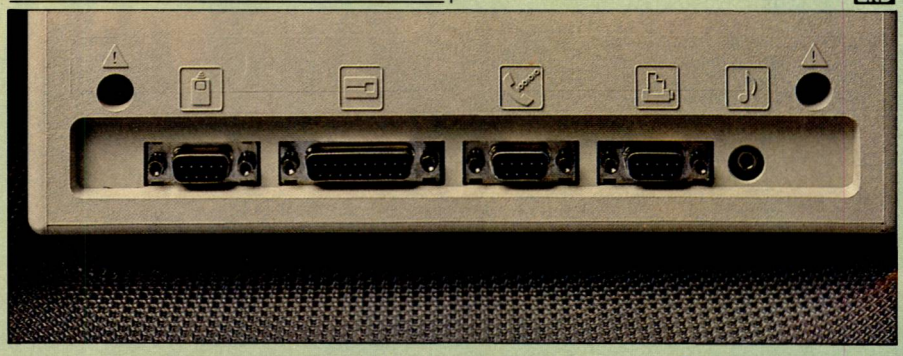
Steve Jobs frankly admits that the IBM PC was a milestone in the personal computer industry because it gave the personal computer a much needed credibility in the office market. But he also frankly states that the Macintosh will be the next milestone.

There is only one standard configuration of the Macintosh. The main customisation of the machine will occur through software. As add-on devices are built — there is already talk about a hard disk option under development at Tecmar — access to the machine will be through its two 1 megabit per second serial ports. Apple's notion is that hardware is important, but you can no longer force the user to be a system builder. Apple still sees itself as the company that makes computers for individuals rather than the anonymous office worker, and makes this appeal in its US marketing approach.

Based on our brief experience with the Macintosh, the only danger seems to be that some of its graphics interface features border on being too whimsical. How many times can you look at a whimsical icon before you tire of it?

The Macintosh is a powerful machine with a growing number of powerful applications programs, and it follows the standards set by the Lisa. For $1995 you get a basic machine; by the time you add on various software programs (for example, MacBasic, MacWrite and MacPaint, an extra disk drive, an Imagewriter printer and a pack of ten blank diskettes), the end product is a $3550 computer which can do both run-of-the-mill tasks and highly individual work.

If hard work meant success, Apple would have no problems; but in today's market-place, other factors like marketing strategy seem to be more important, and this is something Apple has had to learn quickly. Apple is one of the few companies that could take on the IBM/MS-DOS *de facto* standard with any chance of winning, and the Mac is a terrific weapon with which to enter battle. END

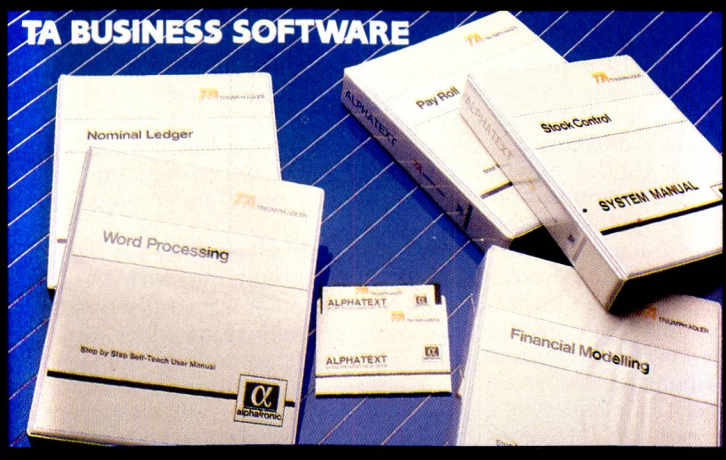


Above the interface ports are icons describing their respective functions

The Alphatronic









The Alphatronic Personal Computer makes playing, learning and working more fun, more fullfilling, more rewarding. But when you put it to work, then it really means business. In fact it's probably the cheapest way to access business programmes through CP/M software.

The games first though — enough for the most ardent player. Some just plug into a socket at the back, with their own 16K Rom module. Others can be played from virtually any cassette recorder. There are arcade games to sharpen reflexes and test imagination. Educational programmes to increase knowledge, plus chess and other traditional games.

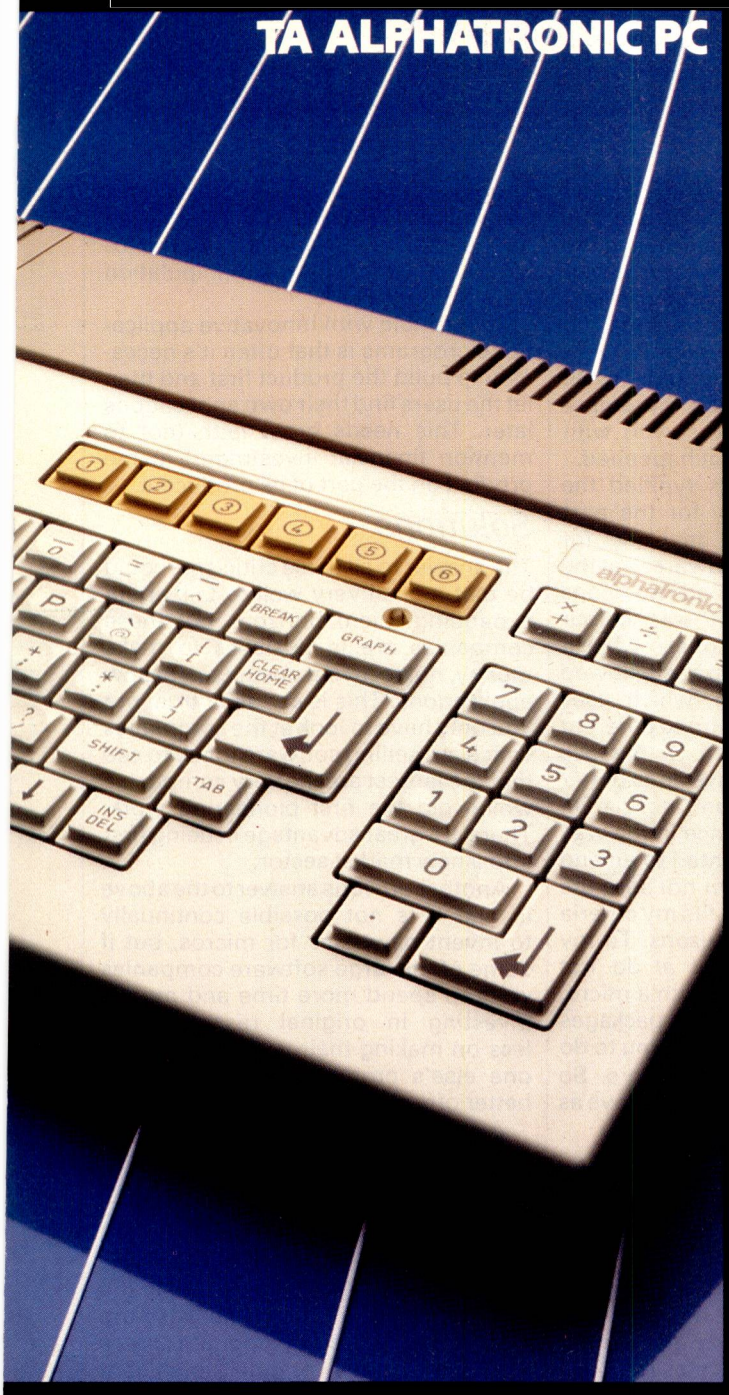
You'll benefit from the learning programs. There are cassette instruction courses on writing programs in BASIC. Other cassettes get you and your family off to a flying start into skills like typing, household budgeting, tax returns and investment management. And of course there's our own instruction and BASIC interpreter manual.

Now to business. The Alphatronic PC is unusual in giving you low-cost access to a complete version of CP/M, the world's most popular operating system for business software. You just connect up one or two floppy disc drives and a printer, then you can run a whole host of new management programs: office word processing, business accounting packages and financial planning — the choice i tremendous.

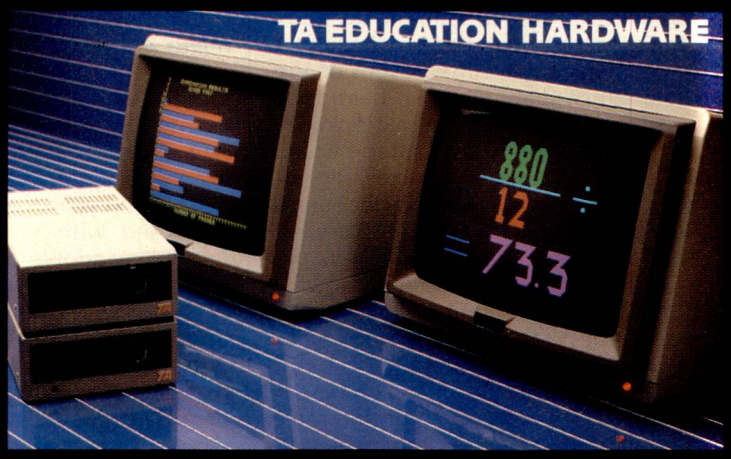
The keyboard is a real delight compared with competitive models. There are very few confusing multi-function keys, and a really professional numeric keypad is included. Six separate keys can be programmed and indexed for special routines. And the full alphanumeric keyboard is just like a modern electronic typewriter.

You may recognise the keyboard, because the

C means business









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The risk game

Should computer software companies strive to be innovators in the field of business applications at the risk of sound financial gain? Peter Bright cogitates.

Microcomputer software is in a rut. This is true not only of business software but of home computing software as well. I can only put it down to a terminal tunnel vision which seems to be affecting most of today's software vendors.

Let's take a look at the history of micros in general and micro software in particular. Business micro software breaks down into four neat areas: spreadsheets, databases, word-processors and accounting systems. The most recent addition to the list was spreadsheets with the advent of VisiCalc. Since then, we have been faced with more and more VisiCalc lookalikes proclaiming they are better because they can print graphs, dance, sing, and so on. The same thing has happened throughout the software industry — a great many people expend a great deal of effort creating a product which is functionally very similar to all the other variations on that theme on the market.

Why has this happened? I can only put it down to a lack of faith on the part of the people who now run the major software producing companies. Let's look at the companies which produced some of the most functionally original products in the business sector: MicroPro, which makes WordStar; Visicorp, which gave us VisiCalc; and Ashton Tate, which markets dBase II.

Early days

When these companies were first established they were designing new products which enabled users to do things with their micros not previously possible. The companies were taking a risk — would anyone buy their products? For example, when VisiCalc was first released, who could say that anyone would want to use computerised spreadsheets? Nothing similar existed even on mainframes — how can the market be measured for something that doesn't exist?

At that time, I was employed in the accounts department of a large firm. Part of my job was to control certain accounts by writing the balances onto an A3 sheet of paper in pencil, and then at the end of the month rubbing all the entries out and starting again. If we'd had VisiCalc in the office the time saving would have been enormous.

However, let's look at what these once-pioneering companies have done since their early days. MicroPro has moved into the database area, Ashton Tate has stayed with databases and Visicorp has opted for user friendly interfaces with its Visi On package.

Of these, the first two have taken the 'safe' route — they have remained faithful to their original products and have not expanded the uses of the micro any further. This sounds very much like the British motor cycle industry to me — do you remember Triumph? The company stayed with what *it* had, and look what happened.

Another trait that has typified the micro software industry for the past two or three years is its liking for 'flavour of the month' software — at the moment, it's multiple windows, icons and mice. Last year it was colour graphics: it's anyone's guess what it will be next year. Visicorp has followed the trend with Visi On, which uses multiple windows to integrate different packages onto one screen. On the face of it Visicorp seems to have done better than MicroPro and Ashton Tate. Visi On does represent an advance in the way that packages are presented to an end user. The trouble is, I am not sure the whole user-friendly idea fits my criteria for expanding micro horizons. To my mind, mice, windows *et al* do not expand what you can do with a micro. They may make applications packages easier to use, but don't allow you to do anything you couldn't do before. So maybe Visicorp hasn't been as brave as it looks.

Expansion and innovation

Why have these companies not continued to expand micro horizons? The answer applies to a great many companies in the micro world in both hardware and software.

Initially the company is quite small and the quicker the product sells the quicker the company grows. As it expands the company takes on more and more staff until structure problems start to set in. At this point the company's founders decide it is time to restructure, using high-powered staff from an existing large corporation, whose attitude is 'give the customer what he wants'. The technical boffins go away and build yet another spreadsheet package, because the high-powered marketing men say this is what the customer wants. The point to remember is that if marketing men had been running, say, Visicorp at the beginning, VisiCalc would not have been released, because the potential buyers of VisiCalc would not have understood its diverse applications. Consequently, they would have turned to the market researchers and said: 'What do I need a matrix manipulation program for?'

The trouble with innovative applications programs is that often it's necessary to build the product first and then let the users find their own applications later. This needs great faith (not to mention financial investment) in the product on the part of its producers.

Solutions

The answer to all these criticisms could be that it is all very well to talk about expanding micro horizons but these companies are in business to make money, not to invent unsuccessful new applications. This is certainly true, but you only have to look at the companies which are selling software today to see that the largest are the very companies which did the first pioneering work. There is a great advantage in being first into a new market sector.

Another obvious answer to the above is that it is not possible continually to invent new uses for micros, but if some of the large software companies were to spend more time and money investing in original research and less on making their version of someone else's product, we might all be better off.

A good example of this is the so-called fifth generation software. For years people have been talking about expert systems, intelligent databases, knowledge engineering, and so on. Where are they all? I'll tell you where they are — they're in Japan and in the universities, and it won't surprise me one bit if some young graduate comes up with a truly original intelligent application. If he does he stands to make a fortune and it will serve today's software companies right if they get left behind.

All is not gloom though. Even if the large companies are slow to react there are still hundreds of small firms who are keen to fill the gap. A good example of this is Messrs Tebbutt and Liardet's Brainstorm program (see *PCW*, January, 1983). It's possible that 'ideas processors' could be added to the list of business package types. It is too early to say now, but if this type of product has the same impact as, say, spreadsheets then I for one will be very happy.

END

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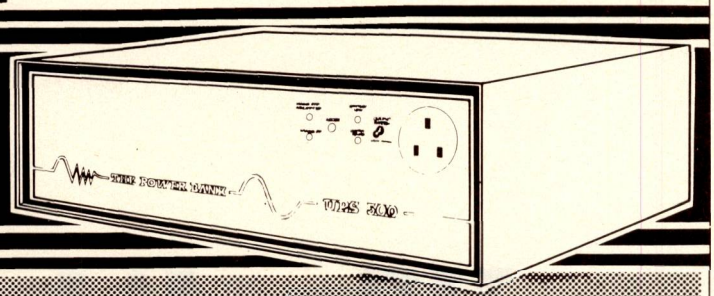

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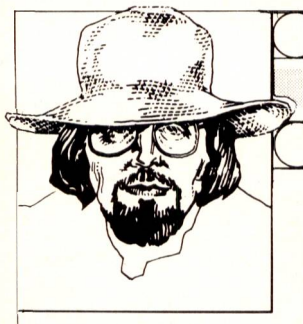
A word of advice about computers



PCW117



BANKS'

Ring in the new

Telephones with built-in computers? Martin Banks calls to mind the everchanging world of telecommunications.

It was heaven over Christmas, it really was.

I loafed around, saw some friends, sang some songs and forewent the pleasure of making my usual, horrendously expensive investment in the joys of British Telecom.

It is a time of year, however, when certain advantages do occur. The prime one is that, for once, the telephone stops ringing. For the rest of the year it warbles away bringing news of all sorts of jolly events; press conferences to attend, new computers being launched, companies going bankrupt: you know the type of thing. The telephone is, without doubt, one of the most useful items of equipment that technology has ever managed to create.

Unfortunately, that usefulness is leading to its downfall. To be sure, the coming downfall of the telephone is only relative, for it will be a downfall only of what we see and use today. The 'telephones' of tomorrow will be radically different in their capabilities. Just talking will become *passé*.

The 'umble telephone, already shaken out of its low technology *reverie* by the introduction of such marginally useful gizmos as push-button dialling, memory dialling, last number recall and the like, is at last going to become the basis of the knowledge and information era that everyone has been predicting for it for years. Now, at last, the hardware is beginning to appear.

There will be those that hold up their hands at this point and say: 'But hardware like that has been around for years,' and I shall say unto them: 'True, but so what?'. It will be in this year, already so loaded with Orwellian 'significance', that at least half of the 'Telescreen' will come onto the market in forms that people can afford. It would not surprise me to see at least one computer/telephone machine being sold in a High Street multiple retailer before the end of the year.

Certainly machines of this type have been around for some years, in both prototype and in saleable form. The West German company Nixdorf, for example, had a system on display back in the late seventies. Nixdorf, a minicomputer maker, was also into PABXs, the local telephone exchanges used internally by many companies and organisations. On one such internal telephone system the company based a complete voice and data communications system that had, as its front end, a combination telephone and computer system. This had all the interesting attributes one might expect to find in such a machine. Not only could it be used as a straightforward telephone for verbal communication, it could also be used as a computer, and to transmit data, electronic mail and all that stuff around the staff of the organisation. Naturally, it could do these things simultaneously, so that one staff member could discuss data and information in real-time mode with another.

There were two major drawbacks to this system, as I remember from those dim and distant days: one was that the telephone system in West Germany, like most of the others around the world, couldn't cope with the level or type of communications traffic such a system would produce (if implemented widely); the other being that it was considerably negative in its cheapness rating. That is hardly surprising, I suppose. After all, it was one of the first, and at least partially experimental in nature.

Since that time, however, things have started to change. British Telecom, in common with many other telecommunications authorities around the world, has begun the long process of physically taking the information technology theories into the bosom of its corporate heart. The infrastructure needed to cope with the type of communications traffic smart phones are going to produce is now either in place, or at least planned for. So now, the smart phones dedicated to the purpose can start to appear.

No sooner said, of course, than done. One of the first to come to my notice has come from Televideo in the dear old US of A. This company, best known for its display terminals but with a recent track record of producing interesting business microcomputers, has just introduced what it calls a personal terminal. This is a screen-based machine, with keyboard and (admittedly still optional) modem and telephone attachment.

Another system, this time with integral modem and telephone handset, comes from a British company, BCD Telemail. This one has received a £200,000 investment from Imperial Life Assurance of Canada which is interesting, for once the likes of insurance companies and property corporations start investing in products like this, one can assume that the technology, the companies and the market are being considered relatively 'safe'.

What these latest introductions have in common with the Nixdorf system of all those years ago is that they are primarily directed towards business applications. This is probably only as it should be, for it is the business community that has the money to spend on purchasing sophisticated machinery that makes life easier.

But as with other aspects of computing, there are parallels here with the hobbyist/home user/computer freak and the influence of such people on microcomputers. As it was in the beginning, so it is now. It was the hobbyists and freaks that started the whole microcomputer business in the first place. Today it's the hobbyists and home users that are, through the introduction of such items as modems for Spectrums and Beeb machines on the Prestel-based Micronet system, leading the industry along.

Many companies in the business will not believe that there is a market for such communications-oriented hardware. Others will not believe that the time is yet right for such products. Others, still, will be prepared to gamble, and it is a gamble that I feel could easily pay off, and pay off now.

There are two immediately predictable types of system that can be foreseen coming from the industry. Equally predictably, they will be a business machine and a home user machine.

The business system is the easiest to specify, if only because all the technical bits of hardware and software needed for a basic machine are now available. It will be a complete box, incorporating screen, keyboard, processor/memory, disk drives and maybe even a printer. To this basic computer configuration will be added an integral modem and a full telephone handset system with all

STATEMENT



Illustration by Mark Watkinson

the necessary gizmos.

On the software side it will, for better or worse, require some compatibility with the IBM PC and need to feature some degree of concurrent operational capability. This latter will be essential if the slow speed of communication is not to constipate the machine totally. Ideally, it will have a more powerful processor than the Intel 8088 which powers the IBM PC. This will be able to emulate the 8088 for compatibility, but will be able to grow into other, more powerful operating system areas.

A major advantage of telecommunications is a dramatic increase in locational flexibility and so it is safe to expect a portable computer as an essential member of any serious manufacturer's product portfolio.

The home front machine is more difficult to predict, if only because just about any strange applications idea is likely to be successful. Here, the physical relationship between the two elements of computer and telephone could possibly be reversed. Instead of the phone being an adjunct to the computer, in the home machine the computer could be an adjunct of the phone. The type of application where this structure might arise is anywhere the phone is used as the prime medium, with the computer providing essential, but secondary facilities. For example, this could be in the classic application of teleshopping, where the bulk of the communication could still be verbal (if only to a speech synth/recognition computer) with the home machine providing the essential services of handling banking transactions, logging orders and printing out confirmation slips during the 'conversation'.

This is a shift in emphasis that I see coming in much of home computing. For the present the computer is important in its own right, but I feel that will change. After all, we admire the labourer and the hole, not the shovel. For the games players, computers will be built into the television sets, and the games will come from the broadcasting companies (if they have an eye for a fast profit).

In most other home applications, the computer is similarly unimportant of its own accord. It is what the thing does that's important, and what it does will normally best be integrated into the 'where' it does it. That will mean a telephone that just happens to have a computer built into it.

All this could be academic of course. The USA is the single biggest market for products of this type, and in telecommunications that used to mean that American Telephone and Telegraph (AT&T) was the sole arbiter of what happened to and with the phone system. Now, as with the UK, the US phone system is being deregulated, and AT&T's monopoly is being broken up. One US company slightly pleased about this is none other than IBM, which has wanted to break into the mainstream phone business for years. Now it has the chance and is poised to take it.

There is just the chance that having IBM compatibility may not be just 'advisable' for smart phone manufacturers. It could end up as the order of the day. Ah, well.

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 £3000.

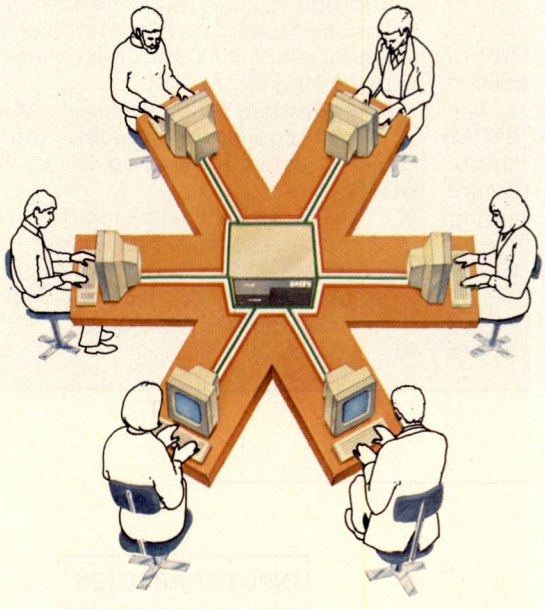
Businessman Brown, with a similar problem and a prudent eye on the future, opts for the SAGE. It costs him £5500, but it does have 4 times the capacity and can handle up to 6 users.

In no time, Smith's staff have taken to computing and want a second machine – another £3000.

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.





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THE COMPANY COMPUTER

TEACH YOURSELF ASSEMBLER

This month we continue our definitive introduction to assembly language programming with Paul Overaa's discussion of the 'alternation' structured building block.

Last month we defined sequence and repetition, and illustrated the ideas with a short program. This month we'll define alternation, the third and last of our structured building blocks. Simple alternation is exemplified by structured Basic's IF — THEN — ELSE type of coding. We can indicate the essential features using flowchart and Warnier diagram forms (see Figs 1 & 2).

We call this form 'simple' alternation in order to distinguish it from those cases involving more than two alternatives. We are implying, in both representations, that any necessary preselection processing will have been performed.

A choice has to be made between two sets of actions based on a specified condition. Simple or 'binary' alternation, as we have shown, represents the existence of two mutually exclusive operation subsets. The idea can be generalised to condition tests with *n* mutually exclusive outcomes. This leads to the corresponding existence *n* mutually exclusive operation subsets within the logical program description.

This month we give you an illustration of how 'alternation constructs' can be created when writing programs in assembly language. To keep to familiar ground, we'll examine a slightly more complex problem related to the 'collection of characters' program shown last month.

Problem & solution

To write a routine to collect input from a keyboard and differentiate between control and printable characters. The routine should end when CARRIAGE RETURN key is pressed. Other control characters less than ASCII value 32 are to be ignored although a warning 'Bleep' is to be given. All other input characters should be echoed to the VDU screen (see Fig 3).

The problem is well defined. We need some sort of input routine; we need to compare each collected character to see if it's a carriage return, that is, an ASCII 13 character. If it isn't, we need to know if it's another control character or a character to be printed.

Let's look at the equivalent Warnier diagram representation (see Fig 4). Note that we identify mutually exclusive subsets of actions by using a ⊕ sign. Remember that only *one* of these subsets will actually be performed.

What does the diagram tell us? We collect a character using an input routine. If the input character is a carriage return then we exit from the routine. If not, we make a further test to identify whether it's a control character or one to be printed. Having performed one of two possible alternative sets of actions, we return for another input character.

How would we program this in Basic? Here's a translation of the Warnier diagram in a Microsoft Basic form:

```
10    X$="A" 'must force an entry
      into WHILE/WEND loop
20    WHILE ASC (X$)-13'<>0
30    GOSUB 1000 ' some input
      routine collects input in X$
40    IF ASC (X$) <32 THEN GOSUB
      2000 ELSE GOSUB 3000
50    WEND
60    END
```

Subroutine 2000 will perform those actions concerned with 'printing a bell', and subroutine 3000 will concern itself with printing a character.

An equivalent form, and one that in terms of coding is arguably more efficient, can be obtained by using GOTO:

```
10    GOSUB 1000' some input
      routine collects input in X$
20    IF ASC (X$)=13 THEN END
30    IF ASC (X$) <32 THEN GOSUB
      2000 ELSE GOSUB 3000
40    GOTO 10
```

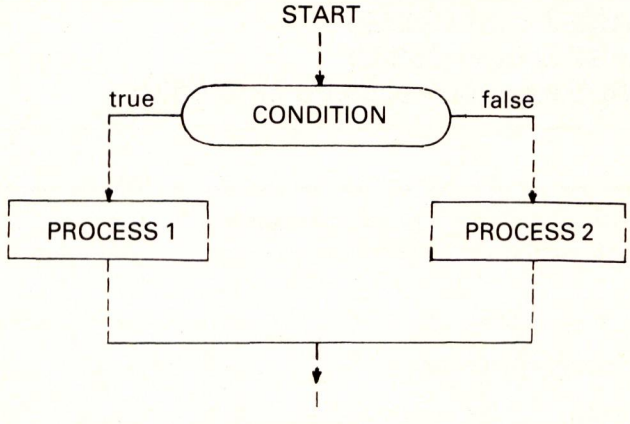


Fig 1. Simple alternation Flowchart Form

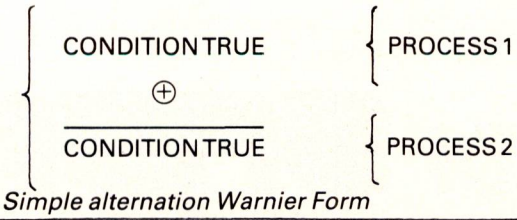


Fig 2. Simple alternation Warnier Form

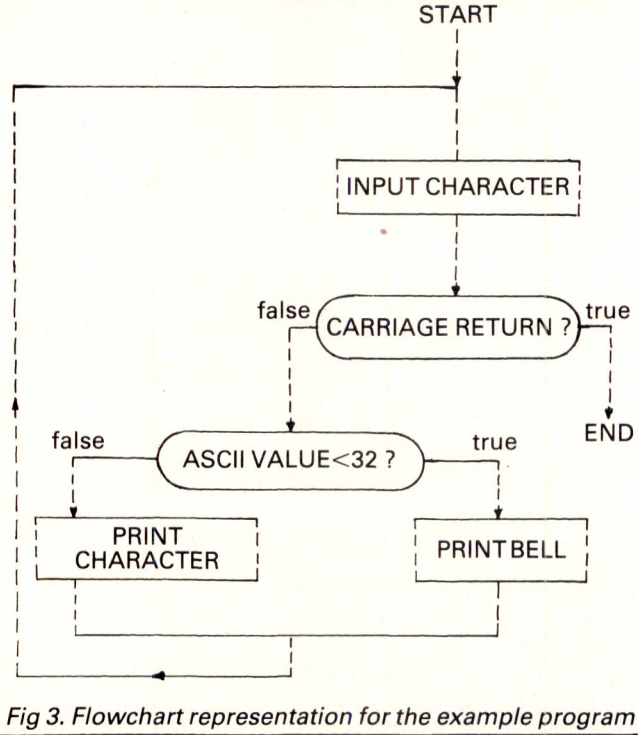


Fig 3. Flowchart representation for the example program

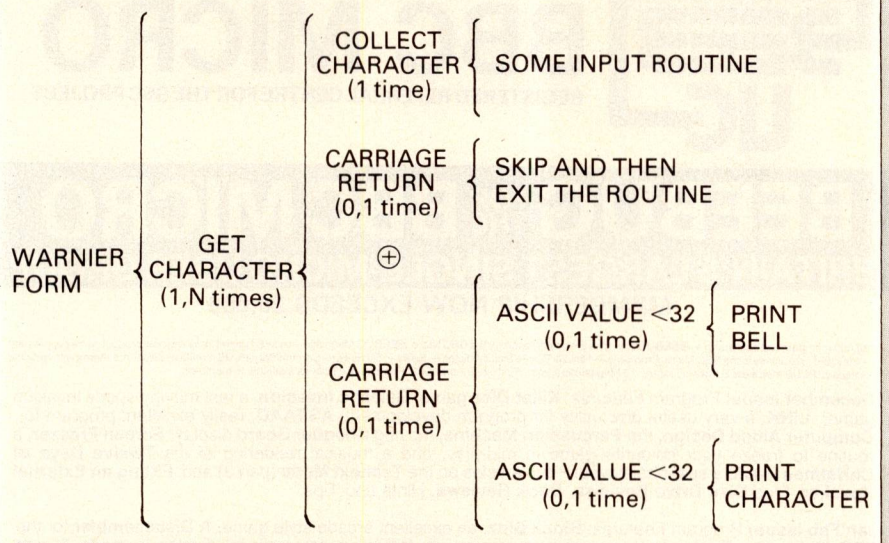


Fig 4. Warnier diagram for the example program

Such a form is perfectly acceptable and shows a correct use of GOTO. It's only when they are used incorrectly that they create 'tangled' code that is difficult to maintain, difficult to understand and prone to errors.

You should not be misled into thinking that, because a language is called unstructured, it is not possible to write well structured programs using that language.

Let's look at general ideas. We'll move on to the practical solution of our problem later. We're dealing with a particularly simple form of alternation, which is usually coded in its own special and very simple way.

Carry flag

Last month we used 'immediate' comparsion instructions to test for equality. The instructions used were the 8080's CPI operand, the Z80's CP operand and in the case of the 6502 we used CMP # operand. When the contents of the accumulator are the same as the immediate byte specified, then the internal subtraction that occurs during the comparison results in the zero flag being set.

When these comparison instructions are used, several other flags are affected. Our present concern is the effect of these operations on the carry flag. We can tabulate all possible outcomes of such testing as in Fig 5:

In all cases, the contents of the accumulator, and of the immediate byte value specified, are treated as simple binary data.

We use the carry flag to detect control characters. For the purposes of our example, we define a control character as one having an ASCII code of less than 32.

8080 form

Let's look at the main part of an 8080 assembly language interpretation of these forms (Fig 6) and make some observations.

The 8080 mnemonics CC and CNC stand for 'call on carry' and 'call on not carry' respectively. They illustrate the concept of a conditional subroutine call, whose function is to perform the specified subroutine call, but only if the necessary flag condition is satisfied.

A more efficient form of coding is shown in Fig 7. It's more compact and satisfies the requirements of our problem, but you'll see later that problems can occur which, at present, are not immediately obvious.

We use an input routine to collect a character: this is returned in the accumulator register. The CPI instruction compares the value of CARRIAGE$RETURN (which will have been previously set to 13 by an EQU directive), to the ASCII value of the character present in the accumulator. If the character present in the accumulator is a carriage return the zero flag will be set. As in the first form, the JZ instruction following this means we exit from the routine as soon as a carriage return character is detected.

If the character being looked at is not a carriage return, then we compare the accumulator contents to the value SPACE (again previously defined by using an EQU directive). *If the character present in the accumulator has an ASCII value less than 32, that is, if it's a control character, then the 8080's carry flag will be set. Otherwise the carry flag will be clear.*

In both these examples, we are using the carry flag to implement the equivalent of an IF — THEN — ELSE structure. If the carry flag is set we do one set of operations; if the carry flag is not set we perform the alternative set of operations. The only necessary stipulation is that the status of the flag being tested must be preserved by the first of the subroutines to be called.

CONDITION	CARRY FLAG	ZERO FLAG
Accumulator > Immediate Byte	Cleared	Cleared
Accumulator = Immediate Byte	Cleared	Set
Accumulator < Immediate Byte	Set	Cleared

Fig 5. Carry flag operations

8080 — VERSION — 1

```
START:          CALL   INPUT$ROUTINE          ;Character in accumulator
                CPI    CARRIAGE$RETURN        ;End of input if true
                JZ     FINISH
                CALL   NOT$CARRIAGE$RETURN
                JMP    START                  ;Loop back for next character
NOT$CARRIAGE$
  RETURN:       CPI    SPACE
                CC     CONTROL$CHARACTER
                CNC    PRINTABLE$CHARACTER
                RET
```

Fig 6. 8080 interpretation

8080 — VERSION — 2

```
START:          CALL   INPUT$ROUTINE          ;Character in accumulator
                CPI    CARRIAGE$RETURN        ;End of input if true
                JZ     FINISH
                CPI    SPACE
                CC     CONTROL$CHARACTER
                CNC    PRINTABLE$CHARACTER
                JMP    START                  ;Loop back for next character
```

Fig 7. Efficient 8080 coding

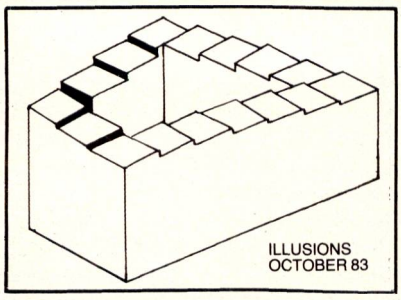
Control$character subroutine

This has to output a bell character. On most terminals this is done by sending the ASCII bell character to the terminal. In Basic you use PRINT CHR$ (7): in assembler a register is loaded with the value 7 and then the system output routine is used to send the character to the terminal. The normal procedure is to define BELL by an equate pseudo operation and the example shown below assumes that this has been done:

8080 VERSION

```
CONTROL$
  CHARACTER:  MVI   A,BELL
              CALL  OUTPUT$ROUTINE
              RET
```

To load the accumulator we are using the instruction 'MVI A,data': this is an example of a 'move immediate' instruction. The data byte following the op code is transferred to the specified



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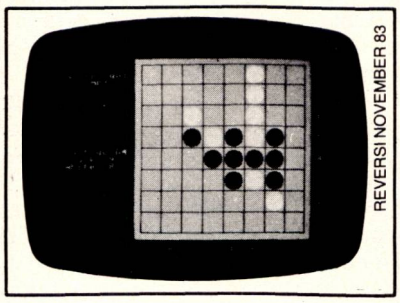

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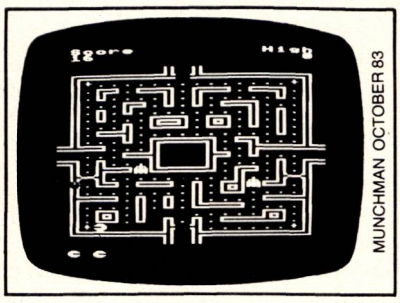

MUNCHMAN OCTOBER 83

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Jan/Feb Issue: Program Features: **Block Blitz,** an excellent arcade style game, **A Disassembler** for the BBC Micro, **the Raybox** game, test your powers of deduction, large digital display in mode 7, and **Dancing Lines,** an interesting visual demonstration of random numbers. Plus articles on **Machine Code Graphics,** the first of an introductory series. **Teletext Mode** (Part 4) with a set of useful procedures, protecting your own programs, and an introduction to **Forth.** Plus review of double density disk controllers, graphics tablet and new software, Product news, Post bag, Hints and Tips.

STOP PRESS
BEEBUG has negotiated a deal with ACORN over the new 1.2 OPERATING SYSTEM ROM. BEEBUG members are offered the ROM at around half-price. See BEEBUG Feb. issue for details.

SOFTWARE DETAILS

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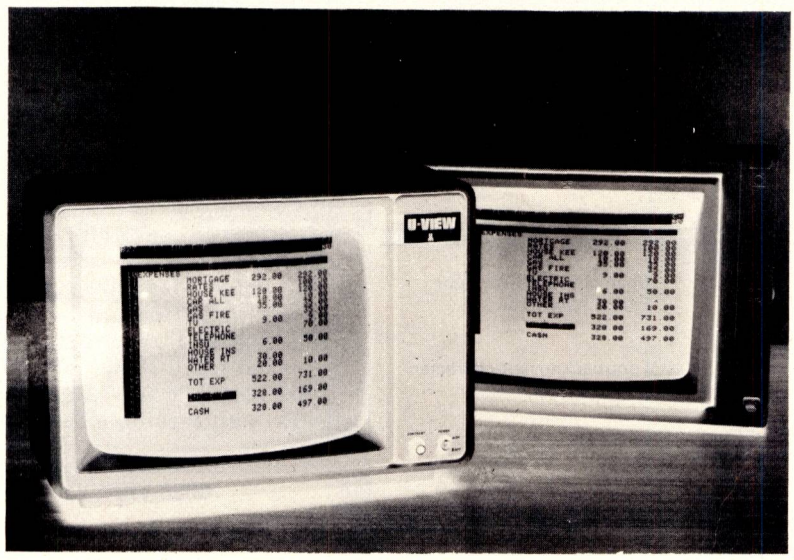

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Continued from page 123

register. We are specifying the accumulator, but it's also possible to use the instruction to load either B,C,D,E,H or the L registers. Note that we have now seen two immediate load 8080 instructions. MVI is used to load 8-bit values into a selected register. LXI is used to load a 16-bit value into a selected register pair (we used it last month to set up the stack pointer).

Printable$character subroutine

This simply has to output the character present in the accumulator, that is, it's your system output character routine.

Z80 form

The Z80 has conditional subroutine call capability similar to the 8080 processor. The syntax expected for the conditional subroutine calls is slightly different but this does not affect the essential ideas. We'll give the equivalents of the two versions of the 8080 code (Fig 8) and then explain why the version 1 forms have possible advantages.

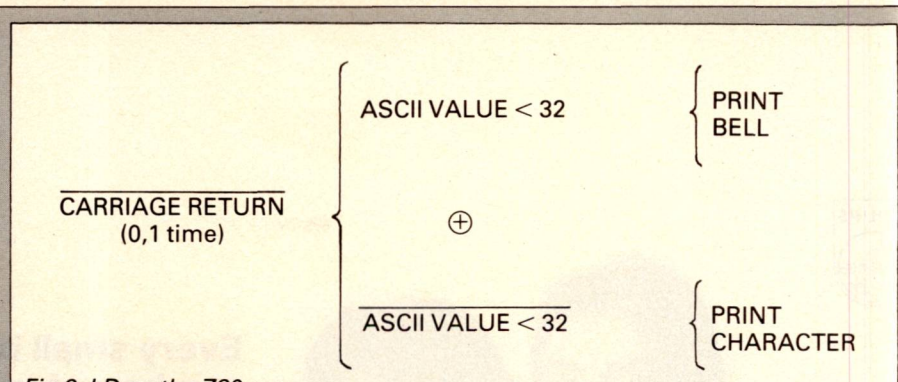

Fig 9. LD on the Z80 processor

memory that follow the op code (the instruction byte itself). LD on the Z80 processor, when used as shown below, is using immediate addressing: additionally, it's used to represent data transfer using other addressing modes.

Go back now and look at the flowchart we are using for the example program. Can you pick out the subset of actions associated with 'not finding a carriage return character'? You'll probably agree that even in this simple example, the isolation of such subsets is not particularly obvious.

Z80 VERSION 1

```
START:              CALL   INPUT$ROUTINE              ;Character in accumulator
                    CP     CARRIAGE$RETURN            ;End of input if true
                    JP     Z,FINISH
                    CALL   NOT$CARRIAGE$RETURN
                    JP     START                      ;Loop back for next character
NOT$CARRIAGE$
  RETURN:           CPI    SPACE
                    CALL   C,CONTROL$CHARACTER
                    CALL   NC,PRINTABLE$CHARACTER
                    RET
```

Z80 VERSION 2

```
START:              CALL   INPUT$ROUTINE              ;Character in accumulator
                    CP     CARRIAGE$RETURN            ;End of input if true
                    JP     Z,FINISH
                    CP     SPACE
                    CALL   C,CONTROL$CHARACTER
                    CALL   NC,PRINTABLE$CHARACTER
                    JP     START                      ;Loop back for next character
```

Fig 8. Z80 forms for 8080 code

The Z80 has equivalent instructions to load a specified register with an 8-bit data value. The mnemonic LD, when used in the form 'LD register, 8-bit data value', is representing an instruction identical to the 8080's MVI. (When used in the form 'LD register pair, 16-bit data value' it is equivalent to the 8080's LXI instruction.)

Z80 VERSION

```
CONTROL$
  CHARACTER:  LD     A,BELL
              CALL   OUTPUT$ROUTINE
              RET
```

The LD mnemonic is, however, also used to represent register loading operations other than the loading of immediate data values. Some have 8080 equivalents that use different mnemonics, some do not have 8080 equivalents at all. Bear in mind for now the main distinction, *viz*: MVI and LXI on the 8080 are register loading instructions that use immediate addressing; that is, the operand is the bytes in

Try to find the same subset on the Warnier diagram. (Remember that we write the logical opposite of a statement by placing a bar over the statement.) The subset we are discussing is shown in Fig 9.

The reason we're particularly interested in this subset is because the 8080 and Z80 first versions explicitly treat the coding involved as a distinct subset; that is, actions corresponding to 'not carriage return' were implemented as a 'called subroutine'. The code is therefore related to the design diagram on this basis: the action subset is defined by coding as a subroutine. The advantage is that the structure of the diagram and the coding is isomorphic (a word used by mathematicians to imply structural similarity.)

The coding in the second version performs the same function as the coding in the first, but the action subset 'not carriage return' is not explicity defined in the second form of code. The difference may not be immediately apparent to you, so let's briefly digress to explain this point.

There is a real advantage, especially when writing large assembly language programs, in being able to easily locate the section of the code that is relative to a particular action subset in the corresponding design diagrams. Such advantage is paid for by a slightly increased program size.

Hardcore assembly language programmers often take great exception to 'wastage of bytes' in this manner, and for certain applications their objections are justifiable. Our defence in general terms is two-fold. Firstly, it's often of great practical advantage to have isomorphic coding with the design diagrams. Secondly, memory is getting cheaper but debugging time is not. Explicit subset definition based on isomorphism between the design diagram and the actual program code contributes in practice to significantly reduced debugging time. The message is simple—save bytes by all means, but distinguish carefully between pointless inefficiency and the deliberate choice of using a few more bytes to create code that can easily be compared to the design diagrams.

6502 form

Our 6502 processor cannot perform

6502 VERSION

```
START:              JSR    INPUT$ROUTINE
                    CMP    #CARRIAGE$RETURN
                    BEQ    FINISH
                    JSR    NOT$CARRIAGE$RETURN
                    JMP    START
NOT$CARRIAGE$
  RETURN:           CMP    #SPACE
                    BCC    N$C$R$1
                    JSR    CONTROL$CHARACTER
                    RTS
N$C$R$1:            JSR    PRINTABLE$CHARACTER
                    RTS
```

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conditional subroutine calls. We must therefore find a way of creating such a facility. One fairly obvious solution involves using the 6502's relative branch instructions to select an appropriate subroutine (several of these are available). Since we're using the carry flag to detect control characters we can use the 'relative branch on carry clear' (whose mnemonic is BCC). With only slight rearrangement we can also use the complementary test BCS, which is the 'branch on carry set' instruction. The bulk of the code shown (see previous page) should be familiar, the differences are due only to the absence of conditional subroutine calls on the 6502.

Don't be fooled by the presence of two RTS instructions — only one will actually be performed; that is, if the carry is set then the conditional relative branch is not performed, so we can execute the CONTROL$CHARACTER subroutine followed by a return instruction. If the carry is clear, the relative branch is performed, then PRINTABLE$CHARACTER is performed followed by the alternative return instruction.

6502 VERSION

```
CONTROL$
  CHARACTER:   LDA  # BELL
               JSR  OUTPUT$ROUTINE
               RTS
```

The CONTROL$CHARACTER subroutine in 6502 form is similar in principle to both the 8080 and the Z80 forms, we simply load the accumulator with the BELL character. The mnemonic used is LDA # data (the '#' sign is a 6502 mnemonic convention that indicates the operand is to be obtained from the next byte in memory; that is, it's signifying an 'immediate addressing' mode.

Practical solutions

We have used our example to explain some general ideas. There is a very good reason why you would not, in practice, actually need to write subroutine based code for this particular example. Look back at some of the coding and think how we output printable characters, and how we output the ASCII bell character. In practice, we'll be using the accumulator to output the printable characters: we'll also use the accumulator to output the bell character. We will also, in both cases, be using our system OUTPUT$ROUTINE to send the character to the terminal.

The practical implementation of our problem has a certain amount of common ground that has not been used in our earlier general discussions. We now consider and modify our flowchart/design diagrams in the light of the above information (see Fig 10).

When we consider fully the practical implementation of our problem we see that one of the alternation subsets is a 'do nothing' process.

This type of structure is frequently handled by simple in-line conditional relative branching or conditional jumping. Based on a condition, we either perform some section of code, or avoid it by jumping over it. Bear in mind that this type of structure is a subclass of the simple alternation we first dealt with. There are still, from a theoretical viewpoint, two sets of actions. The distinction is that one of the subsets is an 'empty set'.

Having possibly struggled through some of the ideas we have presented so far, you will no doubt be pleased to see the assembly language code that results from our most recent efforts. If you've persevered up to this point, you should find the code fairly straightforward. In all three cases, the label PRINT$CHARACTER identifies the location to be jumped or branched to if the carry flag is not set.

You should now appreciate the relationship between simple alternation where two subsets of actions are involved, and the specific case of simple alternation where one of those subsets is an empty set. This month we've shown some of the ways in which the corresponding code can be written.

Last word

The design of our solutions is derived from the logical examination of the problem.

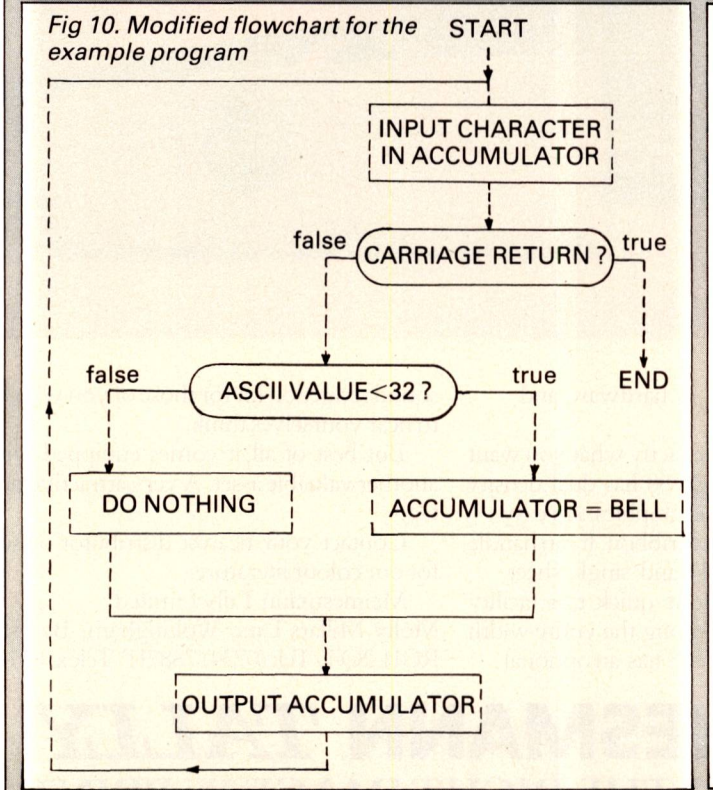
The logical solution exists as an independent entity, and by having such solutions available before you start coding you will side-step many problems that other approaches walk straight into.

approach, we find that we're left with the much smaller problem of how to use an available instruction set to implement an already known logical solution. We would like you to think about the implications (and in particular the benefits) of having language independent solutions available before coding is started.

If last month's 'main block' is modified to incorporate this month's practical solutions you should be able to run a version of the given problem; you might also like to experiment with some of the other ideas we considered.

END

Fig 10. Modified flowchart for the example program



8080 PRACTICAL SOLUTION

```
START:          CALL INPUT$ROUTINE
                CPI  CARRIAGE$RETURN
                JZ   FINISH
                CPI  SPACE
                JNC  PRINT$CHARACTER
                MVI  A,BELL
PRINT$
  CHARACTER:    CALL OUTPUT$ROUTINE
                JMP  START
```

Z80 PRACTICAL SOLUTION

```
START:          CALL INPUT$ROUTINE
                CP   CARRIAGE$RETURN
                JP   Z,FINISH
                CP   SPACE
                JP   NC,PRINT$CHARACTER
                LD   A,BELL
PRINT$ .
  CHARACTER:    CALL OUTPUT$CHARACTER
                JMP  START
```

6502 PRACTICAL SOLUTION

```
START:          JSR  INPUT$ROUTINE
                CMP  # CARRIAGE$RETURN
                BEQ  FINISH
                CMP  # SPACE
                BCC  PRINT$CHARACTER
                LDA  # BELL
PRINT$
  CHARACTER:    JSR  OUTPUT$ROUTINE
                JMP  START
```

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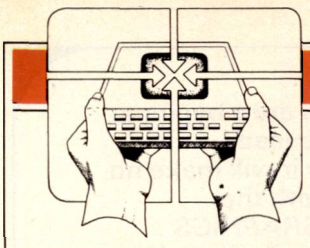

COMPUTER TOWN UK! NEWS

Margaret Spooner brings you the latest news on Computer Towns.

Computer Towns come and go. This is only natural in an organisation which relies on the voluntary efforts of its members and has no formal structure or funding. Two more CTUK!s have folded in the past few months — in Worcester and Sutton in Ashfield. However, there are always people interested in forming new Computer Towns.

The latest name to be added to the Contacts list is J Dale of Newtown, Powys. As secretary of the Newtown and District Computer Club he has plenty of experience in running computer club activities. In addition the club has organised a one-day event — the Mid-Wales Computer Exhibition. It will be held on 24 April from 10am to 8pm at the Robert Owen Suite, Elephant and Castle Hotel, Broad Street, Newtown. Ten companies are expected to exhibit in the home computers section and about 15 to 20 firms on the business computer side. There will also be a separate room for club computers where visitors can book a 20-minute session to gain 'hands-on' experience.

If you live in or near Sutton Coldfield now is your chance to get involved in starting a Computer Town. Dennis Lovatt at Sutton Coldfield Library, 43 Lower Parade, Sutton Coldfield B72 1XX is interested in starting a CTUK! and would like to hear from any 'like-minded Suttonians'.

Guidelines on forming a Computer Town have also been sent this month to Mark Craig, Member Relations Officer, Co-operative Retail Services, Reading Area, 18 Cheapside, Reading, Berks and Gerard Cairns, Librarian, Dumbarton Public Library, Strathleven Place, Dumbarton G82 1BD.

If you've been waiting for a Computer Town in those areas they are sure to welcome your interest, so do contact them.

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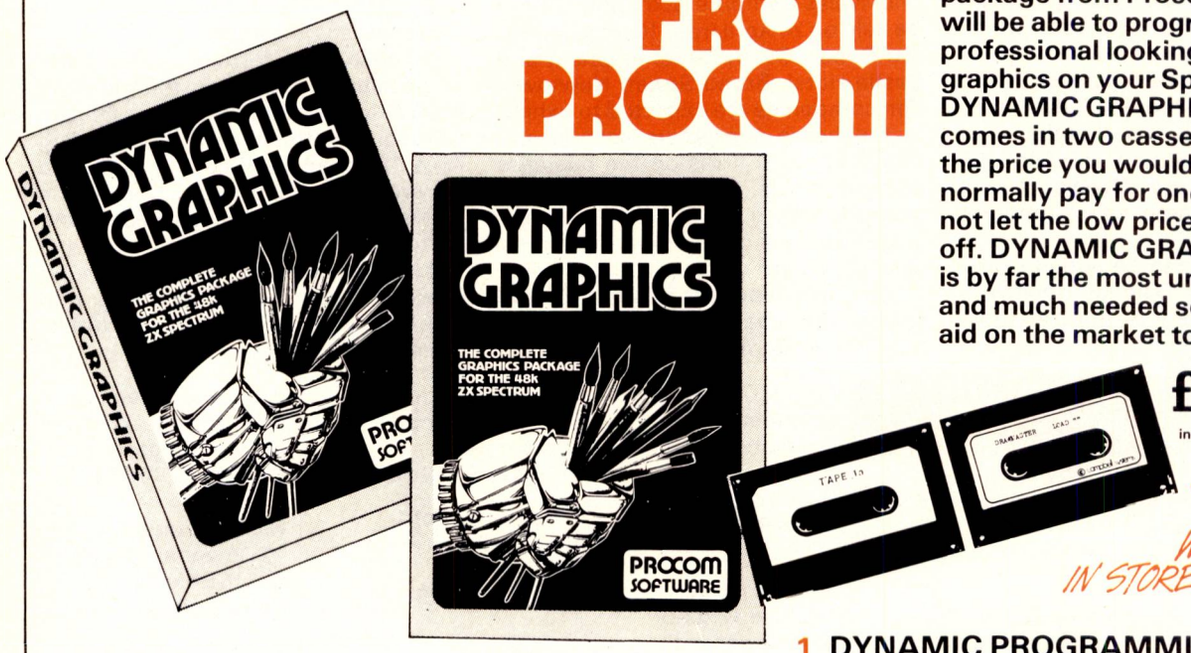

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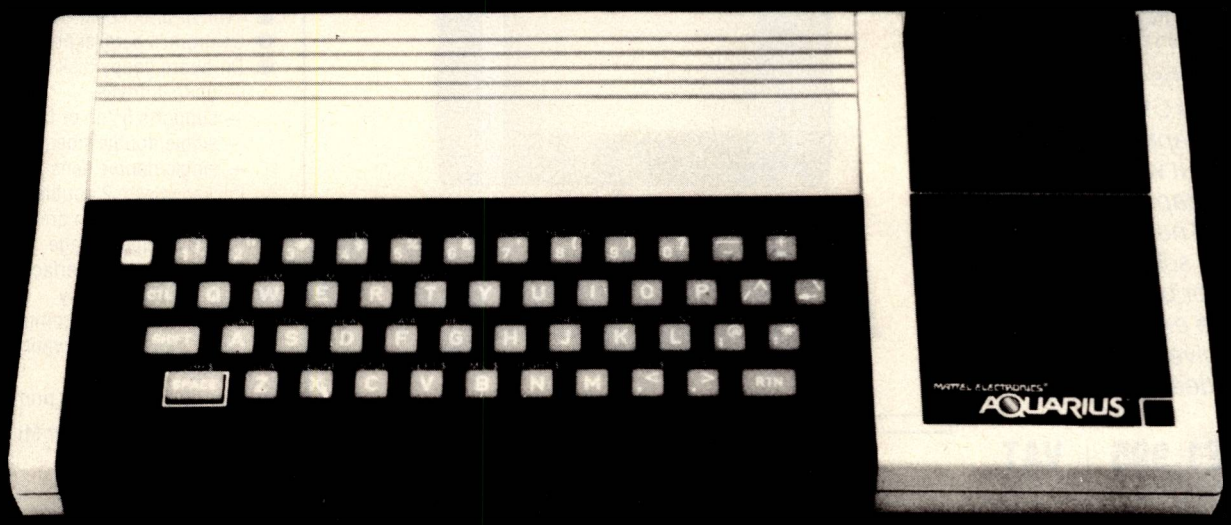

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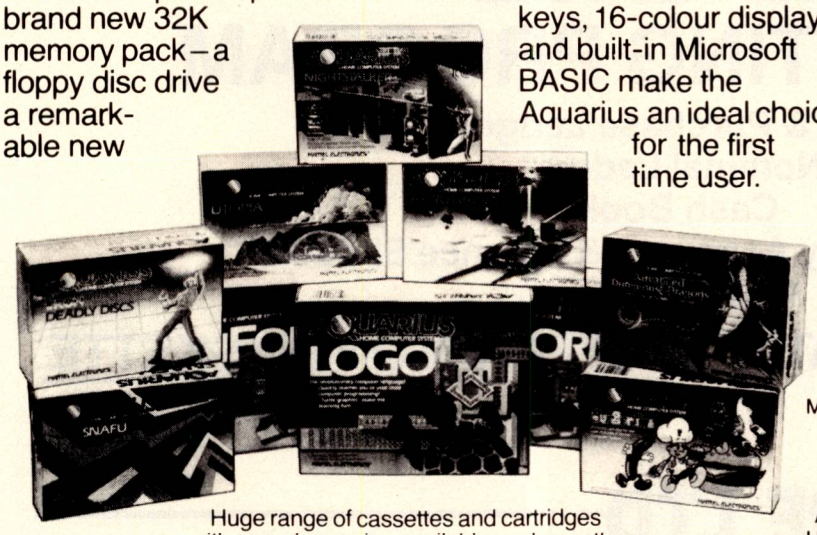

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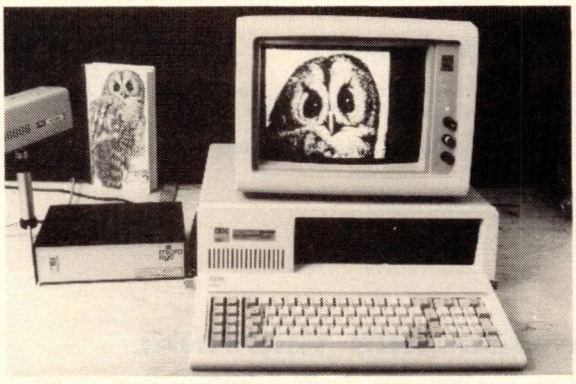

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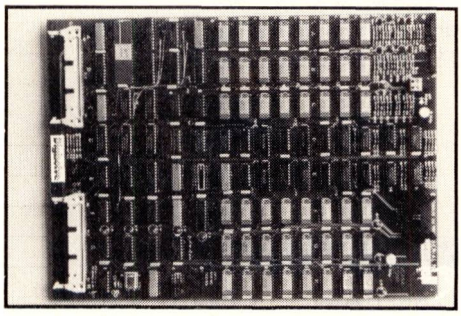

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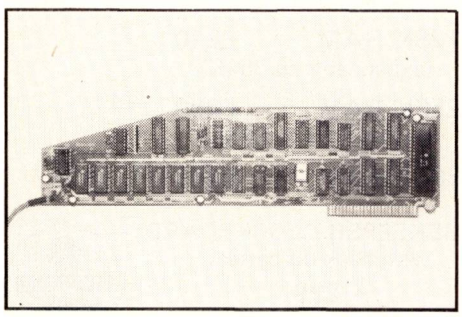

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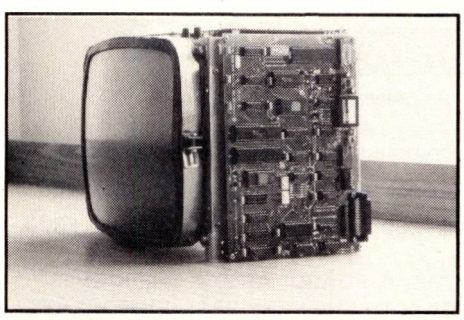

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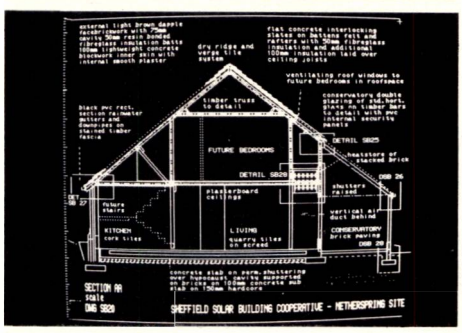

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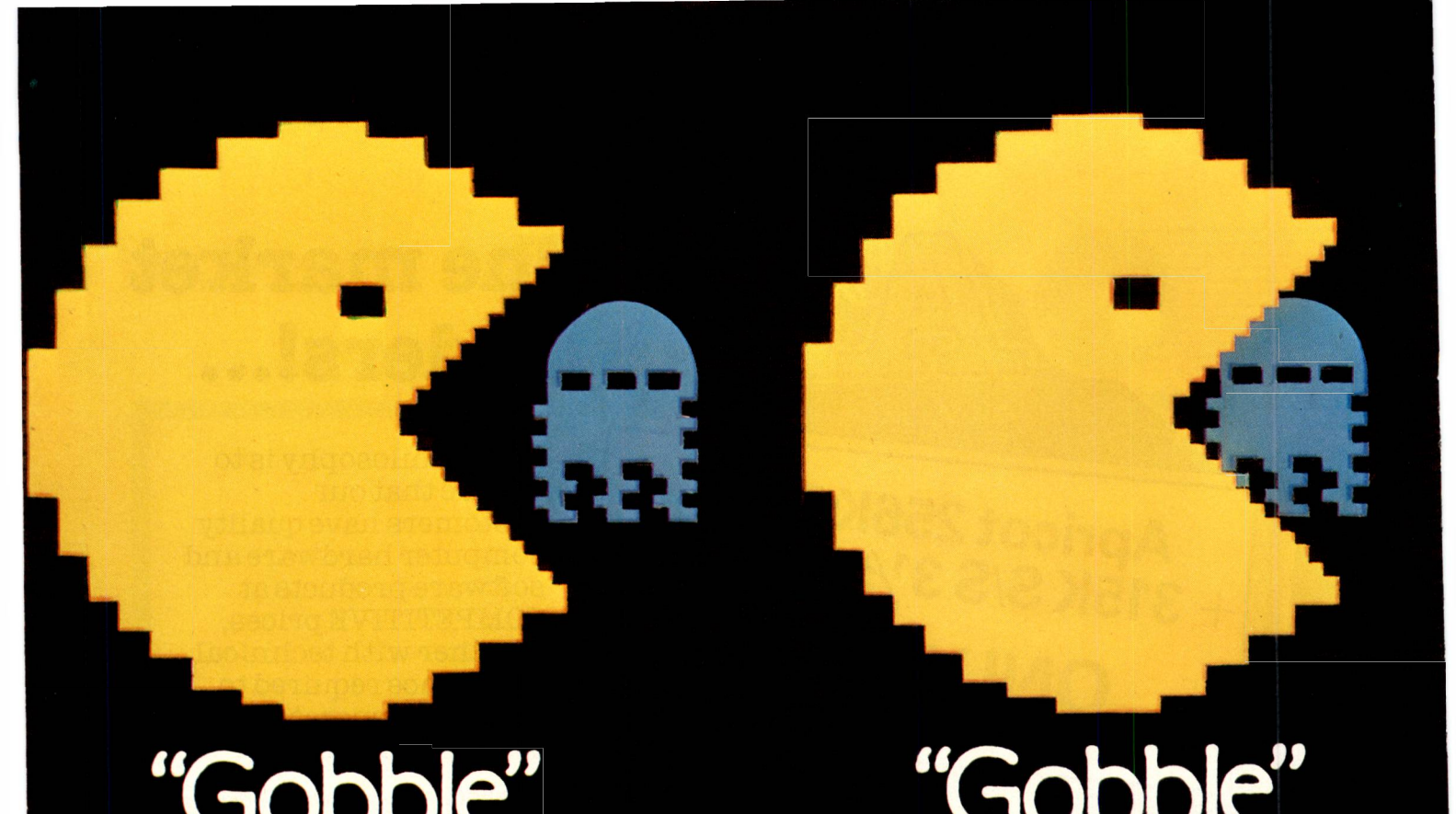

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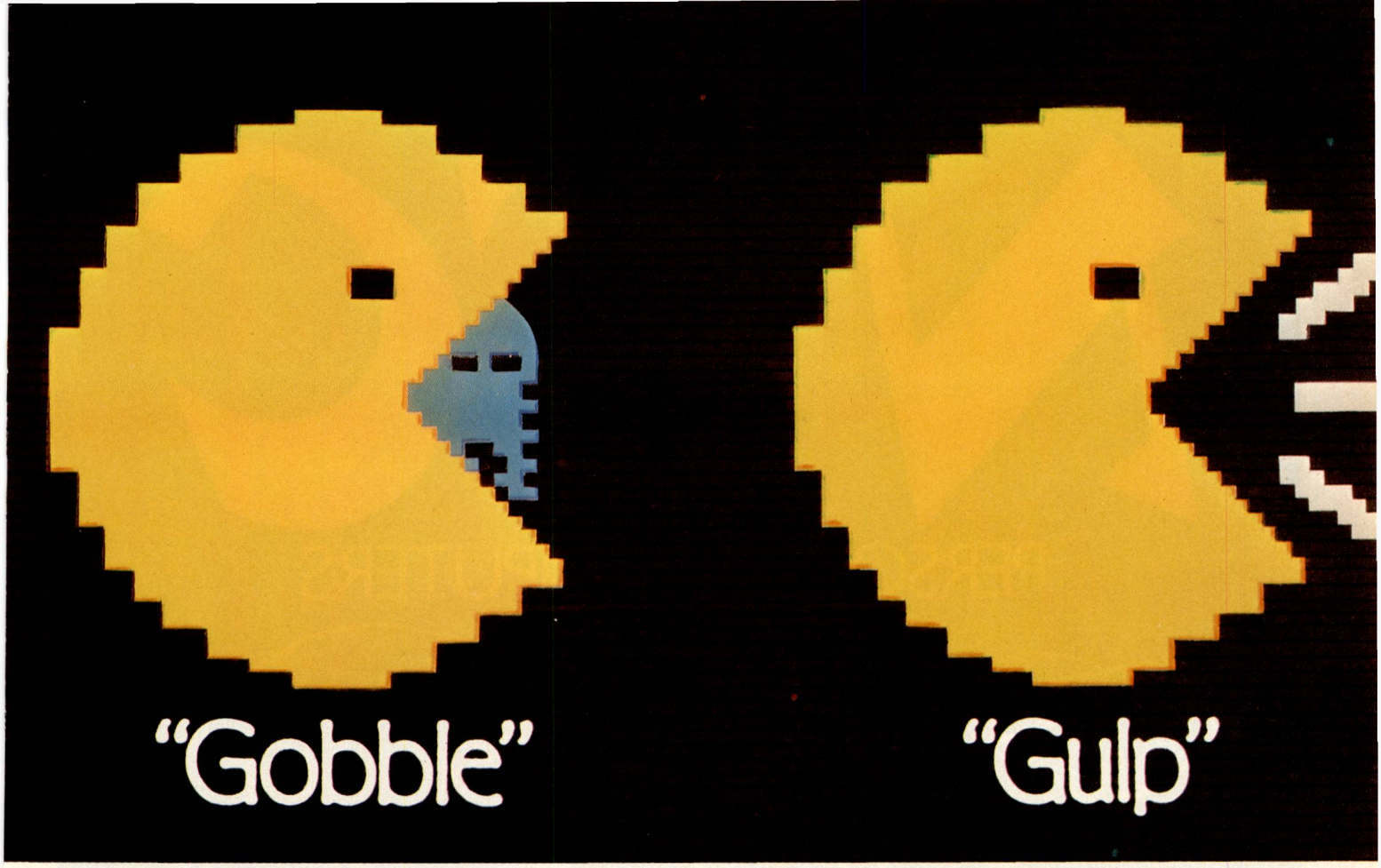

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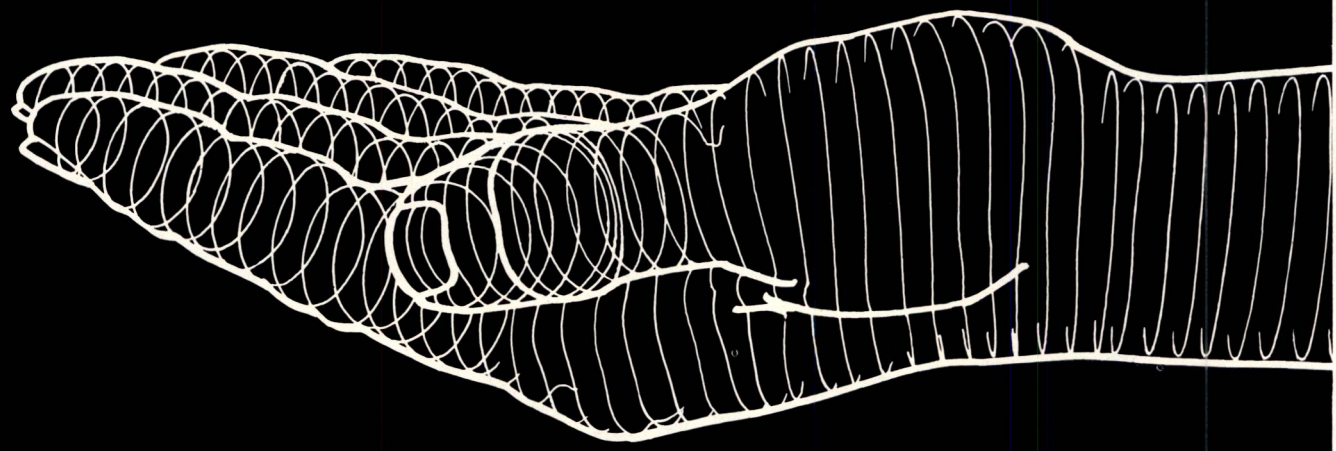

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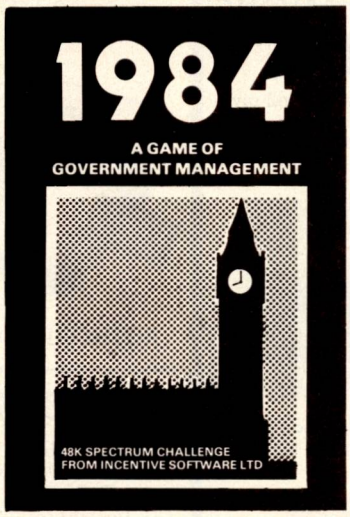

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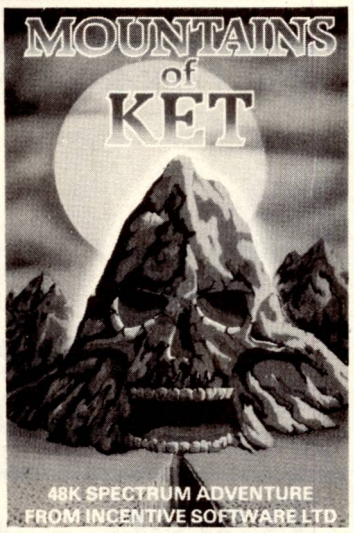



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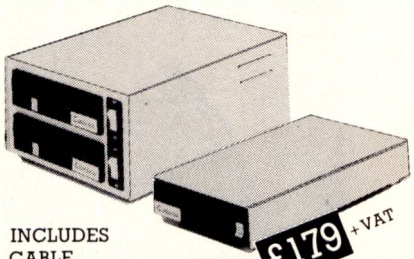

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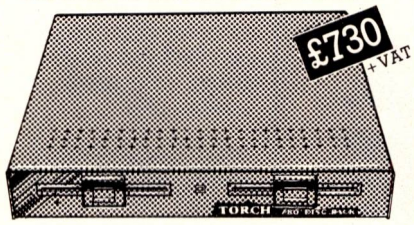

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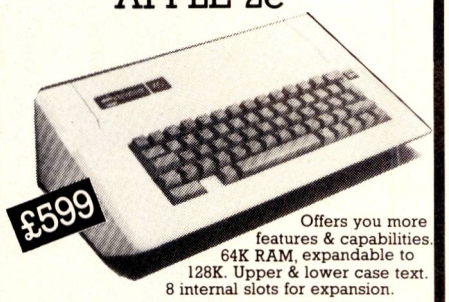

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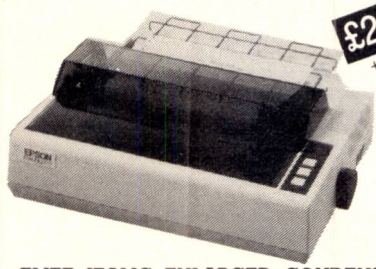

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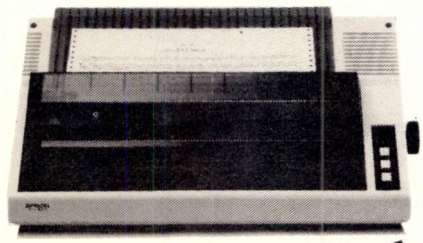

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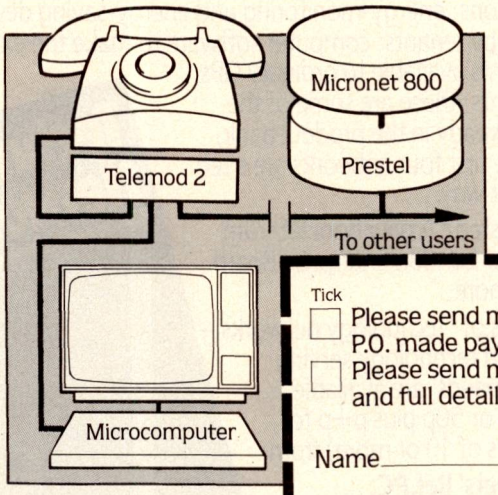

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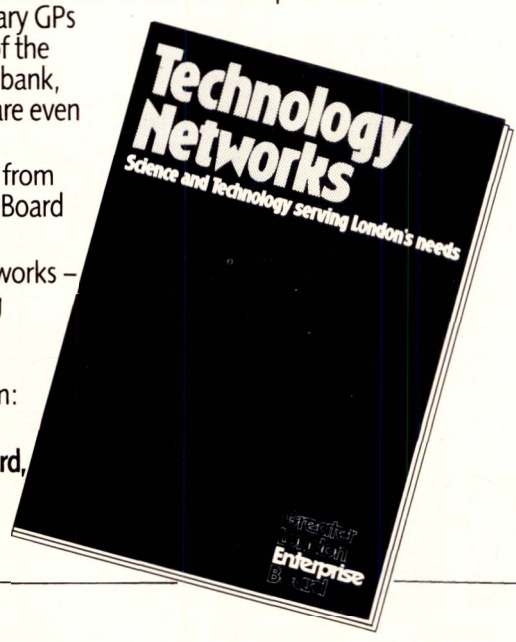

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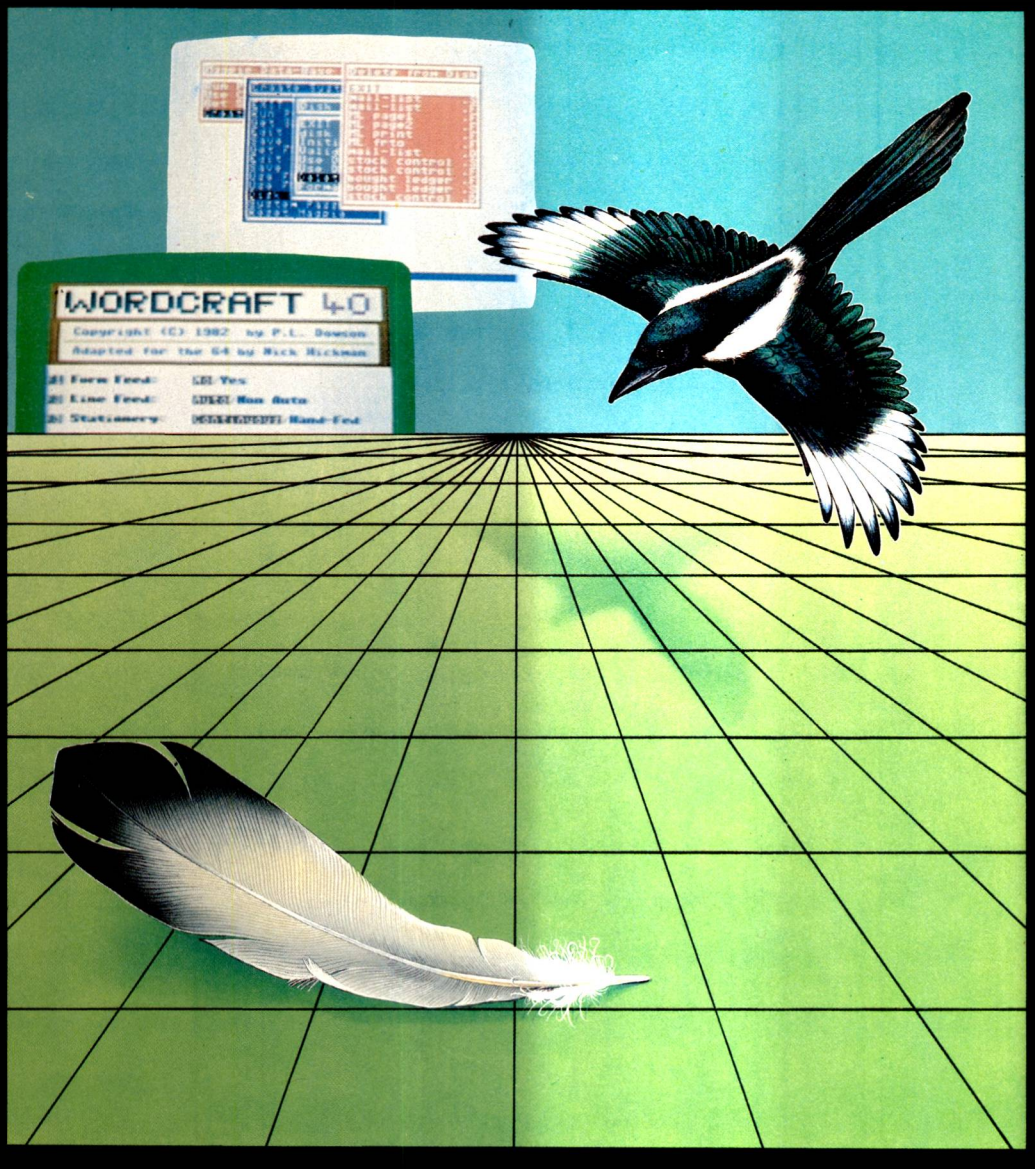

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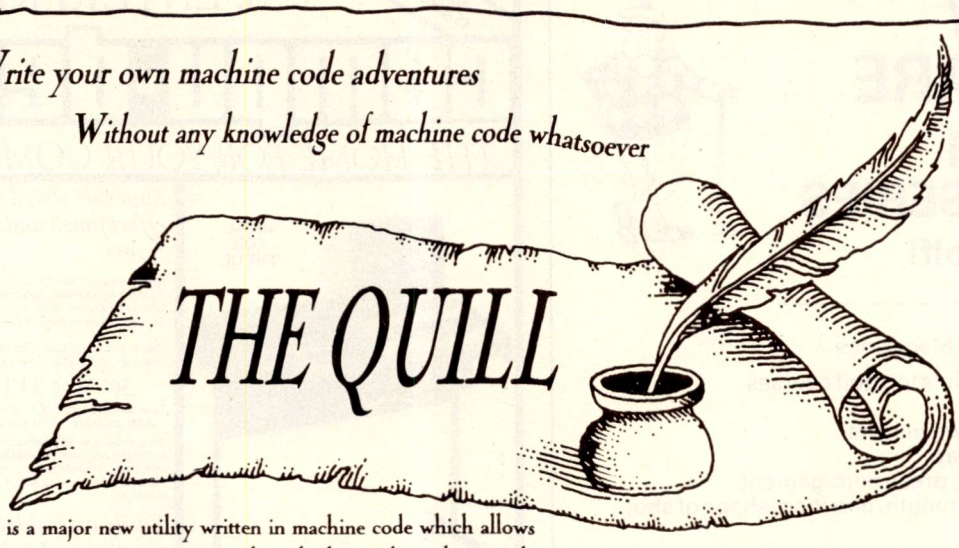

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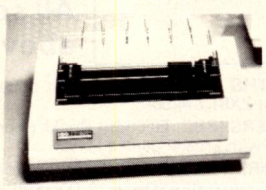

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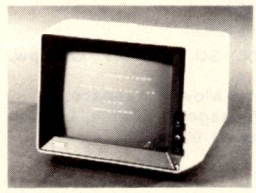

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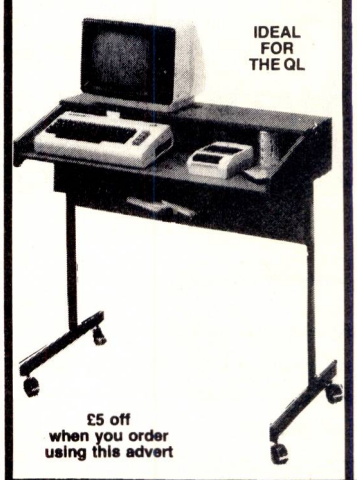

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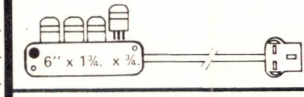

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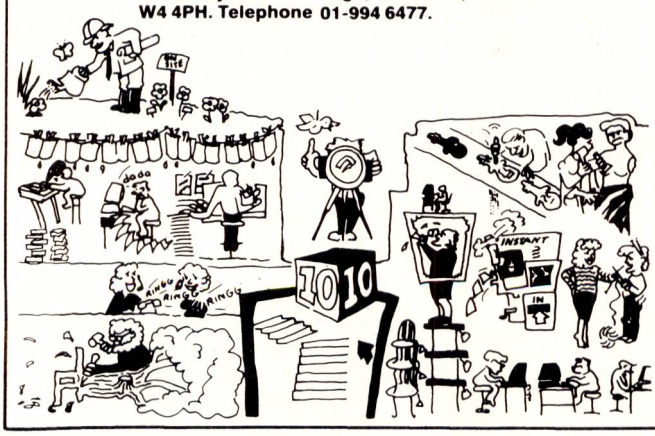

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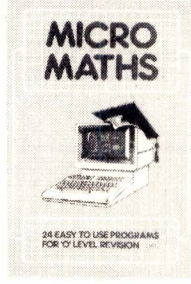

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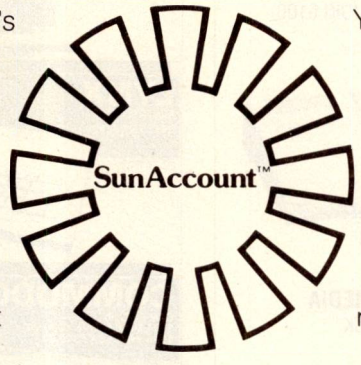

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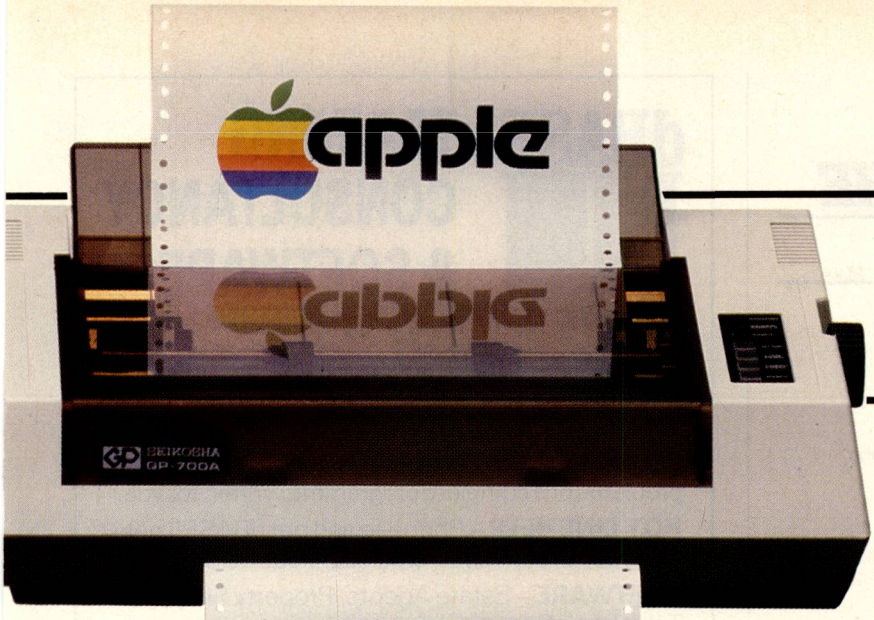

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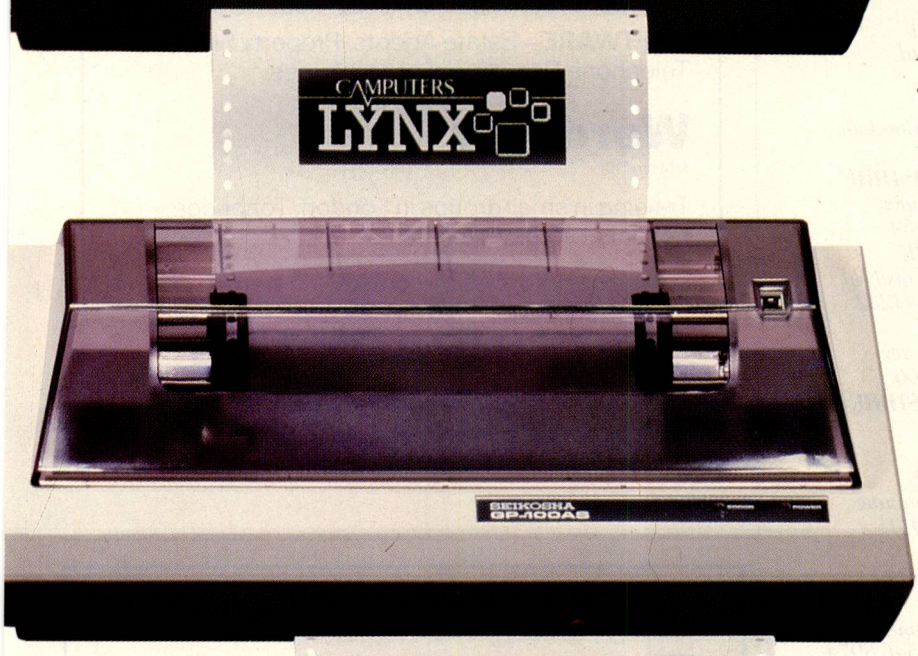

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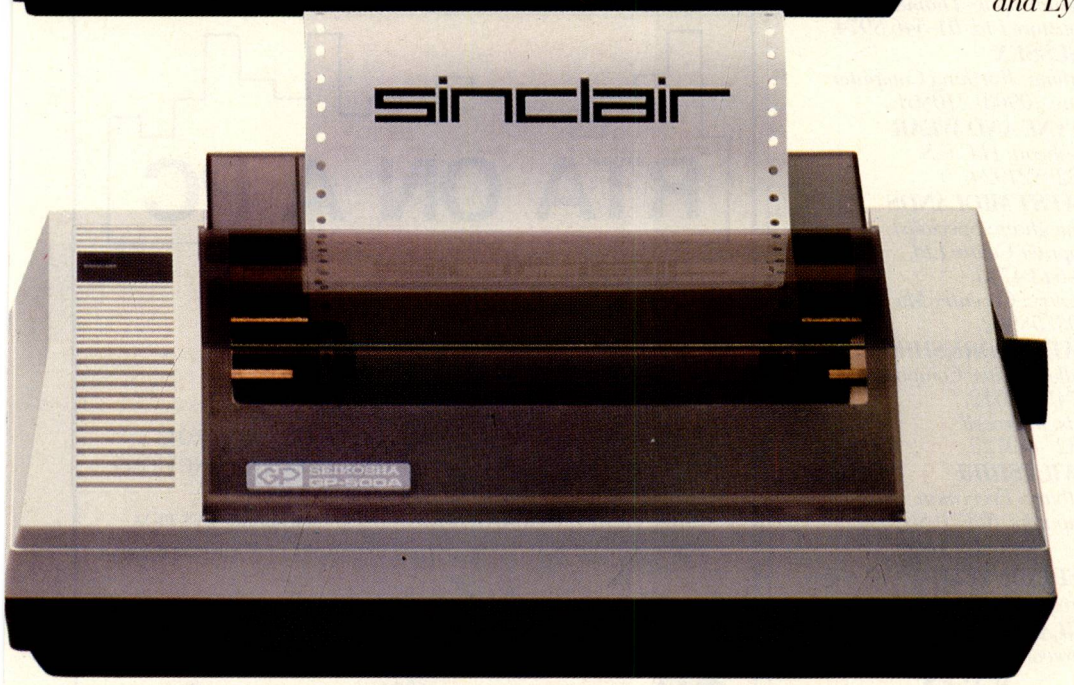

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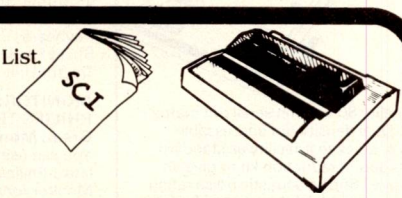

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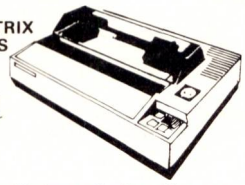

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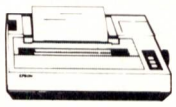

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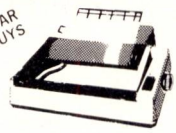

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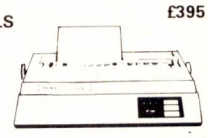

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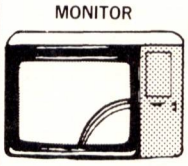

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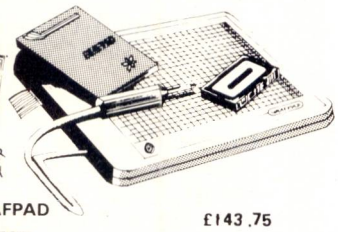

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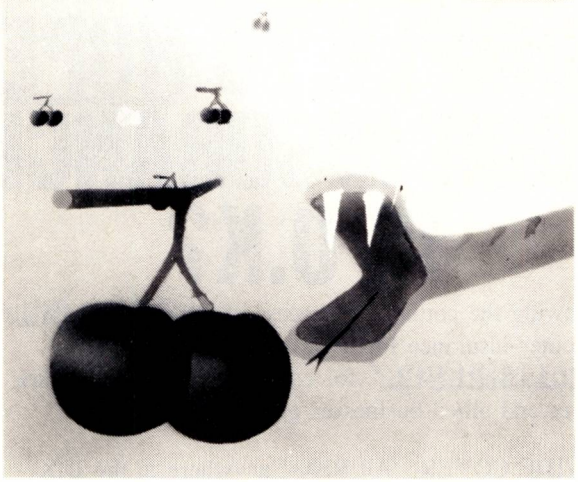

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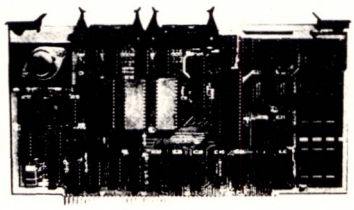

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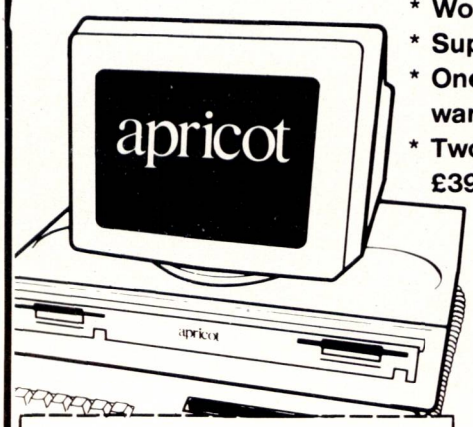

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PC Junior

After months of evasion and secrecy, IBM has finally unveiled the PC Junior. Not yet available in the UK Surya reports from the States on IBM's long-awaited and portentous contribution to the home computer market.



Photograph by Richard Dunoff

After months of rumours and polite 'no comment' from IBM, the PC Junior — IBM's home computer — has finally been launched.

The machine was the subject of much speculation, some of it quite detailed, even before the company officially confirmed that there was to be a new IBM personal computer. Most of the speculators fell into one of two camps: those who believed the machine was going to be a scaled-down version of the PC, and those who felt that IBM had something completely different up its corporate sleeve. As things turned out, the scaled-down PC camp was about right.

The Junior differs from its big brother in a number of ways, but most of the differences are quantitative rather than qualitative. The Junior looks and — to a significant extent — acts like the PC. One of the reasons the Junior has attracted so much interest is that everybody wants to know whether IBM will have as great an impact on the home market as it has had on the business one. The PC made a sizeable dent in the business micro market when it appeared, non-standard operating system and all. Quite what part the three magic letters played in the machine's success is a matter of opinion and, in any case, irrelevant. The machine not only sold, but created a new standard: IBM-compatibility. Time will tell whether the Junior will have this sort of impact on the home market. I think it might, and I think it will also make its presence felt on the small business market — particularly that section dominated by the Apple II.

BENCHTEST

The IBM PC is referred to as the PC Senior throughout this article.

The PC Junior is available in two forms. The entry-level model comprises the system unit, 64k RAM, cordless keyboard and step-down transformer, retailing in the United States at $670. The enhanced model, retailing at $1270, is supplied with 128k RAM and a slimline 5.25in disk drive built into the system unit.

System unit

The system unit, measuring 35x29x10cm, looks like a scaled-down version of the PC system unit—which is exactly what it is.

The unit contains everything except the keyboard and monitor. At the front is an infra-red detector and two cartridge slots. On the enhanced model, the 5.25in slimline drive sits above the cartridge slots.

As with the PC, all the interfaces are at the back of the system unit. With one exception, each is marked with a single letter rather than a full label. Perhaps IBM thinks that 'V' is less daunting to a beginner than 'Composite video'. I found it irritating. From left to right, the sockets are labelled J,J,L,K,LP,T,V, M,D,S,P and A. If you don't understand why I found the labels irritating, try to work out the meaning of these letters before reading any further!

Most of the connections are non-standard, so the sockets themselves don't help. The first two sockets are for two joysticks, one unassigned ('L' stands for 'Later use'). Then there's a socket for the optional keyboard cable, and an as yet fictitious light pen. These are followed by sockets for a TV signal, composite video, optional internal modem (US only), IBM colour display, serial port, power lead and audio output.

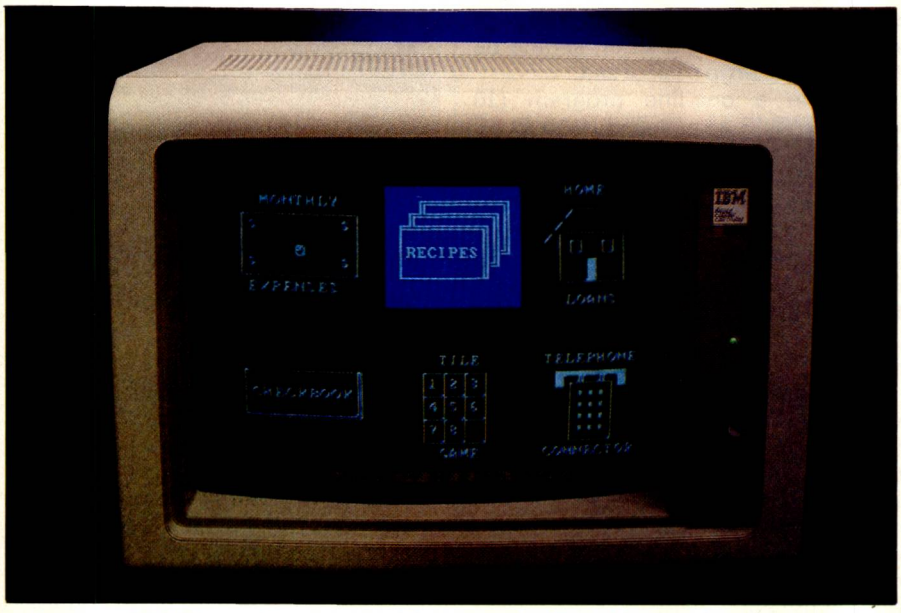
Several essential or near-essential items are sold as 'optional'. The TV and cassette leads would be essential to most users, as would be the keyboard cord if two or more Juniors were to be used in the same room.

Keyboard

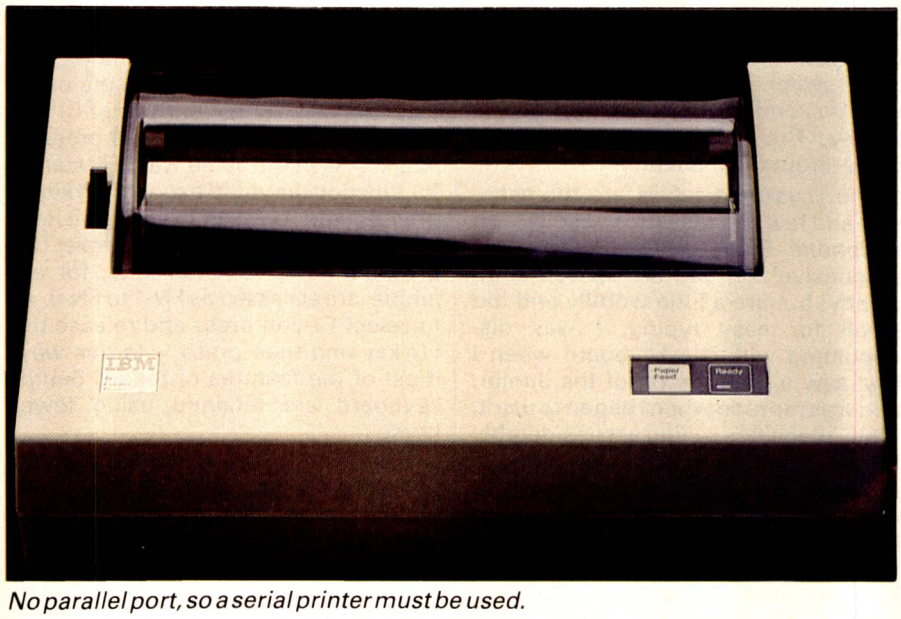
The keyboard measures 34x17x3cm and weighs 700g. The weight is important because the keyboard's main claim to fame is that it's cordless. It sends signals to the system unit via an infra-red beam, the idea being that you can wander around the room with the keyboard on your arm while continuing to use the computer. IBM claims that the system can be operated with the keyboard up to six metres away from the main unit. I put this to the test and found that it's technically true, but only



The infra-red keyboard: novel, but of little practical benefit.



Enhanced IBM PC graphics—part of the extended Cartridge Basic.



No parallel port, so a serial printer must be used.

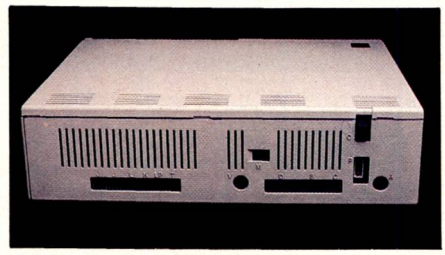
if the keyboard is kept reasonably still and pointing in approximately the right direction. If the signal is too weak to be accurately read, either because the keyboard is too far away or because the angle from the system unit is too great, the Junior gives a warning by bleeping.

The cordless keyboard is an example of an idea that is stunningly obvious — after the event. After all, TV manufacturers have been using infra-red keypads for years. I found myself feeling slightly sceptical about the keyboard. Not being a touch-typist (one day . . .), I have to divide my attention between the keyboard and the display. Using the Junior, I found myself checking that it hadn't missed anything after almost every word. With the keyboard positioned on the desk in front of the unit, the Junior functioned perfectly, but any advertisements which show someone wandering casually around a room, while typing a letter, should be taken with a large sack of salt.

I wrote a one-line program (10 a$=INKEY$:IF a$="" THEN 10 ELSE PRINT a$;:GOTO 10) to display whatever I typed on the screen, and then wandered around the room while typing 'the quick brown fox jumps over the lazy dog'. What actually appeared on the screen was 'thecown foxde lazdP%og' — and it wasn't because the Junior couldn't keep up with my typing speed.

The other problem I encountered with the cordless keyboard was in using it on my lap. Using a Tandy Model 100, I've got into the habit of placing keyboards on my lap rather than on the desk with the machine. With the Junior, nowever, the desk itself blocks the line of sight unless the system unit is placed right at the edge of the desk. All in all, I found it less trouble to use the keyboard cable. When used without the cable, the keyboard is powered by four alkaline batteries. Plugging in the keyboard cable switches off the infra-red beam and disconnects the battery power supply. The keyboard then takes its power from the main unit.

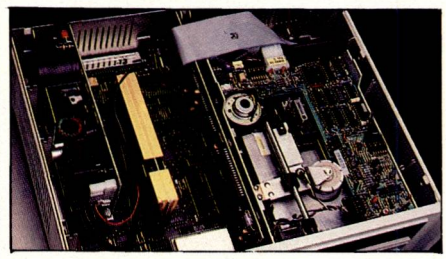
The keys themselves are the same size and feel as those on a push-button telephone. They have a reasonably responsive feel and are spaced sufficiently, but are a little wobbly and too small for easy typing. I was disappointed with the keyboard when I first saw a photograph of the Junior, and was more so when I began to use it. Many machines selling at considerably below the price of the Junior have properly pitched, full-sized keyboards. Perhaps part of the reason the Junior keyboard seems so poor is that the keyboard on the PC is simply the best I've ever used — the Junior keyboard



All the interfaces are neatly recessed.



The enhanced model's slimline drive.



Inside the Junior — a cut-down PC.

looks cheap and nasty by comparison. Another complaint is that the key labels for the unshifted functions are marked in white on a silvery-grey background. Whether this is because whoever designed the keyboard is colour blind, or simply that IBM felt that the two-tone effect was aesthetically pleasing, I don't know. But IBM please note: white on grey does not make for good contrast. All the key functions are marked above and below the keys rather than on the keys themselves.

The keyboard has ALT, FN and CTRL keys. ALT and CTRL work in the usual way; that is, to enter ^C (Control-C) you hold down the CTRL key and press C. ALT works in the same way. FN stands for function, as you'd expect. The key is pressed and released to engage it, and it is then effective for one keystroke. The programmable function keys, for example, are accessed as FN-1 to FN-0, so to select F1 you press and release the FN key and then press 1. In this way, most of the features of the PC Senior keyboard are retained using fewer keys.

The FN and ALT keys are coloured green and blue respectively, and the related labels on the keyboard are colour coded in the same way, therefore F1 is marked in green underneath numeric 1 (shades of the Sinclair Spectrum here!). Four cursor keys are laid out in a diamond shape, below and to the right of the return key. These double as home, end, page-up and page-down when used with the FN key and are software defined. There are two SHIFT keys, and a two-way tab key. All keys auto-repeat.

Cartridges

The two cartridge slots at the front of the PC Junior are intended for 64k ROM cartridges. A small number of games were available in cartridge form at the time the Benchtest was carried out, and others are expected. It doesn't make any difference which cartridge slot is used. Two slots are included to allow future cartridge based software of up to 128k to be used.

Joysticks

The joysticks, for use with both the PC Junior and the PC Senior, are made in Japan for IBM. It's incongruous to see the letters IBM on a joystick. I mean, joysticks are those things used for Pacman and Frogger, and this is, well, IBM . . . But the IBM joystick manages to make itself look suitably dignified: IBM-white, of course, and the legend 'IBM Joystick' on a metal plate. It has two fire buttons, centring adjustments and a useful mechanism which allows the user to switch between 'free-floating' and 'spring-return' modes. The former is useful for design and graphics work, remaining where it's left when released. The latter is generally better for games, returning to the centre when released.

Soak test

This Benchtest was carried out in two days at an IBM plant, so I couldn't do a full 24 hour soak test. In the course of the Benchtest, the machine was running for around seven hours each day and I experienced no problems with it.

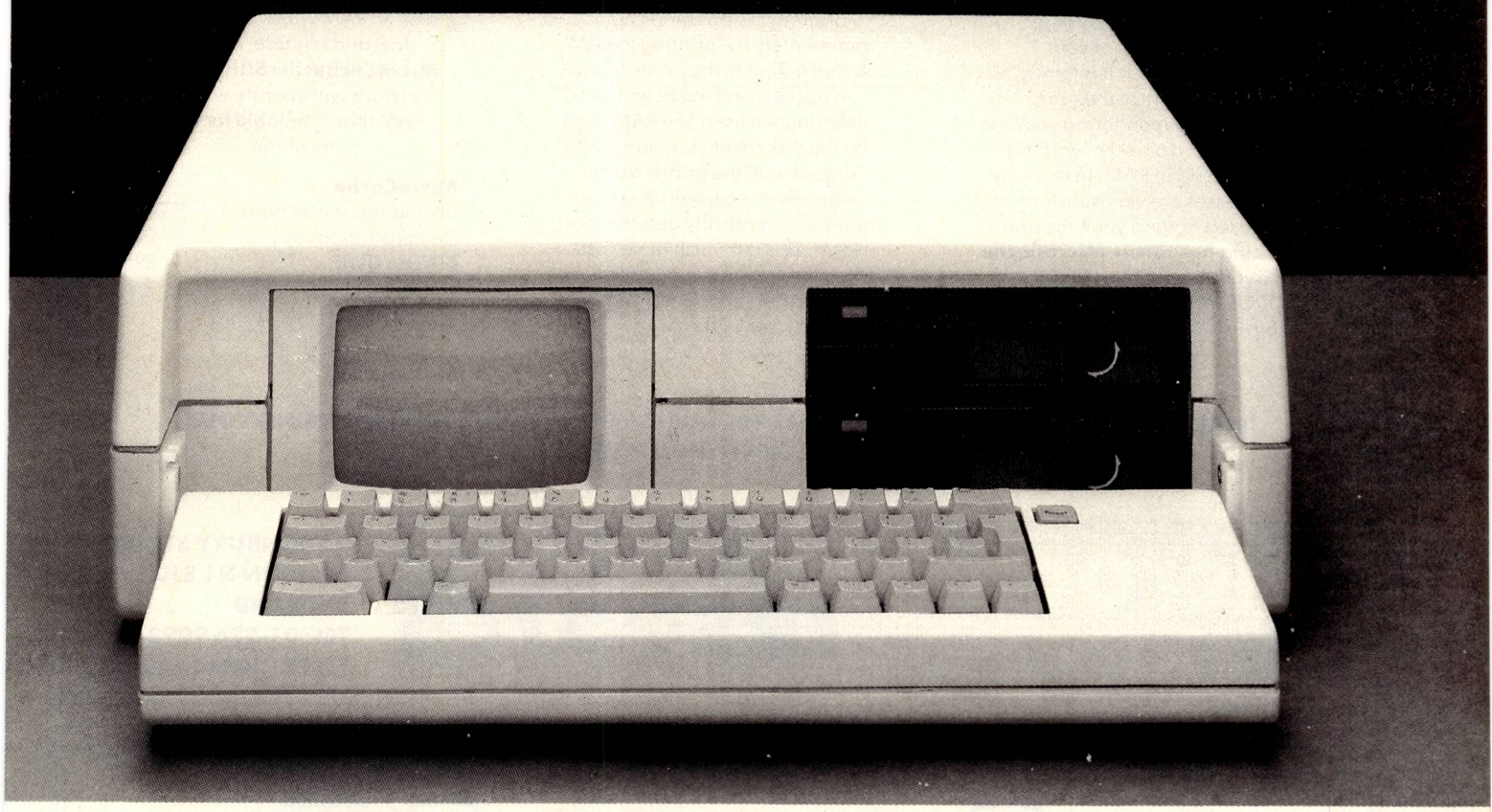
Inside

The PC Junior has the same 16-bit, 8088 processor as the Senior, and is laid out in a more or less identical fashion. Everything is packed closer together for reasons of space, but that seems to be about the only difference.

Software compatibility

When rumours of a new IBM micro first began to circulate, everybody wanted to know 'Is it going to be compatible with the PC?' Now that the machine actually exists, there is still a certain amount of confusion on the point of compatibility. The entry level model is not compatible with anything, for the simple reason that it doesn't have a disk drive. The enhanced model is compatible with a lot of, but not all, PC Senior software. IBM produces a com-

The Xcalibur Portable. The Apple IIe based system for people on the move



Now, the Xcalibur Portable gives you all the tremendous memory power and processing ability of the famous Apple IIe but in one neat, easy, self-contained box complete with display screen and data storage.

The power of Apple. But Portable

The Xcalibur Portable weighs only 17 lbs (27 lbs with optional twin floppy disk drives). In its standard form it is supplied as a complete system with 5" black and white monitor, twin half height disk drives and foldaway keyboard. Being Apple IIe based, all the expansion opportunities of the Apple system are available, including printers, plotters and graphics tablets – all easily added whenever the need arises.



A host of software applications

Although so lightweight, Xcalibur packs all the processing power you could want. With the huge number of business software programs available for the Apple IIe, you can carry on your business at home or any other suitable work location. Use Xcalibur as a word processor to write, revise edit and print reports, letters and documents quickly and easily. Calculate, manage or explore any financial situation with a spread sheet program. Because Apple was designed to be powerful enough for business, it's powerful enough to stretch the broadest imagination.

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PCW171

3 TIME-SAVERS

CACHE

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Silicon Disk is the original 'RAM-disk'. It provides you with an extra 'disk' in RAM which is extremely fast and reliable. As with **MicroCache,** the **Silicon Disk** software will operate with any RAM that is suitable for your machine.

MicroCache	£125
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Demonstration copy	£25
Silicon Disk	£95

WARNING: ONCE YOU HAVE TRIED THESE PRODUCTS YOU WILL NOT BE HAPPY USING YOUR MACHINE WITHOUT THEM.

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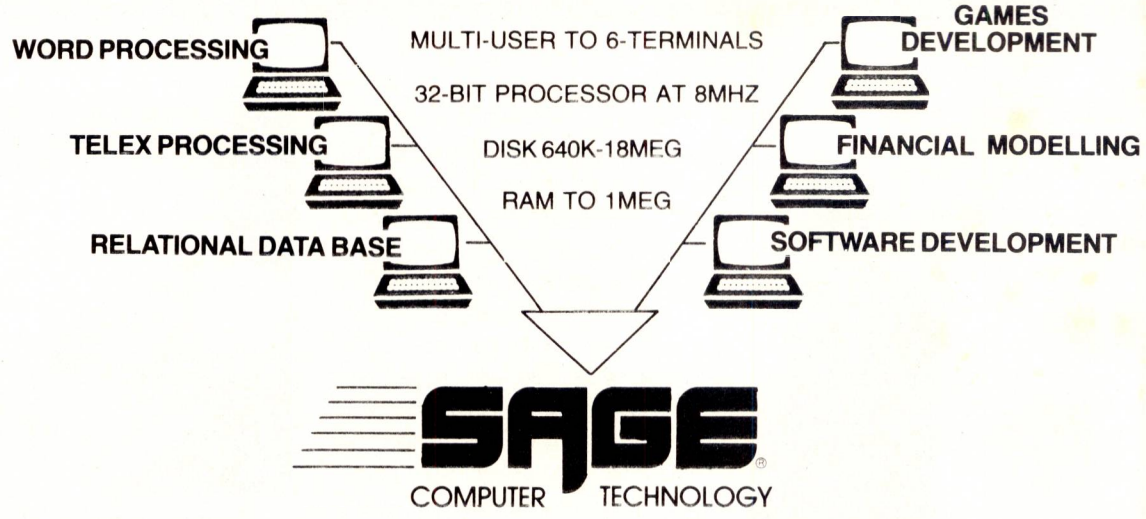

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patibility chart to show which pieces of approved software are compatible with the Junior, and some incompatible software has been rewritten to enable a version to run on the Junior.

Popular packages which will run on the Junior include Easy Writer, VisiCalc and Multiplan. To run PC-DOS software, PC-DOS Version 2.1 is required. This is a slight variation on 2.0, enabling it to handle the slimline disk drive. If you want to save Basic programs on disk, you'll need to buy both PC-DOS 2.1 and Cartridge Basic. Cartridge Basic is a slight enhancement of BasicA (IBM Advanced PC Basic), offering improved graphics and sound support. It's called Cartridge Basic (not surprisingly) because it's supplied in cartridge form — most of the games and educational software available for the Junior are supplied on disk, which means that they can only be used on the enhanced model. More cartridge-based software is expected to be available by the time the Junior is on sale in the UK.

Basic

The Basic supplied on board the Junior in ROM form is identical to the ROM Basic on board the PC Senior, and is a very respectable implementation of the language. To make full use of the Junior, however, you do need Cartridge Basic.

Cartridge Basic is upward-compatible with standard PC Basic, and is both comprehensive and powerful. It offers enhanced graphics, communications capabilities, an internal clock and what IBM describes as 'event-trapping'. Event-trapping is supported by MSX Basic, and is likely to become a standard feature of most future Basics.

Event-trapping statements take the form ON (event) GOSUB (line number). These statements allow programs to detect specified conditions and react instantly to them — like the ON ERROR GOSUB statement supported by many machines. ON COM, for example, will branch to the specified subroutine immediately an incoming signal is detected on the serial (communications) port. This allows the computer to get on with running a program while remaining available to, for example, incoming electronic mail. Other events (conditions would be a better word) which can be trapped include depression of a joystick 'fire' button, a light pen signal and a function key press.

Cartridge Basic does not support true procedures, but otherwise offers just about everything even the most demanding programmer could ask for.

The Junior offers identical editing facilities to the PC; that is, a full screen editor allowing both statements and line numbers to be edited.

Graphics

The PC Junior offers three graphics resolutions and two text modes. Low resolution graphics of 160x200 with 16 colours available; medium resolution 320x200 in either four or 16 colours, depending on the graphics mode; and high resolution 640x200 with two or four colours. Text mode is either 40- or 80-columns and up to 16 colours may be used.

Cartridge Basic is needed to make use of all the available graphics modes, and 80-column text requires 128k RAM. The Junior offers all the graphics-related statements of the Senior, including PSET, PRESET (Pixel SET and Pixel RESET), LINE, COLOUR, CIRCLE and PAINT, all of which are self explanatory.

Applications software

As mentioned earlier, a number of packages designed for the PC will run on the Junior under PC-DOS 2.1, and other programs are being modified to enable them to run on the Junior. In addition to these, a number of packages are being written from scratch: I tested one of the latter packages — a word-processor called HomeWord (see review done on an Apple, *PCW*, February '84).

HomeWord claims to offer all the features of a fully-fledged word-processor while being simple to learn for novices. It does not require a DOS disk, since it has the necessary system tracks. The disk auto-boots and is copy protected.

HomeWord uses simple icons (pictures) to represent all the functions supported. On booting the disk, the user is told to remove the HomeWord disk and to insert the storage disk — you are then placed into text entry mode. Here's an indication of how easy HomeWord is to use. I created a file; moved bits of it around; reformatted it to include right-, left- and full-justification; centred a line; saved the document to disk; and then printed it — without even opening the instruction booklet. With the icons and prompts, everything is self-explanatory.

As text is entered, a tiny graphical picture of the document is created at the bottom-right of the screen, enabling the user to see what the file will look like when printed. This gives immediate confirmation of formatting commands (justification, double line spacing, and so on). To insert text, simply use the cursor keys to move to the appropriate place, and then type in the text. Text can also be deleted using the destructive backspace, but any other form of editing (cut-and-paste, block delete and copy, search or search-and-replace) must be done in edit mode.

Switching to edit mode is simple enough — press the ESCape key to enter an icon menu, then use the horizontal cursor keys followed by the return key to select the edit option from the six functions offered: print, edit, file, layout, alter default settings and exit to DOS. Edit mode presents more icons: block copy, block delete, block move, find and find-and-replace. Each of these options prompts the user to move the cursor to the desired place and enter text as required. Again, the prompts are clear and unambiguous.

The layout icon menu similarly offers five options: justification (left, right, full and centre), insert page breaks, set spacing (line spacing, plus horizontal and vertical margins), print style (normal, bold and underlined) and set headers and footers.

The print menu presents three options: display document on the screen as it will be printed, set the page numbering, and print the document. Since HomeWord doesn't work on the what-you-see-is-what-you-get principle, the first option is a useful feature.

One problem with the icon menu system is that it may be necessary to go two or three levels 'deep' before you find what you're looking for. Having made your selection, you will then be returned directly to the top level. This can be a nuisance if you want to set the line-spacing to double and then insert a page-break, for example, since you need to go back through the same menu levels twice.

The file menu is concerned with disk-handling. The four options are: load a document, save current document, erase current document and insert (merge) another document. Error-messages, like prompts, are friendly and straightforward without being patronising: 'The diskette is write-protected. Remove the write-protect tab or insert a disk that is not write-protected' appears on the screen on attempting to save a file to a read-only disk, for example.

HomeWord is not WordStar, but it does live up to its claim to be extremely easy to use. Usually, the price of ease of use is two-fold; firstly, you sacrifice power for simplicity, and secondly, the system becomes incredibly cumbersome once you are familiar with it. HomeWord avoids both. It isn't the most powerful word processor in the world, but neither is it a toy. It has most of the features you'd expect in a professional package: cut-and-paste, variable justification, document merging, adjustable margins and line spac-

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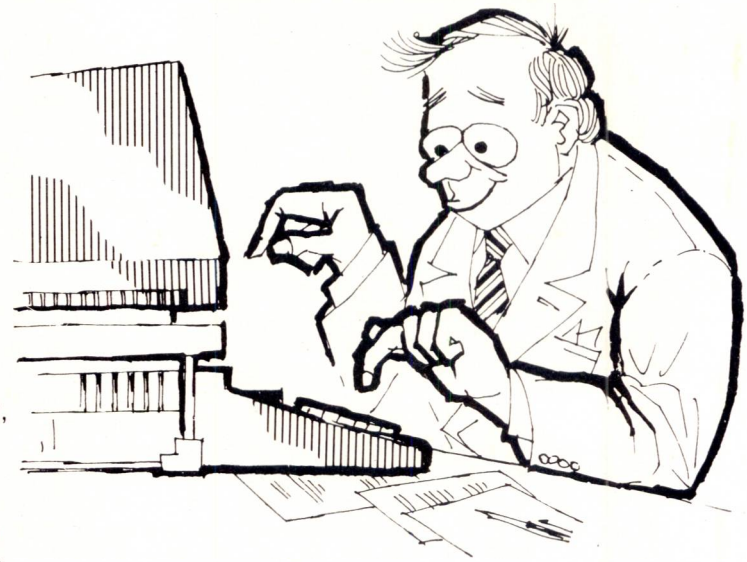

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Keyboard	: Full typewriter style. Numeric/ function keypad.
CPU	: Z80 2·5 MHz. 48K RAM.
Disks	: Two built-in 140K mini-floppy drives as standard.
	: Optional two drive expansion chassis.
ROM	: Programs loaded by inserting 16K ROM modules.
Printer	: Philips P2121 daisy wheel printer, 25 cps.
Basic WP package (under £2000)	: Computer with 48K RAM. Two floppy drives. Word processing ROM. P2121 daisy wheel printer.

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ing, and so on. Documents can be saved to disk in HomeWord format, or printed to disk as ASCII files so that they can be loaded into other programs, and transmitted over the telephone network. Once the system has become familiar, the icon display can be switched off. CTRL-key commands can then be used instead of icon selections. Switching off the icons dramatically increases the response speed of the program.

I don't like separate text entry and editing modes, but this does enable a first time user to learn to use the program very quickly. As a word-processor for beginners, HomeWord is far and away the best package I've seen. It also stands up well as a semi-professional package in competition with products like EasyWriter.

Documentation

The documentation supplied with the Junior takes the form of two manuals (a user guide and an IBM Basic tutorial), and a built-in program called 'Keyboard adventure'. The enhanced model is also supplied with a program called 'Exploring the PC Junior'. The user guide is typical of IBM: thorough, comprehensive and pedantic. Overall, it is well-presented, well-indexed and easy to use.

The Basic tutorial is very unlike IBM. It's written in the 'Gee, isn't this fun?' style normally reserved for VIC 20s and the like. I'm not enthusiastic about this style, but it's clear and informative, and it does make the system seem less daunting to a first-time user. 'Keyboard adventure' is on board the Junior in ROM. It can be called at any time you're in Basic and not running a Basic program by pressing the escape key. It is, as the name indicates, a program introducing the user to the Junior keyboard.

The program begins by presenting a large box and a little man on the screen. After using the cursor keys to move the man into the box and watching him 'drop' through different coloured screens, you then enter the program proper. This invites you to press each of the keys on the keyboard in order to find out what they do. The program is fairly tedious but useful to someone unaccustomed to a computer keyboard.

'Exploring the PC Junior' is a program supplied on disk with the enhanced model. This is an interactive tutorial and is quite simply superb. It's presented as a computerised book, but includes interactive sessions like 'Practice DOS' and 'Practice Basic'. Practice DOS and Practice Basic are pseudo environments offering many of the features supported by the genuine article, and responding true to form. The difference is that the top half of the screen is reserved for friendly explanations and prompts.

Users can enter or leave interactive sessions as they please, and they can flick through the 'book' forwards or backwards, by page or chapter. It's a pity that 'Exploring the PC Junior' couldn't be supplied with the entry level model, but it does require a disk drive.

Prices

UK prices not yet fixed; US dollar prices given below for general guidance only.

PC Junior entry level model	$669
PC Junior enhanced model (includes disk)	$1269
TV lead	$30
Cassette lead	$30
Serial lead	$25
DOS 2.10	$65
Cartridge Basic	$75
HomeWord	$75

Conclusions

Without the letters 'IBM' and without compatibility with the PC, I'm not convinced that the Junior would have much going for it. But the reality is that it does have 'IBM' on it, and it's largely compatible with the PC Senior.

It's difficult to judge a machine without knowing its selling price, and if the PC is anything to go by then the UK price of the Junior may differ considerably from the US price. Assuming that it does sell at a roughly equivalent price in the UK, this puts the entry level model at about £500 and the enhanced model at around £1000 (based on exchange rates at time of writing and taking VAT into account). At £500, the entry level model is at the top end of the home market, and will be competing primarily with the BBC Model B, which sells at £400.

As a hobbyist machine, the Junior is pricey, but the price tag doesn't seem to have deterred people from buying the BBC Model B, and the ability to upgrade to a PC-DOS system is likely to be a significant sales factor. For those new to computing, IBM might seem to have an advantage in being a household name.

The enhanced model is not a home micro at all, whatever IBM may choose to call it. At £1000, it has to be classed as a small business micro. In this light, the main thing in its favour is compatibility with the IBM PC. Software houses are not going to be slow to see the opportunities offered by the Junior; I think we're going to witness a flood of PC software labelled 'PC Junior compatible' and 'PC Junior verson available' as soon as the machine comes to the UK. And people looking for a small business micro are going to be equally quick in seeing that, for many applications, an enhanced PC Junior = an IBM PC + £1500 in the bank.

This area of the market is becoming increasingly competitive. The Macintosh looks likely to sell at around the same price as the enhanced Junior, for example, and we're going to see a lot of activity around the £1000 mark over the next six months or so.

I'm not sure how the entry level PC will fare as a home and education machine. I'm not going to make any predictions until I know the UK price: at this level, £50-60 could make all the difference. But as far as the enhanced model is concerned, I feel confident that — whatever the competition — it's going to be quite a success. END

Benchmarks

Benchmark timings carried out using cartridge Basic.

BM1	1.9
BM2	6.4
BM3	11.2
BM4	15.0
BM5	16.5
BM6	29.3
BM7	46.6
BM8	47.4

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

Technical specifications

Processor	8088 running at 4.77 MHz
ROM	64k
RAM	64k entry level (44k Basic program storage); 128k enhanced model (60k Basic program storage).
Interfaces	2 joysticks, 3 video (TV, direct, composite), 1 serial, 1 audio, Internal expansion bus.
Keyboard	62-key, multi-function, infra-red (cordless).
Disk drive	Enhanced model only, 360k double-sided.
Operating System	PC-DOS Version 2.10.

Bring a micro

Well-known board games such as Scrabble often take the spotlight at parties. Here David Hopkins describes his Sharp PC1500 program which acts as a computer scoreboard.

I took my (S)harp to the party . . . but nobody asked me to play, or so runs the old ballad that used to be sung to while away long evenings. Let's face it though, a harp is a liability in many social gatherings and *glissandos* are not everyone's delight. Bring your 'desktop' micro to the party, complete with peripherals, and you are likely to get the same treatment as was handed out to our Victorian minstrel: 'Boot' has more than one meaning.

The ever-shrinking and more capable breed of portable or even pocket micros, though, may be much more socially acceptable. Take the Sharp PC series, for example: you can even slip them discreetly into your inside pocket if your host or hostess purses a lip at the very hint of a byte. However, if the micro is actually going to be accepted into the party, it must be able to sing for its supper, just like our turn-of-the century baritone.

The trouble is that with their limited display capabilities (a penalty for their very portability) our socialising micros are not very communicative. With ingenuity and the judicious use of limited memory, user-friendliness can be achieved or, should we say, sociability.

The program given below allows scoring on games such as 'Scrabble' was written for the Sharp PC1500, a machine that, complete with interface/printer, is smaller than many a fashionable coffee-table book. The one line LCD display is used almost solely to prompt inputs, while the fascinating printer-plotter (which on its own generates enough interest to keep the party going) is used to yield a continuously updated record of the state-of-play and to deliver a table of results at the close.

With all these features included the 8k memory extension is essential, but you could drop some features and eliminate REMS, and so accommodate a truncated version within the standard machine. Adapting the program to other machines is straightforward as long as you take account of the steps used to circumvent the limited print formatting capability of the PC1500.

The program first asks you to input the name of the game, the number of players (up to four players are allowed, but 'Solo' is declared illegal) and their names in order of play. A variable duration turn-timer option is offered. On completion of this preliminary procedure, the printer then delivers a heading which automatically includes the date and time of starting and formats a number of columns according to the number of players (see Fig 1).

Scores are then requested by the LCD display for each player in turn, so no-one will ever again need to ask 'Who's next?'. Scores are limited to three digits for the same reason that the number of players is limited to four — lack of space on the narrow cash-register type of paper roll. The program utilises the second size of character, 'C-SIZE 1', in the interests of legibility, but if you can tolerate the minuscule 'C-SIZE 0' then four-digit scores, or more participants, could be accommodated by simple adjustments. As each score is entered, the running total is printed into the appropriate column.

```
GAME OF SCRABBLE
PLAYED BETWEEN
1.BILL
2.EVA
3.TONY
4.ARIANNE
ON 23/ 7/ 1983
STARTING AT 21.37
------------------
  1    2    3    4
------------------
 14   12   26   12
 31   37   36   31
 45   47   42   87
 64   78   62  102
 75   92   91  114
 92  119  127  133

1st.ARIANNE     133
2nd.TONY        127
3rd.EVA         119
4th.BILL         92

WINNING MARGIN:-
                  6
BEST SCORES:-
BILL             19
EVA              31
TONY             36
ARIANNE          56
FINISHED AT:21.39
==================
```

```
10:"A":REM INPUT
   NAMES
30:REM Enter 999
   to end scoring
40:CLEAR :Y=1983
50:DIM N$(3)*11:
   DIM U(3):DIM T
   (3):DIM H(3)
60:INPUT "TYPE OF
    GAME ?";A$
70:INPUT "No. of
   Players (2,3 o
   r 4)";A
80:IF A<2CLS :
   GOSUB 1300
90:IF A<2PAUSE "S
   OLO NOT LEGAL
   !":GOTO 70
100:IF A>4CLS :
   GOSUB 1300
110:IF A>4PAUSE "T
   OO MANY PLAYER
   S !":GOTO 70
120:FOR I=0TO A-1
130:PAUSE "PLAYER
   No.";I+1:INPUT
   N$(I)
140:L=LEN N$(I):IF
   L>10GOSUB 1300
   :PAUSE "Shorte
   n Name Please"
   :GOTO 130
150:NEXT I
160:REM **FORMAT*
170:CLS :LPRINT "G
   AME OF ";A$
180:LPRINT "PLAYED
    BETWEEN"
190:LPRINT "1.";N$
   (0)
200:LPRINT "2.";N$
   (1)
210:IF A=2THEN 120
   0
220:LPRINT "3.";N$
   (2)
230:IF A=3THEN 120
   0
240:LPRINT "4.";N$
   (3):GOTO 1200
250:LPRINT TAB 5;"
   1";TAB 13;"2":
   GOTO 280
260:LPRINT TAB 3;"
   1";TAB 10;"2";
   TAB 16;"3":
   GOTO 280
270:LPRINT TAB 2;"
   1";TAB 7;"2";
   TAB 12;"3";TAB
   16;"4"
280:LPRINT "------
   ------------"
290:INPUT "TIMER W
   ANTED ? (YorN)
   ";D$
300:IF D$<>"Y"THEN
   340
310:INPUT "No.of m
   inutes per tur
   n ?";B
320:REM **SCORING*
330:IF D$="Y"GOSUB
   1400
340:INPUT "1st.Pla
   yers Score ?";
   S:IF S=999GOTO
   550
350:T(0)=T(0)+S:IF
   S>H(0)LET H(0)
   =S
360:IF A=3GRAPH :
   LPRINT USING "
   #####";T(0):
   TEXT :GOTO 390
370:IF A=4GRAPH :
   LPRINT USING "
   ####";T(0):
   TEXT :GOTO 390
380:GRAPH :LPRINT
   USING "#######
   ";T(0):TEXT
390:IF D$="Y"GOSUB
   1400
400:INPUT "2nd.Pla
   yers Score ?";
   S:IF S=999LF 1
   :GOTO 550
410:T(1)=T(1)+S:IF
   S>H(1)LET H(1)
   =S
420:IF A=3GRAPH :
   LPRINT USING "
   ############";
   T(1):TEXT :
   GOTO 450
430:IF A=4GRAPH :
   LPRINT USING "
   #########";T(1
   ):TEXT :GOTO 4
   50
440:GRAPH :LPRINT
   USING "#######
   #########";T(1
   ):TEXT :LF 1:
   GOTO 330
450:IF D$="Y"GOSUB
   1400
460:INPUT "3rd.Pla
   yers Score ?";
   S:IF S=999LF 1
   :GOTO 550
470:T(2)=T(2)+S:IF
   S>H(2)LET H(2)
   =S
480:IF A=3LPRINT T
   (2):GOTO 330
490:GRAPH :LPRINT
   USING "#######
   #######";T(2):
   TEXT
500:IF D$="Y"GOSUB
   1400
510:INPUT "4th.Pla
   yers Score ?";
   S:IF S=999LF 1
   :GOTO 550
520:T(3)=T(3)+S:IF
   S>H(3)LET H(3)
   =S
530:LPRINT T(3):
   GOTO 330
540:REM **SORTING*
550:U(0)=T(0):U(1)
   =T(1):U(2)=T(2
   ):U(3)=T(3)
560:CLS :LF 1
570:FOR I=0TO A-2
580:FOR J=I+1TO A-
   1
590:IF T(J)>T(I)
   THEN 610
600:Q=T(J):T(J)=T(
   I):T(I)=Q
610:NEXT J
620:NEXT I
690:REM **RESULTS*
700:FOR I=0TO A-1
710:LPRINT T(I)
720:NEXT I
730:LF -A:X=0:W=0
740:FOR I=0TO A-1
750:IF T(0)=U(I)
   LPRINT "1st.";
   N$(I):X=X+1
760:NEXT I
770:IF X=ATHEN 980
780:IF X*A=4THEN 8
   10
790:X=X+A-2
800:ON XGOTO 810,8
   10,870,870,930
810:FOR I=0TO A-1
820:IF T(I)=U(I)
   LPRINT "2nd.";
   N$(I):W=W+1
830:NEXT I
840:IF W*A=4THEN 8
   80
850:W=W+A-2
860:ON WGOTO 960,8
   70,960,930,960
870:X=0
880:FOR I=0TO A-1
890:IF T(2)=U(I)
   LPRINT "3rd.";
   N$(I):X=X+1
900:NEXT I
910:X=X+A-4
920:ON XGOTO 960,9
   30,960
930:FOR I=0TO A-1
940:IF T(3)=U(I)
   LPRINT "4th.";
   N$(I)
950:NEXT I
960:T=T(1):IF T(0)
   =T(1)LET T=T(2
   ):IF T(0)=T(2)
   LET T=T(3)
970:LF 1:LPRINT "W
   INNING MARGIN:
   -",T(0)-T
980:LPRINT "BEST S
   CORES:-"
990:FOR I=0TO A-1
1000:LPRINT USING
   "&&&&&&&&&&
   ";N$(I);
   USING "#####
   ";H(I)
1010:NEXT I
1020:T$=STR$ TIME
   :IF TIME <99
   999LET T$="0
   "+T$
1030:U$=MID$ (T$,
   5,5)
1040:USING :
   LPRINT "FINI
   SHED AT:";U$
1050:LPRINT "====
   ============
   ==":LF 3
1060:GOSUB 1300
1100:INPUT "AGAIN
   -SAME DETAIL
   S?(YorN)";E$
1110:IF E$<>"Y"
   END
1120:FOR I=0TO A-
   1
1130:H(I)=0:T(I)=
   0:W=0:X=0
1140:NEXT I
1150:GOTO 1230
1200:REM **DATE**
1210:T1=TIME :T2=
   INT (T1/1000
   0):T3=INT (T
   1/100)-(T2*1
   00)
1220:LPRINT "ON";
   USING "###";
   T3;"/";USING
   "###";T2;"/"
   ;USING "####
   #";Y
1230:T$=STR$ TIME
   :IF TIME <99
   999LET T$="0
   "+T$
1240:U$=MID$ (T$,
   5,5)
1250:LPRINT "STAR
   TING AT ";U$
1260:LPRINT "----
   ------------
   --"
1270:ON AGOTO 80,
   250,260,270
1300:REM BLEEPER*
1310:FOR K=1TO 5
1320:BEEP 1,50,20
   0:BEEP 1,100
   ,200
1330:NEXT K
1340:RETURN
1400:REM **TIMER*
1410:WAIT 0
1420:PRINT "SPACE
    to Start.
    0 to Stop"
1430:M=B*60
1440:B$=""
1450:B$=INKEY$
1460:IF B$<>" "
   THEN 1440
1470:BEEP 1
1480:D=TIME :F=
   INT (D/100):
   D=(D-F*100)*
   10000
1490:E=TIME :G=
   INT (E/100):
   E=(E-G*100)*
   10000
1500:IF D=ETHEN 1
   490
1510:N=INT (M/60)
   :O=M-(N*60)
1520:M=M-1
1530:PRINT "Count
   down";USING
   "###";N;"min
   s.";USING "#
   ##";O;"secs.
   "
1540:IF (M/10)-
   INT (M/10)=0
   BEEP 1
1550:IF M<20BEEP
   1
1560:IF M=0CLS :
   GOSUB 1300
1570:IF M=0THEN 1
   630
1580:D=E
1590:C$="0"
1600:C$=INKEY$
1610:IF C$<>"0"
   THEN 1490
1620:BEEP 1
1630:RETURN

STATUS 0
                6882
STATUS 1
                3161
```

Fig 1 Program for Sharp PC1500 Scrabble scoring

Illustration by Paul Allen



'999' is employed as the terminator and when this is entered the total scores are printed out in rank-order. Then the printer scrolls back to the top score and proceeds to print the position and name against the scores. This use of the Sharp printer's negative line-feed capability saves a lot of programming space by utilising the left and right justification features of numerical and string printing.

After these gymnastics, the computer gives you the winning margin and each player's best individual score. Finally, the time at which the game ends is given and the LCD display offers you the chance to repeat the performance if the order and names of players is not changed.

If the timer option is used, you are reminded of the passage of time by regular bleeps; for the last part of the period the bleeps increase in frequency to add a little stress.

The printed record is often prized by the players, particularly the winners and those who make the best individual scores. 'Scrabble' addicts, in particular, like to keep records of their feats. Perhaps it would be a good idea to add a repeat print-out option for those occasions when more than one player wants a copy. It may not become the Belle of the Ball, but in this role the pocket micro can find its way into polite society and make new friends. One even finds people volunteering to keep score, and strangely, they are often those who normally shun such tasks and treat electronic devices with the greatest suspicion.

END

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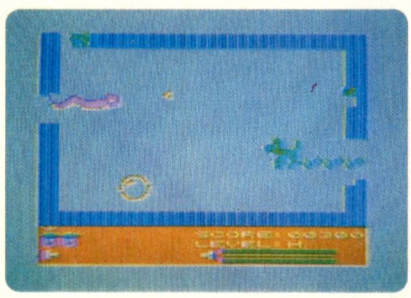
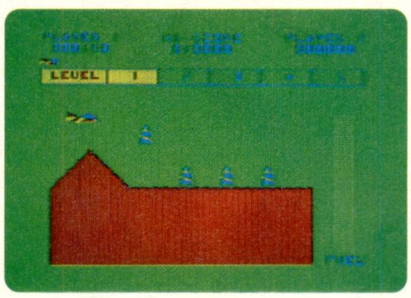


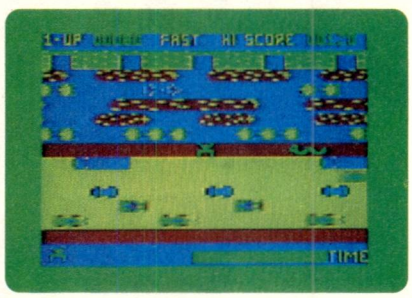
A

A CRAZY PAINTER. A high-speed arcade action game! Try your hand at painting the floor! Sounds easy? Yes, if the dogs, moths, caterpillars, boys, balloons etc. don't keep walking over the paint! Eight levels of difficulty. The catchy tunes played while you paint will have you "singing while you work". Keyboard or joystick controls. **26-7305**



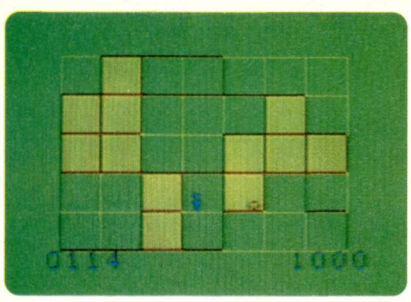
B

B SKRAMBLE. Your mission is to penetrate the enemy's system and destroy their H.Q.. You will start with three spacefighters equipped with repeating cannon and twin bomb launcher. If you succeed in evading the elaborate defences, you will arrive at the core where flying becomes more difficult. Keyboard or joystick control. **26-7306**



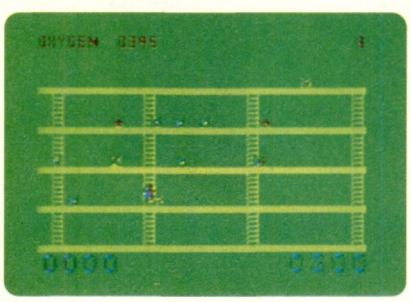
C

C FROGGER. The popular arcade game for the Tandy Colour Computer. Safely manoeuvre the frog to its home within the time allocated. Cross the highway without getting run over and cross the river without falling in. Avoid the traffic, snakes, crocodiles and diving turtles. For one or two players. Joysticks optional. **26-7304**



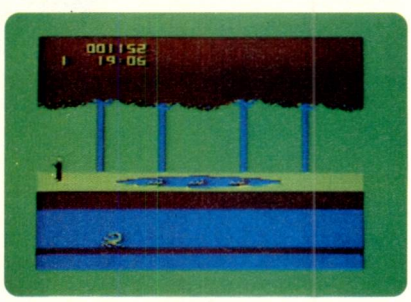
D

D CUTHBERT GOES WALKABOUT. Cuthbert must turn the lights of the lunar landing pad on by walking across the switches before the invading Moronians get him. Watch him do his victory dance before he tackles the next "pad" and another, larger, set of invaders. Superb colour graphics with music. Keyboard or joystick control. **26-7302**



E

E CUTHBERT GOES DIGGING. Cuthbert is guarding the site for a new launch pad. However the Moronians are still determined to get him! One touch and Cuthbert is electrocuted. The only way he can kill them is to trap them in a hole and hit them with his insulated hammer before they escape. Keyboard or joystick control. **26-7303**

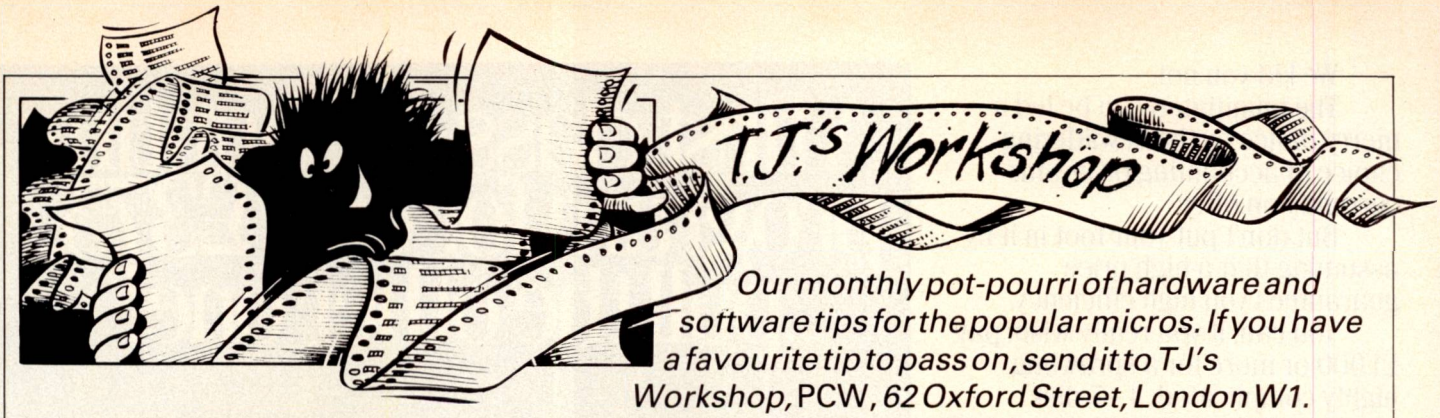


F

F CUTHBERT IN THE JUNGLE. A high speed arcade action game with full colour graphics! Cuthbert failed to overcome the Moronians so he has been sent to the jungle! He must fight his way out collecting treasures, jumping pits and swinging over alligators whilst being aware of the killer scorpion. One joystick required. **26-7301**

Tandy

Tandy Corporation (Branch UK), Tameway Tower, Bridge Street, Walsall, West Midlands, WS1 1LA.



Our monthly pot-pourri of hardware and software tips for the popular micros. If you have a favourite tip to pass on, send it to TJ's Workshop, PCW, 62 Oxford Street, London W1. Please keep your contributions concise. We will pay £5-£30 for any tips we publish. PCW can accept no responsibility for damage caused by using these tips, and readers should be advised that any hardware modifications may render the maker's guarantee invalid.

NewBrain auto

The MERGE command on NewBrain is a useful one for its original purpose of combining two programs but there is no indication in the instruction manual that it is also possible, with a simple routine, to use it to merge lines into running programs. The technique is illustrated by the compact program here which gives an auto-numbering feature lacking in NewBrain's Basic. The program fits neatly into lines 1 to 9 and when run proffers a series of auto line numbers starting at 10 and incrementing upwards by 10 or any other desired amount decided by line 3:1. As soon as 10 appears a line is typed and, on entering NEWLINE, it is merged at the end of the listing and 20 is then offered, and so on. The series can be halted by STOP/NEWLINE at any time and resumed by the CONT command.

When halted LIST will show that the new lines are being properly merged. The program, when halted, can also be tested at any stage by GOTO 10 or any other appropriate line and, when finally correct, DELETE −9 will strip off the auto lines which are no longer needed.

Auto program

```
1 PUT31:LETZ=10
2 PRINTZ;
3 LETZ=Z+10:LINPUT("")
  Y$
4 CLOSE#1:OPEN#1,0,1:
  PUT#1,27,13
5 PRINT#1,(Z−10);Y$
6 PUT#1,27,4
7 PUT#1,3
8 MERGE#1
9 GOTO2
```

Beginners may like to have the following clarification. The semi-colon at the end of line 2 keeps the cursor on the numbered line ready for it to be typed. The double quotes in line 3 suppress the normal question-mark prompt. In line 4 it is necessary to close stream 1 before opening it to avoid error message 108 when the program loops back. Lines 5 to 7 make the line which has just been LINPUT, and its accompanying number, into a short file and close it ready to be merged by line 8.

This routine is a powerful one and has many possible applications. A modification allows data to be added to an already running program even when generated by the computer itself. For example the program

```
10 LINPUTC$
20 CLOSE#1:OPEN#1,0,1:
   PUT#1,27,13
30 PRINT#1,x;"DATA
   ";C$
40 PUT#1,27,4
50 PUT#1,3
60 MERGE#1
```

appropriately numbered to fit into any part of a long program, will put a string of data entered as C$ into line 'x' of the program whether x is before or after the numbers of the merging routine. Thus new data can be added in lines 1-9, or well ahead, either of which are equally accessible to a subsequent READ command. LINPUT has to be used in line 10 so that commas can be used to distinguish the separate items of data. Clearly C$ could be equally well composed of data computed within the program rather than input from the keyboard.

Wilfred Ashworth

Clean ZX printouts

Here is a trick for ZX Printer users.

In common with many fans of the ZX81, I like to keep my metallised paper listings glued on standard-size white paper sheets. The metallised paper is most probably the best material known for finger-print recording, and consequently, in the process of glueing and handling, my listings become an ugly mess of overlapping dark impressions, unless I wear a clean pair of gloves.

A simple, effective way to overcome such a nuisance is to spray the listings immediately, thoroughly but carefully, with a good fixing fluid for watercolour paintings or drawings.

Manuel Ballester, Barcelona, Spain

Video Genie multiple USR calls

Here is a useful method for calling machine code subroutines from Basic on the Video Genie which cuts out the need to use two pokes before the routine can be called.

To use a USR machine code routine the address must be POKEd into locations 16526 and 16527. This is alright if there is only one routine but if there are two or more the time taken to POKE the new address before each call is very much wasted and also uses more memory than is necessary.

The first thing to do is set up the following routine anywhere in memory. (I usually just tag it onto the end or the beginning of one of the machine code routines.)

```
CALL    0A7FH
JP      HL
```

Then POKE the address of the above CALL instruction into locations 16526 and 16527. For example, if the CALL were at 32000 decimal then you would POKE 16526,0 : POKE 16527,125.

To call any routine in memory use X=USR(N) where N is the start address of the routine; say, the routine is at 7F00H then use X=USR(32512).

This method is particularly useful for a type of ON n GOSUB to a machine code routine. To set this up put the addresses of the routines in an array—for example, A(1)=32000 A(2)=32123. Then use X=USR(A(I)) where I is the number of the routine.

The problem with this method is that you cannot pass an argument to the routine. The best way round this, and the method I prefer, is to define which variables you are going to use at the beginning of the program as integer, and then use the VARPTR command to find the address of these variables and POKE these directly into the machine code.

For example,

```
10 defintA
20 X=VARPTR(A)
   :POKE32001,
   (X−(INT(X/256)*256))
   :POKE32002,INT(X/256)
```

Then in the machine code

```
7D00H LD HL,(ADDR) ;line 20
```

above pokes the address of variable A into ADDR.

WJ Burgar

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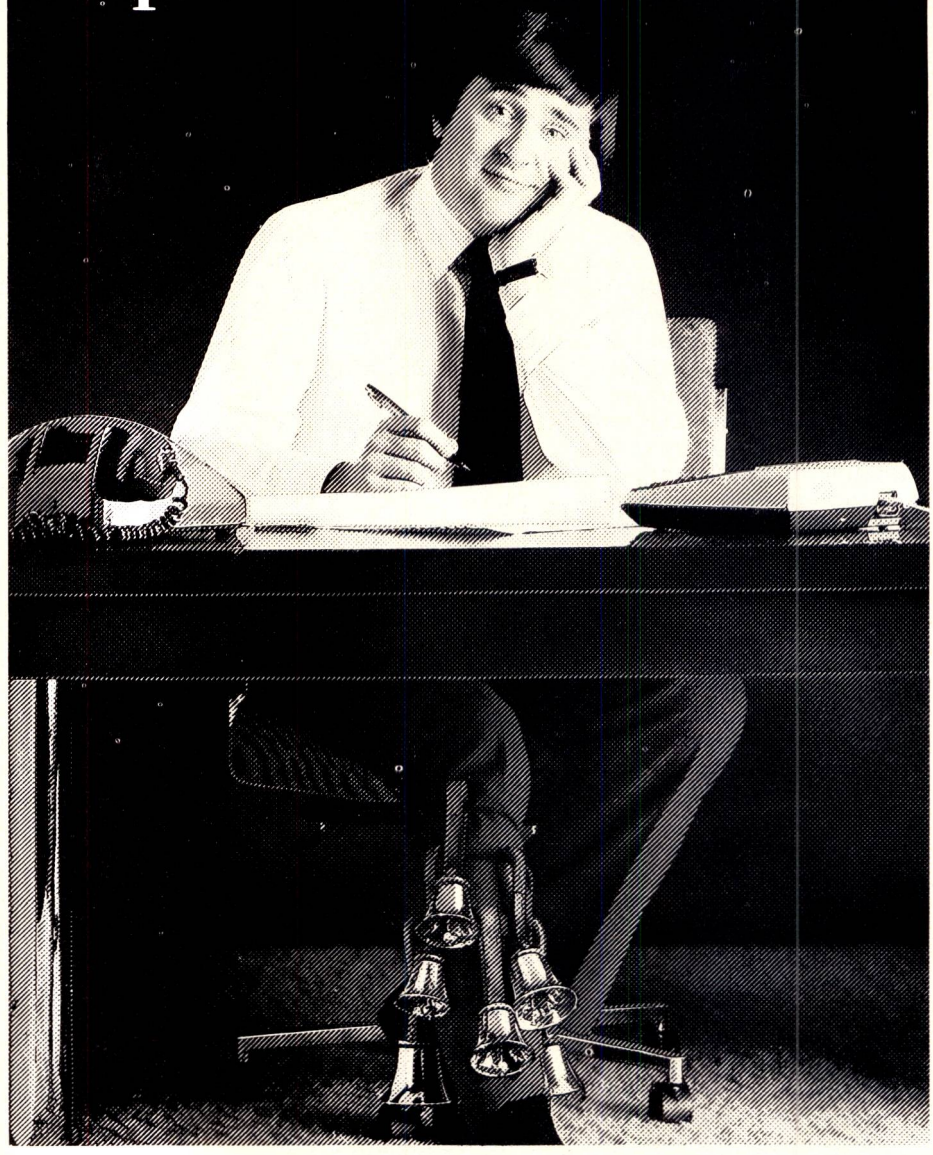

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Ace case

The CASE structure is unfortunately omitted from Jupiter Ace Forth. This is an attempt to remedy that omission.

The 2 byte operand field of OF holds the number of bytes to be skipped to the corresponding ENDOF, if the case is false. The 2 byte operand field of ENDOF contains the number of bytes to be skipped to ENDCASE after the words between OF and ENDOF have been executed.

The numbers 7, 8, 9 together with ?PAIRS are used to ensure that the CASE statement is always properly structured, in the form:

```
CASE                (n- -)
  x OF . . . ENDOF
  y OF . . . ENDOF
  z OF . . . ENDOF
  OTHERWISE . . .
ENDCASE
```

OTHERWISE may not be omitted from the CASE statement.

Words containing the CASE structure may be EDITed and REDEFINEd, and they may also be added to an existing directory.

The six words occupy 301 bytes as written, without comments.

```
: ?PAIRS
    = 0=
    IF
      ." ERROR 5"
      CR ABORT
    THEN
;
0 COMPILER CASE
    0  9
  RUNS>
    DROP
  ;
2 COMPILER OF
    9 ?PAIRS
    HERE 0,
    7
  RUNS>
    >R OVER = R> SWAP
    IF
      DROP DROP
    ELSE
      @R> + >R
    THEN
;
2 COMPILER ENDOF
    7 ?PAIRS
    HERE SWAP 0,
    OVER OVER — SWAP !
    9
  RUNS>
    @R> + >R
;

0 COMPILER OTHERWISE
    9 ?PAIRS 8
  RUNS
    DROP DROP
;
0 COMPILER ENDCASE
    8 ?PAIRS
    BEGIN
      ?DUP
    WHILE
      HERE OVER — 2 –
      SWAP !
    REPEAT
  RUNS
    DROP

;
Example use:
: SILLY                (n– –)
  CASE
    1 OF CR ." NUMBER
    ONE!" CR ENDOF
    6 OF CR ." NUMBER
    SIX!" CR ENDOF
    40 OF CR ." NUMBER
    FORTY!" CR ENDOF
    OTHERWISE CR ." NOT
    1, NOT 6, NOT 40!" CR
  ENDCASE
." The end of a pointless
  word." CR
```

Stephen Renals

ZX81 tip

Sometimes, especially in graphic displays, you may slip up and find that the end of the program is wrong. If it is a long subroutine, it can be very tedious deleting line by line. One excellent way of NEWing the end of the program is to enter "POKE PEEK 16425 + 256 * PEEK 16426" as the first line you require deleting, then GOTO that line, and when the report code appears, delete it. Simple!

Another useful tip is split screen scrolling. By POKEing 16418,x then SCROLL you can scroll up the first 24-x lines.

Andrew Davies

Oric program restore

Here's a very short machine code routine which recovers NEWed programs and is really intended to be POKEd (or in this case DOKEd) into place and executed when a Basic program has been accidentally or otherwise NEWed. It can of course be saved as a machine code file and reloaded when needed, but as it is only 13 bytes long, it is hardly worth the trouble.

It requires no documentation, but I have provided a brief outline on the way the Oric organises Basic lines which, together with the source listing, should be sufficient to clarify the way in which the routine works.

David Yan

The following routine is a useful way of recovering Basic programs that have been NEWed and will work on both 48k and 16k models. It must be directly POKEd into place and executed with a CALL command.

The routine makes use of the fact that when a program is NEWed, it actually remains intact while an End of File marker is placed at the beginning of the file, effectively telling the interpreter that no file exists in memory. Each Basic line begins with a two-byte pointer showing the location of the following line and is terminated by an End of Line marker byte containing zero. The EOF marker is basically two empty bytes in place of the following pointer bytes after the last Basic line of the program. In other words, a Basic program may be terminated anywhere by simply zeroing the appropriate pointer bytes. This will also explain why sometimes a corrupted program will list a string of 'U's or empty memory where the corrupted bytes are pointing.

The routine removes the EOF marker and restores the pointer bytes by looking for the start of the second Basic line which is naturally at the location following the first EOF. This forms the LSB and it is stored in location Hx501. The MSB can only be Hx05 as a Basic line cannot be any longer than 78 characters and is therefore POKEd directly into location Hx502.

DOKE is used in the listing below to save typing and note that only decimal numbers may be used with POKE. Hex numbers bomb the interpreter.

(Read '#' – shifted '2' for '£')

```
DOKE £400,£4A2 : DOKE £402,£BDE8 : DOKE £404,£500
DOKE £406,£FAD0 : DOKE £408,£8EE8 : DOKE £40A,£501
POKE £40C,96 : POKE £502,5
```

Execute CALL £400 when the above has been entered and *Voilà!* the NEWed program is restored. The routine can be relocated anywhere and the assembler listing below should clarify it.

LOC Hx	CODE	LINE	
0400	A2 04	LDX £04	;Initialise Counter
0402	E8	INX	;Counter=Counter+1
0403	BD 00 05	LDA 0500,X	;Each byte
0406	D0 FA	BNE 0402	;Is it EOL?
0408	E8	INX	;Yes, so next byte is...
0409	8E 01 05	STX 0501	;start of next line
040C	60	RTS	;Return to Basic

Vic game controllers

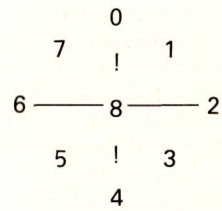
I read with interest 'Joyful VIC' in September TJs on how to incorporate the use of a joystick into programs. There is one major problem with the routine. It is in machine code, and so a monitor is needed.

Here are two routines which should be used inside programs to enable the use of either the paddle or the joystick.

The programs come in two parts. Lines 10-50 are initialisation; the rest of the program can be called as a subroutine whenever you want to read the joystick/paddle.

Joy-vic fire=128

```
10 PRINT"(SHIFT/CLR)"
20 PRINT"JOY-VIC":PRINT
"BY C MURRAY"
30 DIMC(2,2):POKE
37139,0: A=37154:B=37152
40 FORJ=OTO2:
FORI=OTO2: READC(I,J):
NEXT I,J
50 DATA 7,0,1,6,8,2,5,4,3
60 GOSUB9000: 1FR=1THEN PRINT"128":GOTO60
70 PRINTC(X+1,Y+1): GOTO60
9000 POKED,127:E3=-((PEEK(B)AND128)=0)
:POKED,255:P=PEEK(A)
9010E1=-((PAND8)=0):E2=((PAND16)=0):EO=((PAND4)=0):
9020 FR=-((PAND32)=0):X=E2+E3:Y=EO+EI:RETURN
```



Vic-paddle

```
10 PRINT"(SHIFT/CLR) VIC-PADDLE"
20 PRINT"BY C MURRAY"
30 POKE 37139,0:D=37154: A=37137:B=37152
40 ZX=36872:ZY=36873
50 GOSUB9000:PRINTPEEK(ZX); PEEK(ZY);X;Y:GOTO50
9000 POKED,127:Y=-((PEEK(B) AND128)=0):POKED,255
9010 X=-((PEEK(A) AND16)=0):RETURN
```

CA Murray

Spectrum double-height listings

The ZX Printer is an excellent little machine but often the print suffers from fading lines. Sometimes this can be so bad that program listings, especially long lists of data, can be almost unreadable in parts. The program described here avoids these problems by printing listings in double-height characters, so that when fading occurs it is much easier to recognise what the characters are supposed to be.

The task of producing double-height characters from string variables can be accomplished fairly easily using Basic and user-defined graphic characters. Producing listings of program lines, however, is not quite so easy, since there are many non-text control characters embedded within each line, and so we have to resort to using machine code.

The program works by printing each line in turn at the top of the screen and then uses a modified version of the COPY command to print two pixel lines on the printer for each single pixel line on the screen. The screen is cleared and the process repeated until the last line has been printed. This method uses the normal Spectrum listing routine to remove all the control characters from the line to leave a text-only copy of the line on screen, which is then printed. One limitation of the program should also become apparent here: lines that occupy more than one full screen will not be printed properly. However, since the use of such long lines is not recommended, this is no real problem. (Have you ever tried to edit a program line of 10-15 lines? Slow is not the word!)

The code is fully relocatable, simply change the initial CLEAR and LET x = statements to any number you require; to avoid overwriting your own machine code. For example, the listing is set for a 16k Spectrum, making the code sit just below the first user-defined graphic, but will work on any machine size. Simply enter the Basic, RUN it once and then the machine code is in place, protected from NEW, LOAD, and so on. The Basic program can be safely removed or overwritten.

To use the program, RANDOMISE USR 32524 (or your own new number) will produce a listing of the whole program on the printer. As each line is printed it appears on the screen. To stop any listing, simply press BREAK at any time.

The program may also be used to produce double-height copies of any screen image the user wishes, by printing a user-defined number of pixel lines from the top of the screen. Whatever has been printed or plotted there by Basic will appear in double-height on the printer. To do this, POKE 32521,n where n is the number of pixel lines (remember: a full screen is 176 lines, one character line is eight pixel lines and so on) and RANDOMIZE USR 32520.

GA Wilson

Assembly Listing of Program

```
entri1:   lda,1          ;entry for pixel lines
          jr main        ;jump to main prog
entrie2:  ld hl,(prog)   ;entry for llist, point hl
          push hl        ;at prog start and save it.
loop:     call clrall    ;monitor. clear the screen
          pop hl         ;pointer to current line
          ld a,(hl)      ;check that we have not
          and 192        ;finished listing whole prog
          ret nz         ; return to basic if so.
          call nxtone    ;monitor. else point de at
          push de        ;line and save it
          call outlin    ;print the current line
          ld hl,(sposnl) ;point to last screen line
          ld a,25        ;printed, and adjust to range
          sub (hl)       ;1 to 24 (from top of screen)
          add a,a        ;mult*8 for no. of pixel lines
          add a,a        ;in one character line
          add a,a
main:     ld b,a         ;copy to b for loop.
          di             ;for the printer.
          ld hl,d-file   ;hl=first pixel line
cpy1:     push hl        ;save pixel line pntr
          push bc        ;save pixel line counter
          push hl        ;save each twice
          push bc
          call cpylin    ;monitor. copy one pixel line
          pop bc         ;to printer. restore pointers
          pop hl         ;and copy same line again, ie
          call cpylin    ;print each line twice.
          pop bc         ;restore pointers
          pop hl
          inc h          ;now adjust hl to point at next
          ld a,h         ;pixel line
          and 7          ;if <7 then simply h=h+1
          jr nz,cpy2     ;jmp to continue loop
          ld a,l         ;else adjust hl depending on
          add a,32       ;which third of the display file
          ld l,a         ;it lies
          ccf
          sbc a,a
          and 248
          add a,h
          ld h,a
cpy2:     djnz cpy1      ;dec pixel counter and loop if
          ld a,4         ;unfinished lines still
          out (251),a    ;else stop printer motor
          ei
          jr loop        ;and loop back to main loop
OK,
```

```
  5 CLEAR 32519: RESTORE : LET y=32520
  6 REM set for 16K Spectrum. Use any number you prefer
  7 READ x: IF x<>-1 THEN POKE y,x: LET y=y+1: GO TO 7
 10 FOR x=3759 TO 3763: POKE y,PEEK x: LET y=y+1: NEXT x
 20 FOR x=3762 TO 3768: POKE y,PEEK x: LET y=y+1: NEXT x
 30 FOR x=3764 TO 3785: POKE y,PEEK x: LET y=y+1: NEXT x
 40 READ x: IF x<>-1 THEN POKE y,x: LET y=y+1: GO TO 40
200 DATA 62,1,24,28,42,83,92,229,205,175,13,225,126,230,
    192,192,205,184,25,213,
205,85,24,33,137,92,62,25,150,135,135,135,71,243,-1
210 DATA 224,62,4,211,251,251,24,188,-1
400 STOP
450 REM ##To use the program
500 POKE 32521,4: RANDOMIZE USR 32520: REM print top 4
    (for example) pixel lines on screen.
510 RANDOMIZE USR 32524: REM LIST entire program
```

Oric double-height characters

This program was written on a 48k Oric 1 but it only takes up 400 bytes so will easily fit into the 16k Oric.

The routine is particularly good as a title screen within another program and the cursor position set in line 180 can be altered to give an image anywhere on the screen.

The main line of the program is line 200 which uses the Oric PATTERN command. The pattern is set to a value between 0 and 255 and all lines or circles drawn afterwards will be drawn in a series of dots and dashes.

The value 38912 in line 200 is the memory location where the character values are stored when the Oric is in Hi-res mode.

The loop from line 210 to line 240 draws the character line by line and if the size of the loop is increased then larger characters will be drawn, so that one character could be as tall as the whole screen.

Matthew Stickland

```
100 REM Double height characters
110 REM for the ORIC 1 in the
120 REM HIRES mode.
130 REM By M.Stickland.
140 REM N$ can be any sentence.
150 N$="Hello,I am your ORIC computer"
160 HIRES
170 FOR M= 1 TO LEN (N$)
180  CURSET M*7,0,3
190  FOR N= 0 TO 7
200   PATTERN PEEK(38912+N+ASC(MID$(N$,M,1))*8)
210   FOR L= 1 TO 4       ' Height of character
220    DRAW 7,0,1
230    CURMOV -7,1,3
240   NEXT L
250  NEXT N
260 NEXT M

Changes which can be made to the above program :-

SIDEWAYS CHARACTERS
180  CURSET o,M*7,3
190  FOR N= 7 TO 0 STEP -1
220    DRAW 0,7,1
230    CURMOV 1,-7,3

ITALLIC WRITTING
220    DRAW 7,9,1
230    CURMOV -7,-8,3

FLASHING CHARACTERS
270 CURSET 0,0,3
280 FILL 45,1,14
The same method can be used to make
coloured characters.
```

Sirius escape codes

Having just read John Lane's 'Sirius Tips' (TJ's Workshop, *PCW*, December '83), John has performed some of the functions in a very long-winded way, in particular the way he has printed out the Sirius Banner; he could have done it in one escape sequence by:

Esc i0 — for the whole system boot up banner.
Esc i1 — for the company logo only.
Esc i2 — for the product name only.
Esc i3 — for the configuration information only.

There are about 70 escape codes on the Sirius and most turn on or off a particular feature. Pokes never have to be used.

These codes are purposely not distributed with the Sirius because most users are business users with off the shelf packages and so initially would only become more confused with an extra manual to read.

Here is a fairly comprehensive list of the escape codes.

A C Hausser

Explanation.	ESC
MODES.	
High intensity mode ON.	(
High intensity mode OFF.	)
Reverse video mode ON.	p
Reverse video mode OFF.	q
Underline mode ON.	0
Underline mode OFF.	1
Insert Mode ON.	@
Insert Mode OFF.	O
CURSOR POSITIONING.	
Clear screen.	E
Home cursor.	H
Up one line.	A
Down one line.	B
Right one character.	C
Left one character.	D
Save cursor position.	j
Restore cursor position.	k
Goto x,y	Y+(x+32)+(y+32)
DELETES.	
Delete to cursor position.	b
Delete from cursor position down screen.	J
Delete line that cursor is on.	l
Delete to end of line from cursor.	K
Delete character.	N
OTHERS.	
Print bootup banner.(total picture: banner,logo,specs)	i0
Print Banner only	i1
Print Logo only	i2
Print Specs only	i3
Put characters into graphic mode.	chr(14)
Put characters back into normal mode.	chr(15)
Sound bell (NO esc)	chr(7)
Put into 132 characters mode.	chr(124)
Put back into 80 characters mode.	z
Turns the cursor ON.	y5
Turns the cursor OFF.	x5
Make cursor = Underscore	y4
Make cursor = block	x4
Make cursor flash	2
Make cursor still	3
Turn keyboard on	
Turn keyboard off	

25th Line.
When a message is written on the 25th line it can only be removed by writing a message of zero length to it.

The codes are as follows :-

ESC x1 ESC j

ESC Y8 [spc]

ESC l [message]

ESC Y [spc][spc]

ESC k

From the above separate codes it can be seen that alot of the codes are not necessary but are useful.

Small business can now stop going by the book.

For under £1,000 a small business can now equip itself with a BBC Microcomputer, a disc drive, a word processor and printer.

(All tax deductible by the way.)

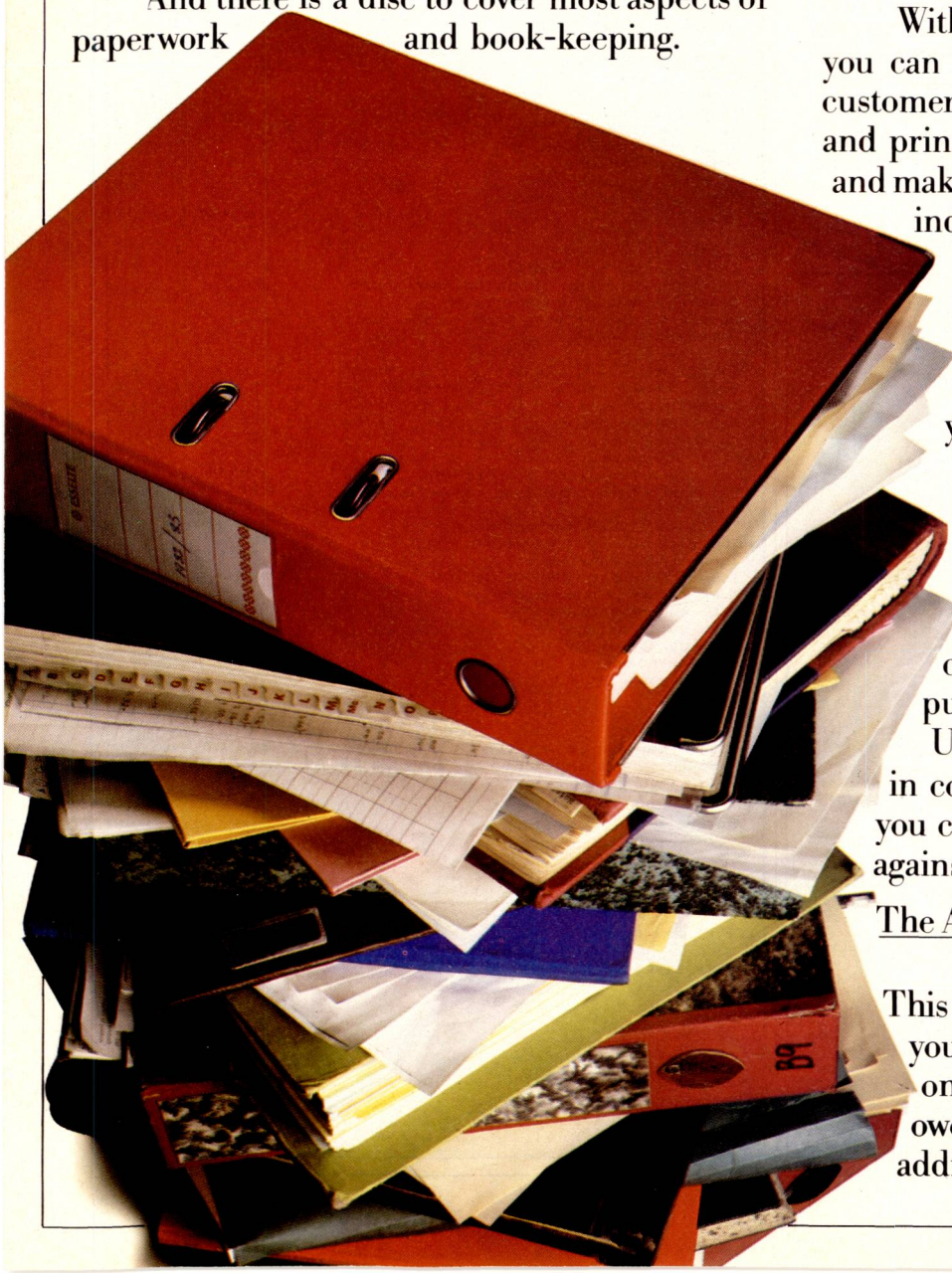
Once you've parted with that money, you'll find that business has never been brisker.

Because now, there's a new series of floppy disc software specially for the smaller business.

It has been developed by Acornsoft, the software division of Acorn Computers who are the manufacturers of the BBC Micro.

For only £24.95, each disc can store volumes of vital bookwork which can be updated and amended in a fraction of the conventional time.

And there is a disc to cover most aspects of paperwork and book-keeping.



The Invoicing package.

This program stores details of products, VAT numbers and, of course, the names and addresses of your customers. As orders come in, you simply record them. Then, when it's time to invoice, you just press a few keys and each invoice or credit note is printed automatically in seconds.



Allowing for variable terms of trading, the system calculates and prints discounts. And it should help to improve your cash flow dramatically.

The Order Processing package.

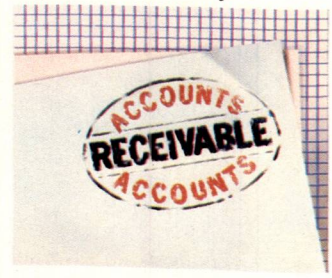
With this program, you can confirm your customers' orders, prepare and print despatch notes and make fast analyses of individual orders or of all the orders stored on disc.



The Accounts Receivable package.

Now, it couldn't be easier to keep your customer accounts under control.

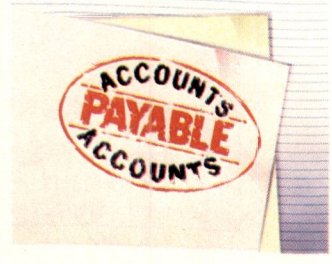
In an instant, you can analyse debtors, produce statements, keep a check on any credit limit and calculate VAT output automatically.



Using this package in conjunction with the invoicing package, you can also keep tabs on payments received against payments outstanding.

The Accounts Payable package.

This package will keep you fully up-to-date on how much you owe and who to. In addition, it calculates



input VAT and, used with the Accounts Receivable package, produces instant VAT returns.

It also highlights settlement discounts, produces remittance advices and provides an immediate analysis of all creditors.

The Stock Control package.

Touch a few keys and you have instant access to stock status and automatic analysis by quantity and value.



Consequently, it's easy for you to maintain correct stocking levels, having an early warning of out-of-stock situations or the likelihood of over-stocking.



The Purchasing package.

All your suppliers' names and addresses go onto the disc. Then they can be retrieved instantly for preparing and printing orders.



All order data can be recalled in seconds, allowing you to check on orders, and suppliers' invoices and to record all deliveries.

The Mailing package.

Instead of the shotgun method of sending mailshots, this package enables you to refine each mailing down to the customers who are most likely to respond.



It gives you a rapidly accessible mailing file of your customers, according to any criterion you choose. Size of company, for instance, or type of business. Average value of the business they do with you, or whether they are good or bad payers.

Then, when you are doing a mailing, you simply choose the group or groups of customers you want.

At £24.95 each, these packages could be priceless.

Each package comes with clear instructions on how to get the program running so that you can devote much more of your time to more profitable activities.

If you're a credit card holder, you can order any or all of the packages by ringing: 01-200 0200 anytime. Or 0933 79300 during office hours.

(By ringing the same number, you can get the address of your nearest stockist, or full details of the BBC Microcomputer system if you don't already have one.)

Alternatively, you can order the packages by sending the order form below to: Acornsoft, c/o Vector Marketing, Denington Estate, Wellingborough, Northants NN8 2RL. Please allow 28 days for delivery.

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Accounts Receivable			SNB 10
Accounts Payable			SNB 13
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Mailing			SNB 09
	TOTAL		

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ACORNSOFT

Unique Unix

Bell Lab's Unix has spawned many imitators since its introduction in the 60s as an operating system for mainframes. With its successful implementation on business micros, Peter Bright analyses the reasons for its popularity.

A year or so ago, the business operating system market was plain and simple. There was one major operating system — CP/M, with a few other machine specific operating systems like Apple, Commodore and Tandy. They all supported just one user. Today the scene is a great deal more complicated; hardware has become more powerful and there are many more operating systems trying to become Number One in their particular area.

One of the more recent developments has been the release of the so called 'super micros'. These have moved into the multi-user areas that were previously the province of minis costing tens of thousands of pounds. These new super micros need an operating system and a high percentage of them are offering Unix as their choice.

PCW has looked at Unix before (back in March '81), but events have moved on since then and I feel it's time we took another look to see where Unix stands today.

History

Unix has been around for many years — it was first written in 1969 to run on a DEC PDP-7 mini at Bell Labs (the research arm of AT&T — see Fig 1) by Ken Thompson and Dennis Ritchie. It was designed as a multi-user interactive programming environment for the staff at Bell. Unix roots go back to an early mainframe operating system known as Multics, which has since developed from Version 5 through to System 5. The first generally available portable version was Version 7, which was developed into System 3 and then into the latest implementation which is known as System 5.

Bell Labs hasn't been the only company developing Unix — many other companies have released their own versions. Some of these are based on the original Bell Labs source code and are therefore largely compatible with Bell Unix. Others have been written from scratch by borrowing ideas from Unix. One of the most popular Unix lookalikes is Xenix from Microsoft. This is based on Version 7 of Bell Unix but as the two companies develop their own products, so the differences increase.

Popularity

Why has Unix become so popular? The answer lies in a number of areas. One of the major factors is that Unix used to be given away to universities and higher educational establishments, so many graduate programmers came out of university with an in-depth knowledge of Unix. When they got into industry they went for Unix in a big way.

Another big advantage of Unix is that it's portable. It can be moved from machine to machine relatively easily because much of Unix is written in a high level language known as 'C'. As long as the machine that's intended to run Unix has a good C compiler it will only be necessary to rewrite some of the more machine-dependent parts of Unix, which usually only involves a small percentage of the total code. Unix has moved very well to the new super micros that use the Motorola MC68000 processor, with companies such as Root Computers specialising in porting Unix onto the new machines. This portability is something very few other mini/mainframe operating systems are capable of achieving.

Shell

Unix has been described in many different ways. My favourite description is to look on it as an egg — the hardware is the yolk, the Unix kernel is the white and the eggshell is the shell. In other words, when you sit down at your terminal and think you're talking to Unix, you are actually talking to the shell.

It's perfectly possible to write your own shell and run that instead of the standard shell — one of the best examples is the Fortune 32:16 which has substituted a menu system for the standard shell. This may be no bad thing — the standard shell is not known for its friendliness.

Shell programming

One very powerful feature of the Unix shell is that it's possible to build programs using just the shell commands. This is known as 'shell programming'. Using the shell you can test the status of a file, assign string variables, test variables, and so on. The shell also supports certain control structures:

```
IF condition THEN action ELSE action FI
CASE word IN
   pattern) command-list;;
   ...
ESAC
FOR variable-name IN list DO action
      DONE
WHILE condition DO action DONE
```

Using these structures, it's possible to solve some quite complex problems without ever having to resort to a high level language. Once the program is completed it can be saved to a disk file, and when it's called it will be executed in exactly the same way as a standard Unix command.

Pipes and filters

Unix has a wide range of software tools that read their standard input and write to their standard output (standard input is where the utility expects to see its input coming from disk, keyboard, and so on). These tools are known as filters — they take their input, modify it in some way and then output the results; for example, sorting a data file and then processing the sorted file. On most other operating systems the data is read into the sort, written to a temporary file and then read into the program.

Unix differs from other operating systems in that you can avoid using temporary files by using 'pipes' (see Fig 2). A pipe will direct the standard output of one filter straight into the standard input of another without bothering with intermediate files.

Directories

The file system in Unix is based on a tree structure (see Fig 3). This means that any directory can have a number of sub directories which in turn can have sub directories of their own, and so on. In other words, you start with the main directory (known as the root) and then go on down through the system.

Each Unix system has a root containing standard sub directories called BIN,

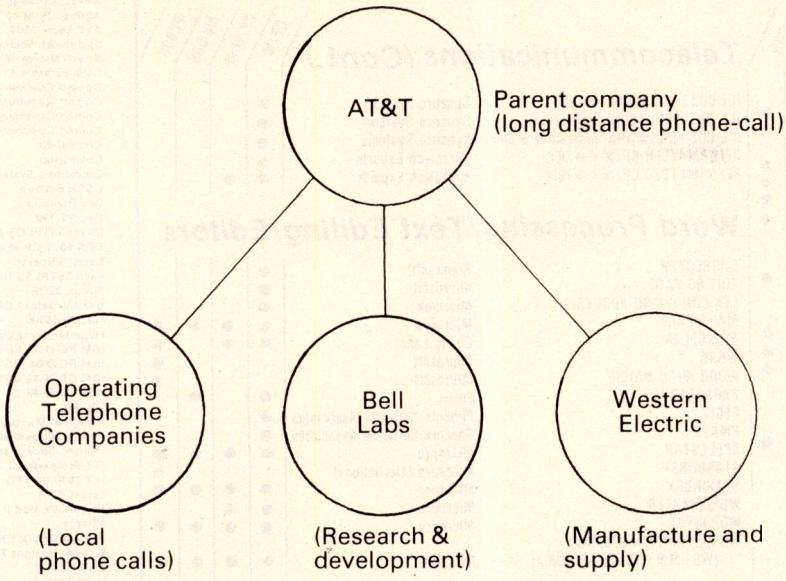

Fig 1. Structure of AT&T

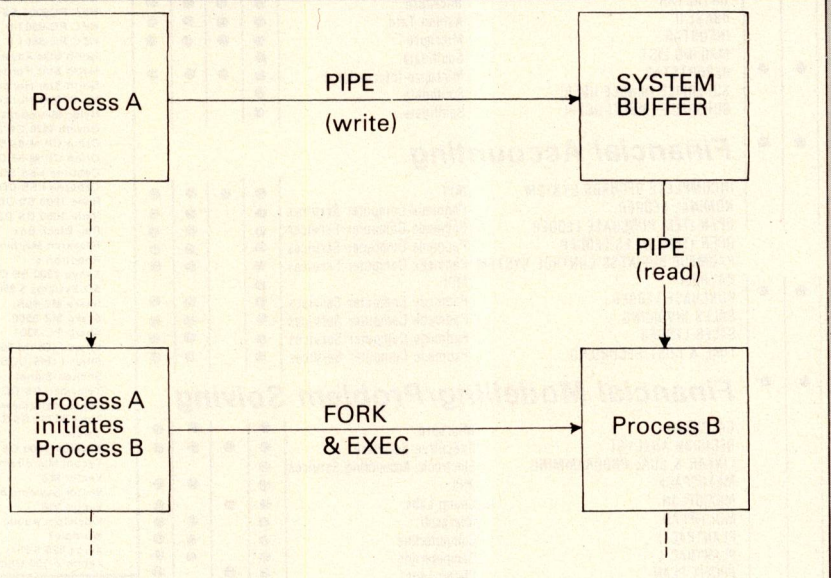

Fig 2. The pipe

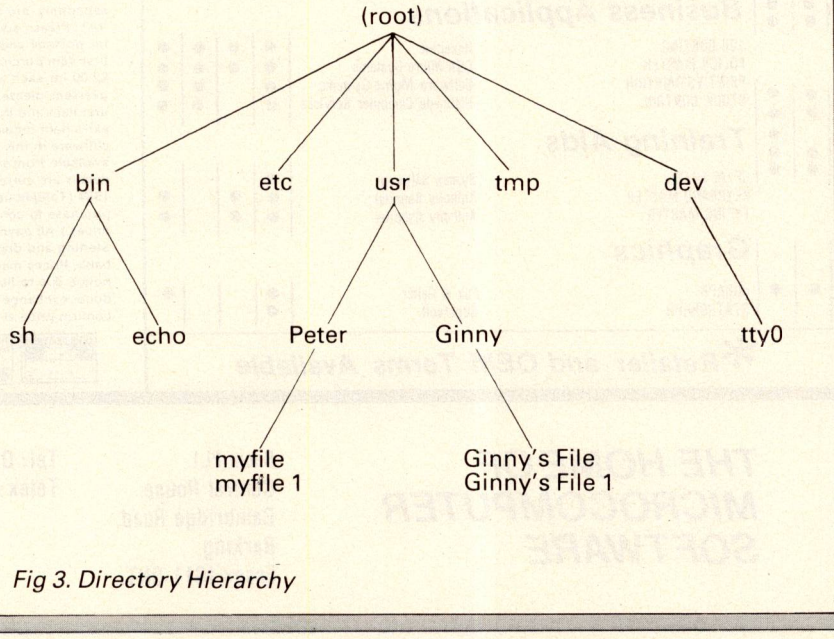

Fig 3. Directory Hierarchy

DEV, LIB, USR and ETC. BIN contains binary files used by the system, DEV refers to I/O devices such as printers and VDUs, LIB contains the library files, USR contains user directories and files, and ETC holds the rest of the system files.

When a user logs onto the system he will be taken straight to his 'home' directory, which is usually a sub directory of USR. New directories can be created using the MKDIR command followed by the new directory name. The CD command is used to move to a new directory.

In order to find a file or a directory, it's necessary to specify what is known as the pathname. This can take one of two forms — either as an absolute address from the root or as a relative address from the current directory. For example, if I had a program called MYPROG in directory PJB, the absolute address would look something like /USR/PJB/MYPROG. Here, the first '/' refers to the root directory while the other obliques are used as separators. This highlights one of the problems of using Unix — the same character can have a totally different meaning in different contexts. The oblique is one of the worst offenders in this respect — accidental use of this character can have some very strange effects.

It's also possible to specify a pathname in relation to the current directory by the use of '..'. This is used to represent the next highest level directory. So, for example, if I was in my directory called PJB, '..' would take me back to the USR directory.

Files

Unix supports one file structure and doesn't mind what kind of data is entered into it, so text, binary files and command files can all be put in the same filetype. Filenames can be 1 to 14 characters long but '/' cannot be used. Unix supports a powerful range of wildcards to help you find your file easily. Anyone who has used CP/M, MS-DOS *et al* will be familiar with '?' as a single character match and '*' as a string match, but Unix also supports a range match '[]'. An example of this would be LS PETE[1-10]. This would list files PETE1, PETE2,...,PETE10.

An interesting point about Unix is that it can write the file to disk, tape, printer or VDU, making it easy to redirect files without having to worry if the device will understand. All the device drivers are held in the DEV directory.

It's also very easy to redirect the standard input and output of a process. This is achieved by the use of the '<' and '>' commands. For example, the ECHO command will usually print its argument on the screen (therefore the standard output is VDU). However, if you were to type ECHO PERSONAL COMPUTER WORLD > FRED it would write PERSONAL COMPUTER WORLD to a disk file called FRED instead of

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continued from page 187

printing it on the screen.

Security

Any multi-user operating system must have some method of protecting files and directories so that they can only be accessed by authorised personnel. In Unix, the first line of defence is the normal user code and password system. The second line of defence relates to permission for people to access specific files and directories.

Files and directories can be accessed by three groups of people — the owner of the file, the user group he belongs to, and everyone else. Files can be read only, write only, executable or any combination of these three, each group having its own set of permissions. For example, the owner might have read, write and execute permission, the user group could have execute permission only and everyone else could be barred completely. Access permission can be changed by using the CHMOD command.

Unix also provides for a 'super user' who can access any file on the system whether it's protected or not. Usually this will be allocated to the system manager. The super user is an obvious weakness in the security of a Unix system — Bell Labs has been working on the problem for years but as yet hasn't come up with anything better.

Very large data files can sometimes cause speed problems on Unix systems, because disk space is allocated in an apparently random manner one block at a time, with pointers indicating where the next block is located. The file can then grow very easily but the problem is that the read/write heads spend most of their time moving to the next block rather than actually reading data.

Office applications

Ever since its early days Unix has been used as an environment for business applications: modern Unix has a number of interesting features designed to aid office automation. Everybody's talking about electronic mail and Unix has its own version known very originally as MAIL. Using this feature, messages can be sent to friends and work mates, and also pick up any messages sent to you. If a message has been sent, the system will inform the user when he logs on by displaying 'You have mail', or something equally short and to the point. The messages can then be saved or deleted, as required.

Unix also has a wide variety of text processing packages — three of the most common are Ed, Troff, and Nroff. Unix can be supplied with many different editors but Ed is the only one shipped with every system. In keeping with everything else about Unix, Ed is not very friendly but it's very powerful. In order to edit a program file it is necessary to type ED followed by the file name. The program loads the file which can then be edited, but Ed is unhelpful: if a mistake is made it will respond with a '?' and wait for the mistake to be corrected. If H is pressed a short error message will be displayed.

One of the main differences between Ed and most other editors is that it makes very little use of line numbers. They are there if they're needed but the approved Ed method is to refer to the area of required text as a pattern and then let Ed wander off to find it. Using the pattern matching ability of Ed it's very easy to perform complex search and replace operations on a file.

Troff and Nroff are both text editors, as opposed to Ed which is designed for editing program files. Troff is designed to output to phototypesetting equipment whereas Nroff is designed for standard output to a printer.

System documentation

To use a Unix command correctly, refer to the user manual which is held on disk. To do this correctly and easily, type MAN followed by the command name. The system should then display a number of pages showing what the command does, what parameters it needs, and so on. The only trouble with the manual is that it keeps faith with everything else about Unix by being hard to understand, but most of the necessary information is there (including any known bugs).

Unix in context

So where does Unix stand in the micro world? One point to remember is that most other micro operating systems were written for micros, whereas Unix was designed for minis and has now moved onto micros. The majority of today's Motorola 68000 multi-user machines offer Unix, which in turn means there's more of an incentive for multi-user software writers to make their programs run under Unix.

At the moment, Unix doesn't seem to have many large scale competitors in the multi-user market, MP/M, MBOS and Pick being the only main contenders.

As a business operating system Unix is not ideal. It has some very powerful features but is not user-friendly — it's a hackers' paradise. Having said that, a great deal can be done to mitigate its hostility. It's a comparatively straightforward job to modify the shell, and a number of companies offer friendly versions of Unix.

This leads on to what has been one of the major problems facing Unix users — the lack of support from Bell. Until recently, Bell shipped Unix with virtually no customer support — the reasons for this are embedded in the anti-trust laws of the USA. This has now changed and Bell is taking much more interest in the marketing of Unix. Some will say that the damage has already been done. So many other companies have cashed in by offering their own versions that compatibility problems are bound to set in — unless Bell can pull the other suppliers back into line.

In the final analysis it's not necessarily the best product that becomes the industry standard — this has more to do with being in the right place at the right time. It's too early to assess properly the effect Unix will have — it's certainly ahead at the moment, but we may still see a late run from Pick or one of the other systems. END

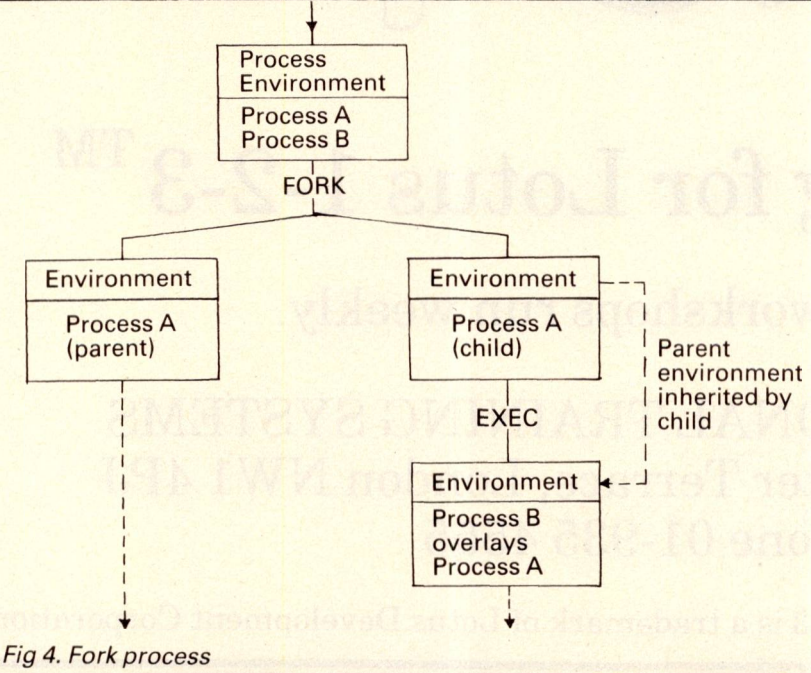
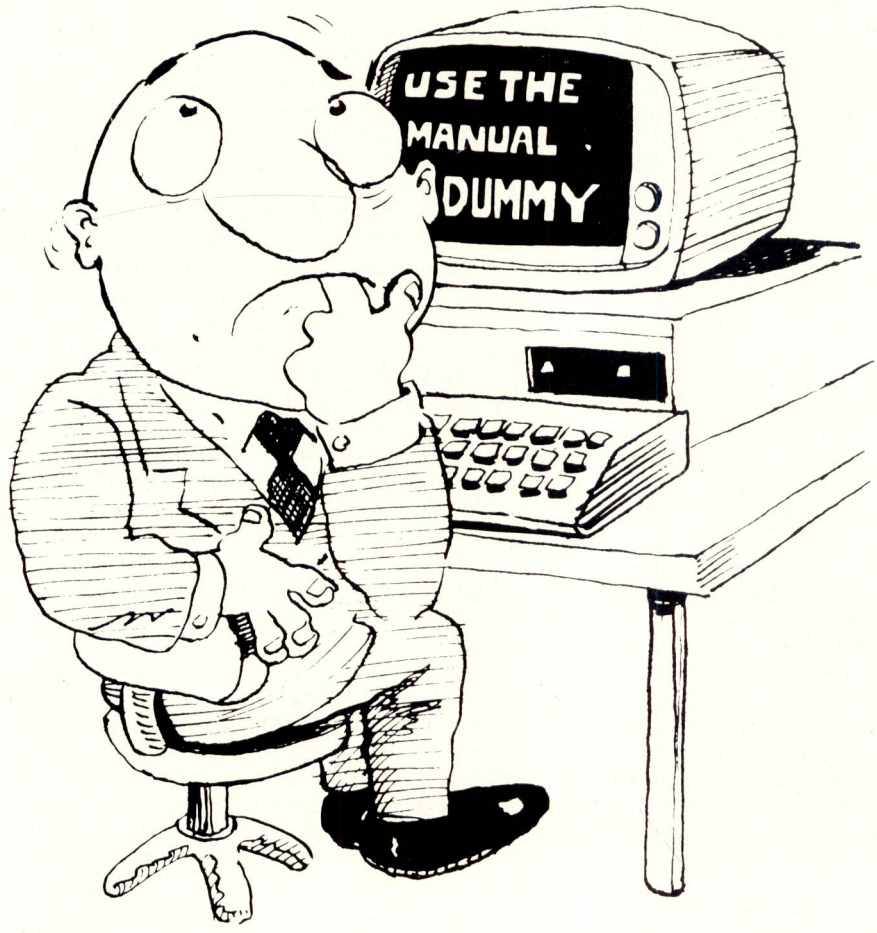


Fig 4. Fork process

It could be so much simpler.



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Micro Animation

The PCW Micro Animation Competition has sparked off nationwide interest. This month we present reviews on some informative books to help you prepare your entry.

Our competition has already caught the imagination of the microcomputer industry — thousands of pounds worth of prizes will be on offer from many of the industry's leading manufacturers. Here's a preview to whet your appetite.

For schools' entries, Sinclair is providing three prizes of 48k Spectrum computers plus software. To accompany the Spectrum each winning school will receive a Cub Colour monitor for high quality display, worth over £250, from Microvitec.

In category 3 (animation sequences), Hantarex will present the winning entrant with a Hantarex high resolution colour monitor worth over £500.

Century Communications will provide two prizes of 'libraries', containing £100 worth of books and software from its list. Century also plans to follow up the competition with publication of a micro animation book, which will survey the state of the art, list routines and include the most innovative ideas generated by the competition. The company will offer some of the winners in the programming section the opportunity to have their programs marketed to accompany the book, on a generous royalty basis.

A special prize for NewBrain enthusiasts is being offered by Brainwave Software. Just released in this country, the new integral disk drive and floppy controller with onboard power supply from Tradecom will upgrade your machine to CP/M standard. The best overall NewBrain entry will be awarded a unit with a single 200k disk drive plus CP/M disk, manual and licence, making a total prize value of nearly £500.

Full details of competition categories and rules were given in last month's issue, but will be repeated in the April issue together with the entry form. The closing date for entries is 15 July, 1984.

Reviews

The first and most important point to make about books dealing with computer animation is that they tend to be extremely expensive. This is due in part to the fact that many of them are American imports, so you'll probably want to use a library to check them out. Almost all deal, to a greater or lesser extent, with a variety of input devices, CRT technology, shape building and primitive animation. It is perhaps inevitable in studies which aim at being introductory that the same examples and applications recur *ad nauseam*.

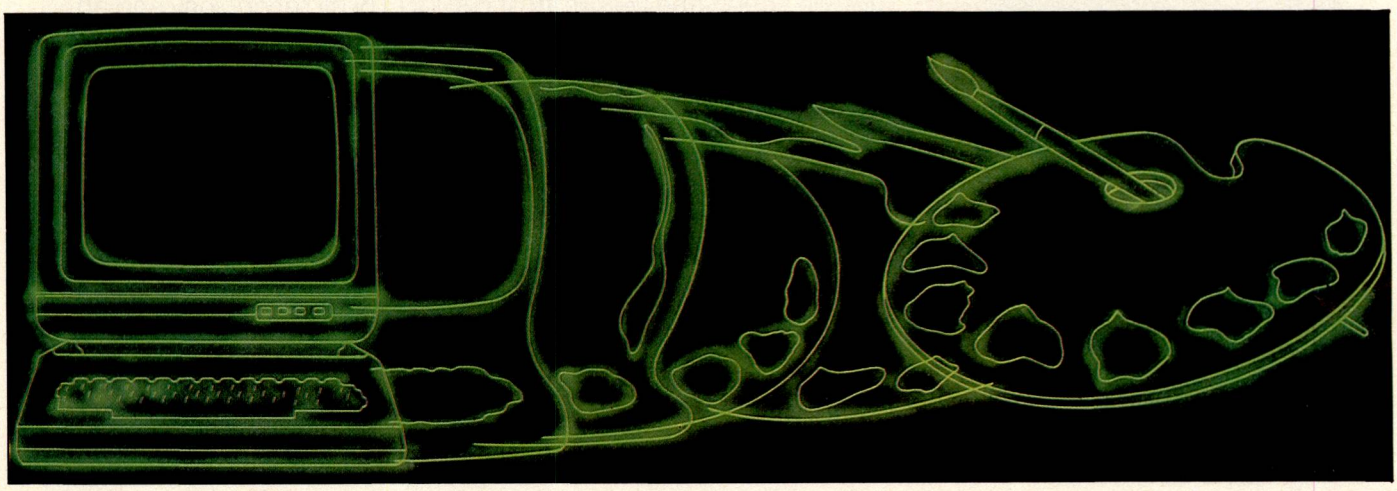
Less easily excused is that in the majority of books I looked at, the illustrations (diagrams and photographs) are conspicuously shoddy. This is presumably explained by the publishers' expectations that computing types are likely to be primarily concerned with the means of generating graphics and less interested in the aesthetic impact of the end product. The excellent colour plates in *Computer Images — State of the Art* (Thames and Hudson, £9.95) show how misguided such an attitude is.

The tone of many of these volumes is idiosyncratic. If they're not characterised by the hard-nosed pragmatism and pedantry of the professional salesman, they drip with the contrived wackiness of the stereotypical hacker. Be warned: there's not much in between.

Introduction to Computer Animation
Author: Nad Wadsworth
Publisher: Hayden Book Company Inc,
Price: £9.95

The only volume to be found under 'Computer Animation' in *British Books in Print* is an idiot's guide which occasionally treats the reader like an idiot. Aimed at owners of the Commodore PET, the Radio Shack TRS-80 and the Apple II, it deals with low resolution graphics in a manner valid for all micros. *Introduction to Computer Animation* has on offer sufficient Basic listings to enable the reader to write a game of football (American) with relatively sophisticated graphics and sound effects.

Unfortunately, the opening note of breezy pedagogy is wearily sustained: 'You will have enough knowledge to allow you to be "graphics boss" of your own machine. That is what you really want anyhow, right?'. Wadsworth argues that nothing more complicated than high school algebra is necessary for the successful animation of simple figures. He elaborates a graphics itinerary that includes defining a point in a matrix, PEEKing and POKEing, PLOT-



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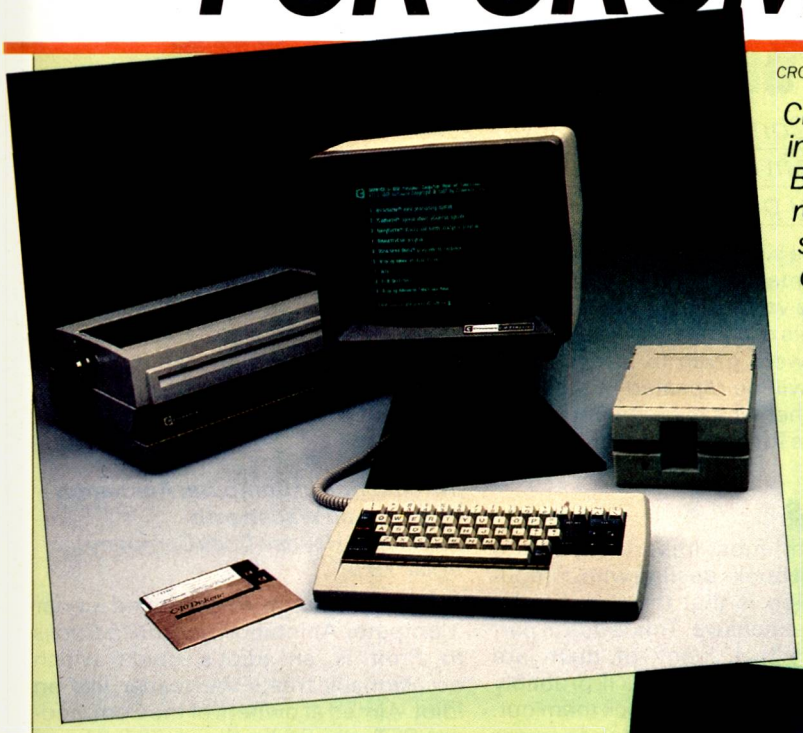


CROMEMCO C-10MP

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.

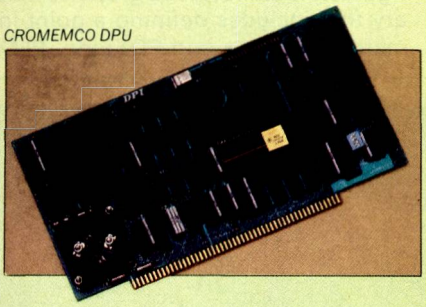
The S-100 bus has eight card slots, sufficient for expansion utilising Cromemco's range of interface cards for high resolution colour graphics, process control, analogue-digital data conversion and telecommunications.

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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ting and COLOURing, simple shapes, multiple overlapping shapes, straight lines and hidden line algorithms. Circles he regards as tricky: I recommend you minimise your use of circles. Building a library of subroutines to produce specified shapes at a specified point on the screen, objects with borders, reversing of backgrounds and colour capacity is also included.

Having mastered the essentials, the reader is in a position to produce card games and animate a clown who winks and gestures. Everything comes together in the interactive football game.

This is the book for beginners who can tolerate what fans might decribe as Wadsworth's infectious enthusiasm.

Introduction to Interactive Computer Graphics
Author: Joan E Scott
Publisher: John Wiley and Sons
Price: £13.95

Joan Scott is not backward in self-promotion: 'This book is easy to read and understand, but has enough depth to serve as a reference.' As the introduction develops, the claims become more vaunted: 'For all those who wish to become sophisticated users of computer assisted design and for managers responsible for initiating and supervising graphics installations, this book will serve as a complete introduction.'

Part One catalogues the relevant hardware from light pens, digitisers, joysticks, trackballs and keyboards to voice input systems. A discussion of CRT technology (vector writing and raster scan) is followed by brief notes on hard copying, photography and pen plotters.

Part Two deals with software in some detail. It explains geometric transformations that require some mathematical expertise, argues the importance of 3D and does a good job of explaining the complexities of perspective.

Part Three looks at graphics applications in the real world and lists CAD/CAM courses in New York and Rome.

This book is thoroughly researched and exhaustive, although somewhat ponderous. In common with so many books on the subject the photographs and diagrams are unremittingly dull.

Computer Graphics Primer
Author: Mitchell Waite
Publisher: Howard W Sams and Co,
Price: Not available

This is an altogether (and rather self-consciously) snappier number with lots of good colour photographs (including NASA simulations) but irritatingly bland cartoons. Specifically conceived as a guide to the home enthusiast, its assertion that computer graphics are within reach of anyone who can afford reasonable hi-fi is not realistic as far as real time animation is concerned.

Having recorded conventionally pious hopes that home computers will make TV sets 'a machine with more raw power than any product ever offered to the consumer, and with the capability to alter completely the way we relate to the visual world of electronics', Waite gets down to business. Tailoring his account to the capacities of the Apple II, he rehearses a plethora of shapes and mandalas, moves on to figures like tanks, jets, cars, rockets and animals, and takes a look at shape shifting and moving figure animation.

There are Basic listings of gaming figures and 'Pong' games with paddles and bats.

The discussion of animation is prefaced with the promise of showing how to make things walk, run and fly in Basic: 'The same techniques used here could be used to animate a bird flying with flapping wings, a body dangling from a rope in a game of hangman, a frog jumping or catching a fly with its tongue, a tree bending in the wind. . .'

The appendix provides a comparison of the screens available with the PET, Radio Shack, Apple II and TI micros.

Computers for Imagemaking
Author: D R Clark (ed)
Publisher: Pergamon Press (1981)
Price: £6.50

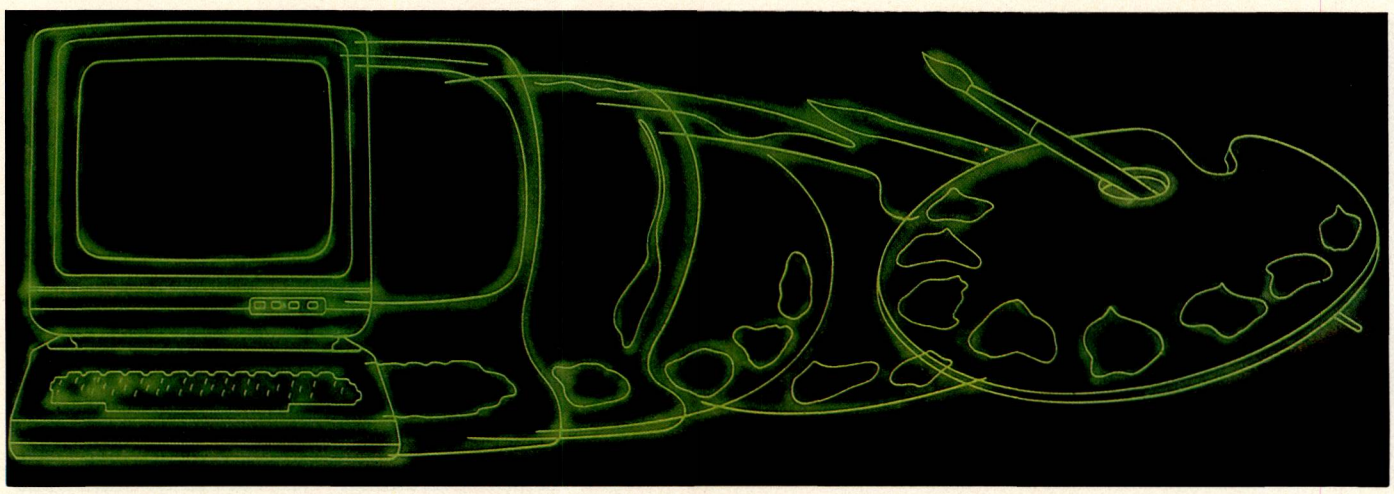
Dr Clark is on the faculty of the University of London Audio Visual Centre which organises the British Universities Film Council conferences. His book is exceptional because almost all the contributors are distinguished.

Edwin Catmull ('Computer Character Animation — Is It Possible?') deals with some of the practical problems every user encounters such as jagged edges and beaded lines, and argues that much of the published software fails to cope with such problems. In his view, computer animation is an exercise in compromise: the higher the resolution, the greater the computational time.

In 'Seeing Hypotheses' Richard Gregory, Head of the Brain and Perception Laboratory at Bristol University, concludes that because the human visual system is prone to error, these errors must be understood if 2-D and 3-D image making is not to produce accidental and ambiguous results. He points out, for example, that neighbouring areas of contrasting colours of the same brightness are unstable relative to one another.

'Combining Computer Animation and Television Production' is a case study of an Open University Mathematic Foundation Course project which used animation to take students from 'O' level standard through basic calculus and beyond.

Finally, in 'Computer Animation as an Aid to Comprehending the Universe', Ken Knowlton of Bell Laboratories asserts that computer animation offers the possibility of 'an intellectual framework for understanding the relative magnitudes of time and space', and



C·O·M·P·E·T·I·T·I·O·N

points to the beautiful work that has been done on the structure of the atom, the formation of crystalline structures and the evolution of galaxies.

Computer Image Generation
Author: Bruce J Schachter (ed)
Publisher: John Wiley and Sons
Price: £28.45

This is a specialist publication principally interested in the simulation potential of high resolution graphics such as those produced by the NASA GE system. Nevertheless, it is still of interest to those with more limited budgets. A chapter on 'Computer Generated Graphics' by William Bennett discusses the formation of shapes from points and line segments to filled polygons and groups of polyhedra.

The colour photographs, particularly those produced by NASA, are excellent. The bibliography is impressive but there are no biographical notes on the contributors.

Microcomputer Colour Graphics System
Author: Donald Bell
Publisher: The Pitman Press (1982)
Price: £6.95

This is a rather dull book, once again based on the Apple II, which covers everything from line drawing to paint brush effects, shading and split screen modes available to users of the Apple Versawriter.

Its Basic listings reflect its concentration on industrial applications: 'Sports Car Body Design with Animation' by one Francis Botto and the seductively titled 'Four Strand Steel Rolling Mill with Animation' by John Drummond.

Computer Graphics 82
Publisher: Online (1982)
Price: £50

Were the proceedings of the Online 1982 conference not so poorly produced and printed, even they would scarcely be a snip at £50. There are very few illustrations and the photographs shown are poorly reproduced.

The section on animation is, however, authoritative. It includes 'Computer Aided Animation — A Concise Review' by RJ Lansdown of System Simulations Ltd, 'Input Techniques and TV Graphics' by B Gardner and R Vinson of BBC Television's *Computer Graphics Workshop,* and 'Dream Flight — a Fictional Film Produced by 3-D Computer Animation', an account of a fifteen minute film made entirely by computer at Montreal University.

Computer Animation
Author: John Halas (ed)
Publisher: Focal Press (1974)
Price: Not available

This contains quaint reference to punch cards and batch jobs but also contains a fascinating essay — 'Computer Film as Art' — by Malcolm Le Grice. By implication, Grice makes the point many commentators overlook: graphics is a visual medium. Consequently, he has written a short history of abstract film.

Grice rescues the films of Viking Eggling (*Horizontal Vertical Orchestra,* (1921), and *Diagonal Symphony,* (1924)), and Marcel Duchamp, (*Anaemic Cinema* (1926) — revolving spirals and texts) from obscurity.

These rejections of 'psycho-narrative' realism in the interest of relationships of association were the hand-made precursors of today's computer films. Nothing was prohibitively bizarre: in the 1950s oscilloscopes were used to generate film images and in 1962 Marc Adrian made *Random* by placing a camera with no lens against the face of an X-ray receiver tube linked to an IBM 1620-21. In the development of the computer film proper, the Whitney family (father John and sons John Jnr and Michael) have consistently shown the way with such key productions as *Binary Bit Patterns* (1969). END

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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) .....

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Address for correspondence .....

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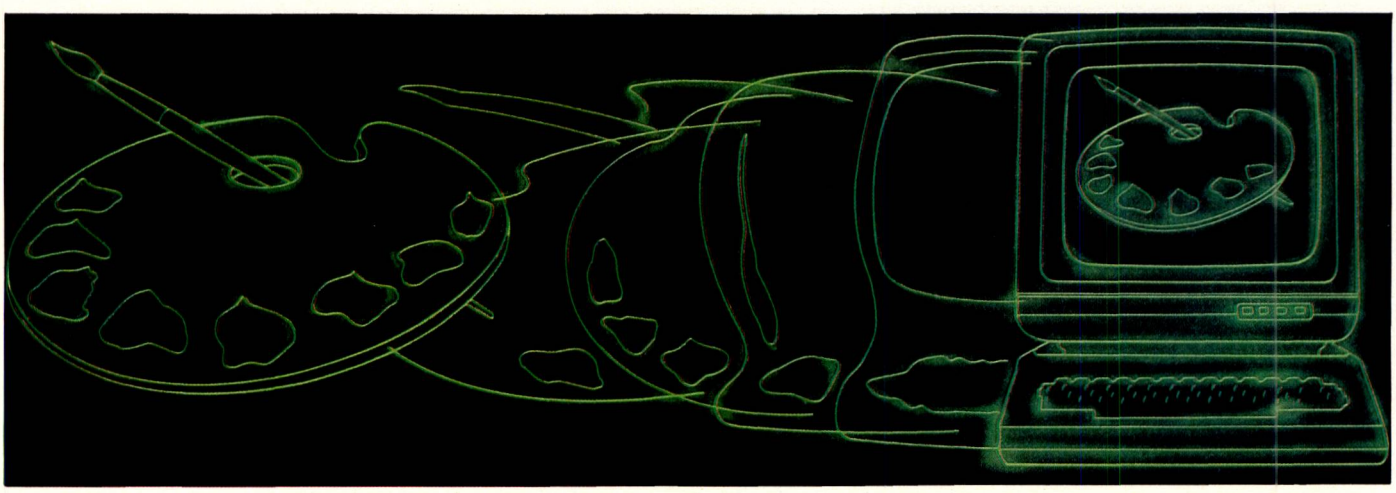
Telephone number (day) ..... (evening) .....

If Category 2, 3 or 4 state sequence title .....

Machine ..... RAM (if appropriate)



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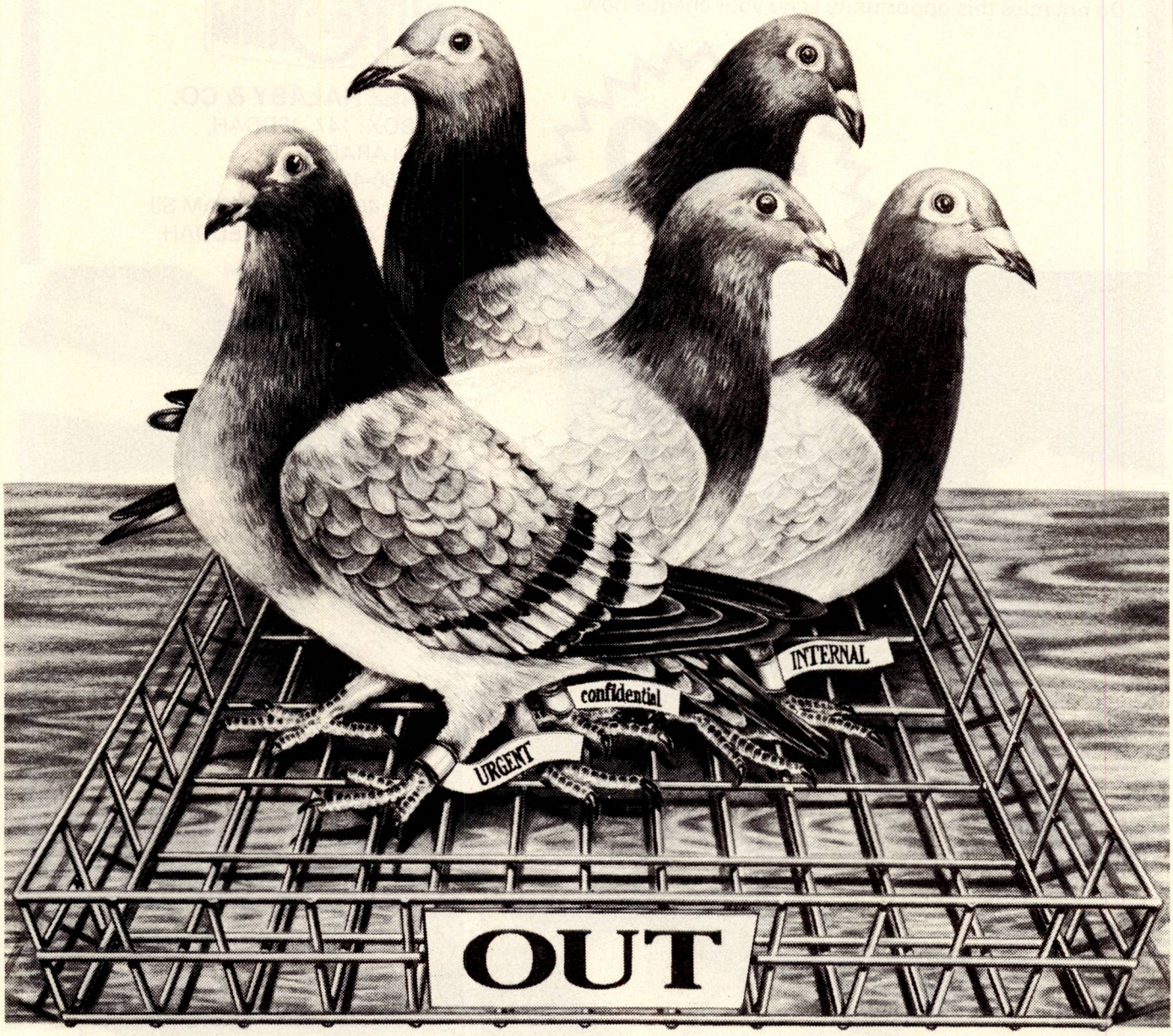

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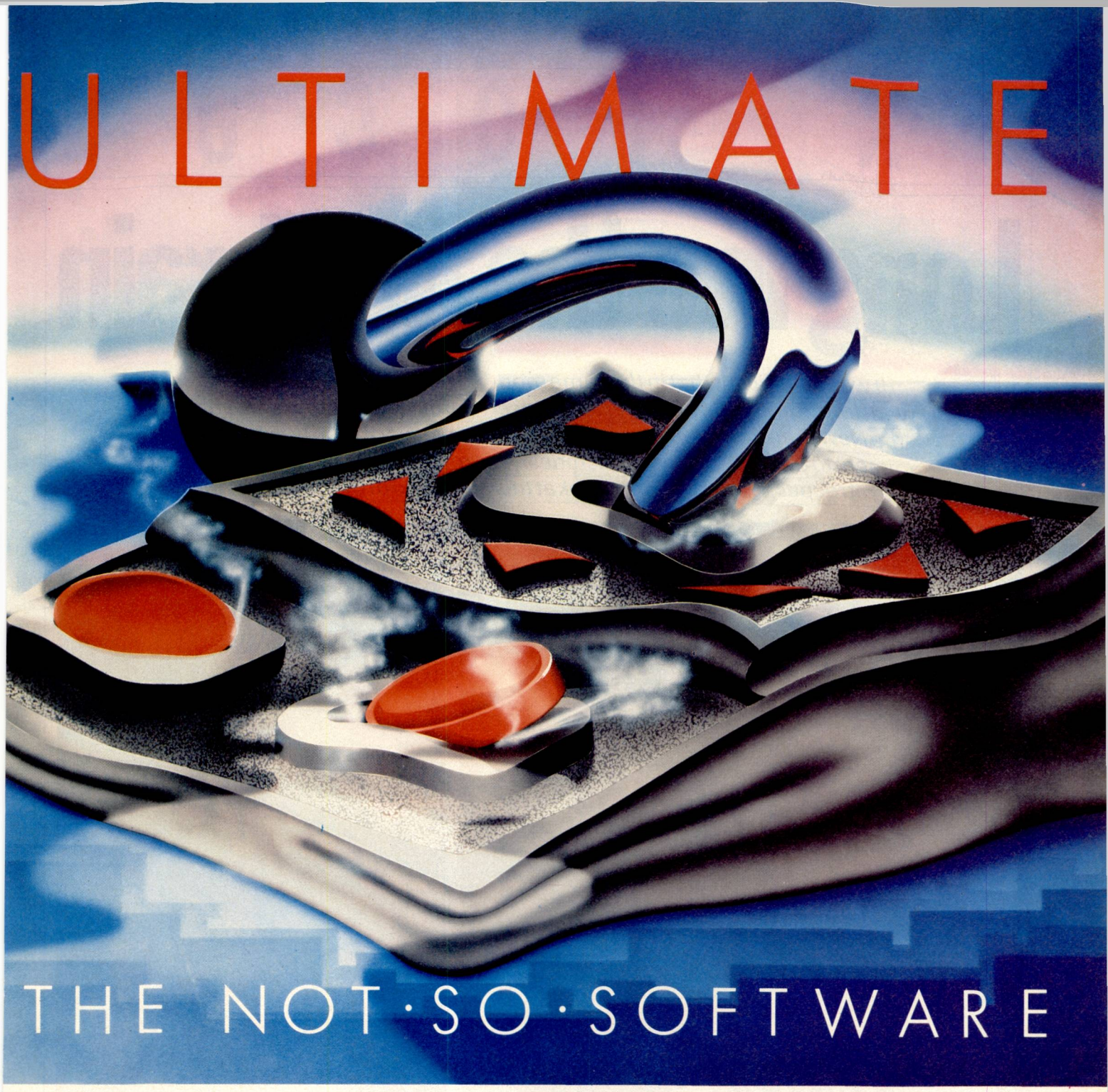

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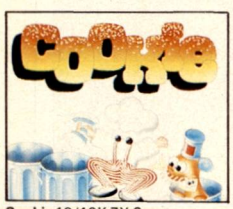

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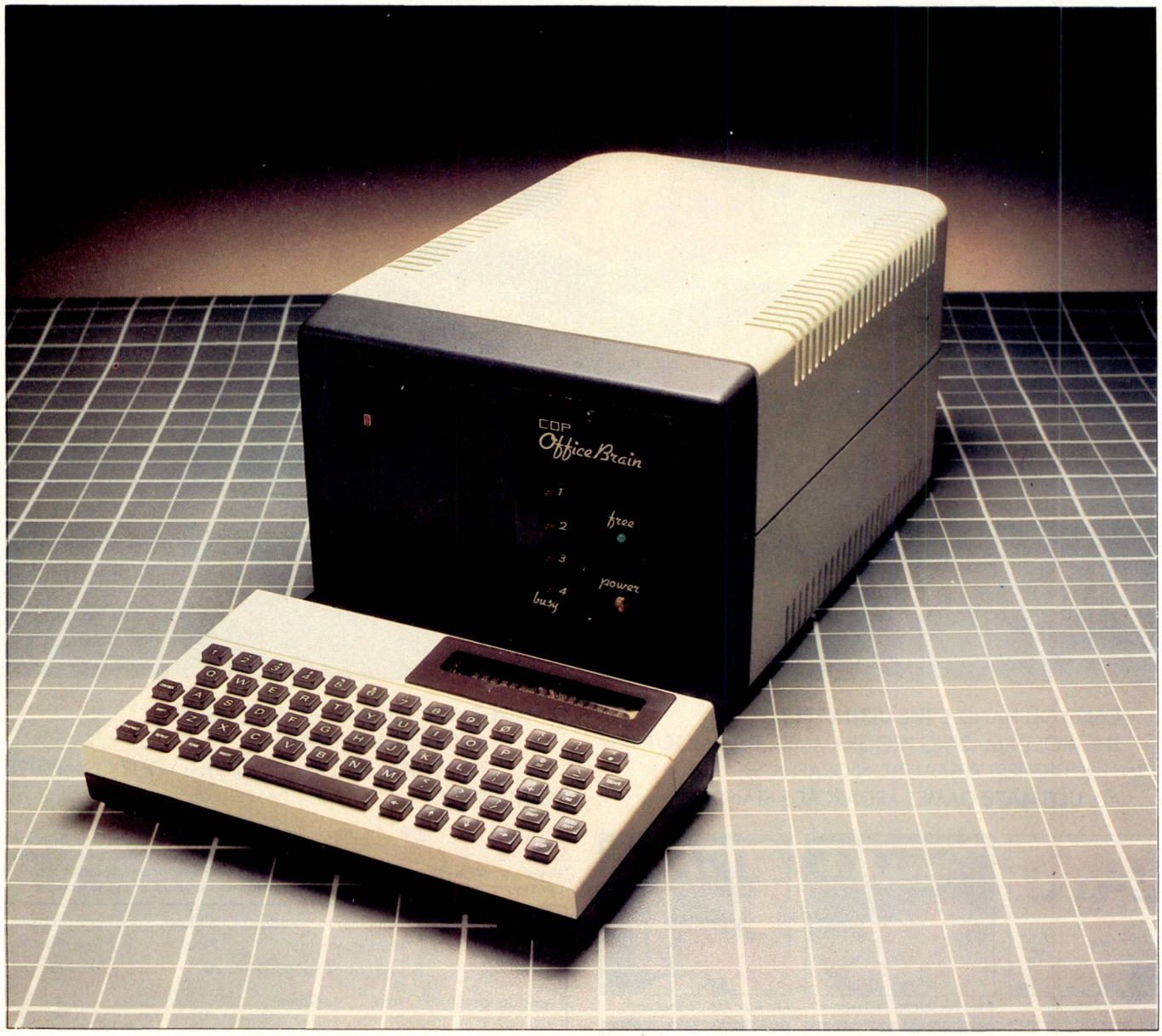
Long live the Newbrain

It was significant that in the same month Grundy Business Systems went into liquidation PCW started to receive articles and programs about the NewBrain in increasing numbers. Perhaps it had taken that long for users to understand their machines. This month Jerry Sanders takes a retrospective and forward look at this 'phoenix' of the micro world.



NewBrain owners I meet all have one thing in common — a strong love-hate relationship with their machines in which the love is always much stronger than the hate. They are enthusiastic, loyal, and by definition 'stayers'. You need to be when your micro disappears and then rises like a phoenix from its own ashes, stronger and more vigorous than ever. Last month the NewBrain made its appearance again in a top selling micro chart .

Grundy just couldn't hang on. Now, new products, hard and soft, are appearing on the market every month. Tradecom, which bought the NewBrain from the liquidators, has designed a new slimline disk unit with integral controller and power supply and two 200k drives which will be available in this country by the time you read this.

But there are 20,000 NewBrains out there, in Greece, Spain, Scandinavia, Saudi Arabia, and many other countries. The evidence is growing that the machine is beginning to fulfil the potential both in business and education that it showed in the early days when it was scheduled to be the BBC Micro.

In fact, if Grundy hadn't collapsed, the NewBrain would have become the Norwegian schools' micro late in 1983!

User Groups

Probably the most healthy NewBrain User group is in Cambridge. Run by ex-Grundy software engineer Gerald McMullon its substantial first newsletter includes a history of the machine. McMullon identifies the beginning of the end for Grundy in November 1982, when the marketing department was promising expansion units and research and development couldn't come up with them! The newsletter also contains an in-depth look at the operation of the new disk modules and excellent reference information on dealers and suppliers, together with routines to use.

There are only two books on the NewBrain. One, just out, is called *Getting more from your NewBrain* by Andrew Pepper and Michele Clark. The other, entitled *The NewBrain Dissected* by John Braga, is reviewed below.



Four different character sets can be obtained from the NewBrain keyboard

Review by Gerald McMullon, Cambridge NewBrain User Group

The intention of Braga's book, *The NewBrain Dissected,* is to provide a supplement to the handbook and software technical manual, not a replacement. It won't teach you how to write your own Z80 routines, or go into great detail on how to write better programs. What it does do well is explain how and why the NewBrain works.

The style is concise and often amusing. The structure of the book follows the lines of division between the NewBrain ROMs, with detailed explanations of the operating system, input/output system and Basic. The graphics and maths packs are discussed, but not in depth.

The memory map is thorough but contains some errors, mostly minor and yet confusing. For example, the start and end address of the Basic area is different on my machine. This may be because Braga was using an early model A. In fact there are half a dozen issues of the ROM: the first series has three common issues, 1.4, 1.9 and 1.91 — most UK users have 1.91. Braga has not checked different operating system issues, or checked with AD standards.

Many of the quirks of the system are mentioned, but not explained in detail, thus often posing more questions than answers. Unless a sequel is planned? In fact much of the apparent redundancy of the system is utilised by expansions: the remaining dead ends could now be tidied up.

Parts of the ROM are disassembled and well commented in the book. However, fully commented source listings have been available for several months now, so more could perhaps have been revealed in this book.

The chapters on the workings of NewBrain Basic are among the best explanations I have read. I should have appreciated more routines by way of explanation, particularly about handling Basic strings under machine code.

The sample programs (in assembler listings) include a French keyboard emulator, a monitor and a renumber for Basic, as well as several other routines used to illustrate points made in the text. Some mistakes are printed in my review copy, but I understand that corrections have now been made. Anyone who bought an early copy can obtain substitute pages from the publishers. By extracting routines from within the sample programs you can acquire some useful routines to use in your own programs.

Details of the character ROM format are given, leading to another sample program, a character generator. It is suggested that a word processor could be written based on the graphics screen and using graphics dumps, but this is not really practical on the standard NewBrain. A possible use though would be to design chessmen or spaceships for use in a machine code program.

The book ends with a somewhat muddled overview of the disk and paged memory system. The technical notes for these modules was in fact still under review in August '83, which partly explains this, but information on the CP/M system has not changed much since February '83.

This could have provided a neat way of emphasising the real beauty of the NewBrain operating system. It is by this mechanism that Basic is able to access the disks. Facts might have been included — for example, device 12 (the new default back-up device for disks) behaves exactly like devices 1 and 2 with only two adjustments: CP/M restricts file names (NewBrain's handling is more flexible than CP/M's); and there is a new set of error numbers (151 instead of 131).

To the NewBrain, CP/M appears as another user program like Basic (a rather poor one, in that page zero is messed up and is very limited in the number of peripherals that it can access simultaneously).

Nonetheless, these criticisms need not worry you if you are contemplating buying the book — it is concerned mainly with the unexpanded machine, and the principles are applicable to expanded machines even if the detail is missing.

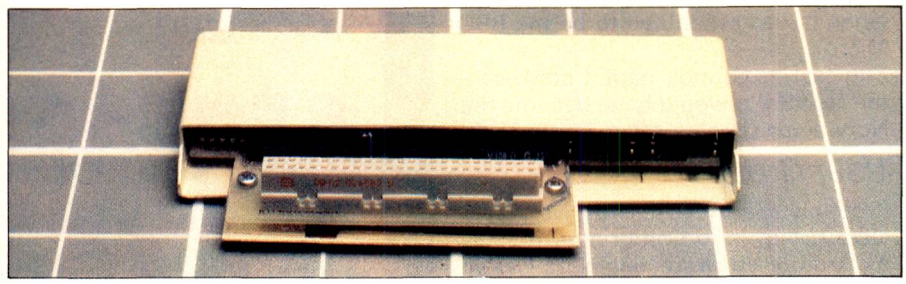
The one main omission is that no in-depth study of the high resolution graphics is offered. It would have been interesting to learn more about the way high-res screens are parasitic on the text screens, how they can be 250 lines long and why they cannot all be accessed on the standard system. Help on how to interface graphics to Z80 code would also be useful — after all, it is Basic that slows the graphics down.

I have intended to make my criticisms constructive, because I recommend this book to you if you'd like to learn more about the workings of 'Brains, and if, like me, you appreciate as much help as you can get in understanding the software technical manual.

IN FOCUS

Reliability

In *PCW*'s Benchtest of the NewBrain, (July 1982), reviewer Dick Pountain noted that 'the quality of construction is remarkable at the price'. *PCW* decided to see if the proof of the pudding was in the lack of repairing, and asked Tim Parsonson of AJ Electronics, who specialises in repairs and upgrades to the machine, to provide an appraisal from workbench (see below).



Four ROM programs can plug into the Micropage

NewBrain appraisal by AJ Electronics

AJ Electronics' knowledge of the machine was limited to the reviews, and with that limited information we were thrown in at the deep end.

The first problem we encountered was how to get inside the beast. The screws which retain the power supply regulator transistors to the heat sink locate into nylon bushes which are glued onto the transistors. If the glue survives the removal of the screws, then a temporary heat sink must be provided while the machine is run 'open' or the glue melts. If all else fails then the bushes will almost certainly drop off when the screws are replaced. We still battle against this problem.

Once you are inside, the quality of construction is very high. Considering the price of the machine the standard of components used is excellent. Although densely packed, with approximately 100 chips (the NewBrain doesn't use uncommitted logic array), the boards respond well to repairs. This is not so true of the disk controller, on the basis of a small sample.

Having repaired a few NewBrains and used one for a while, we soon began to wonder why anybody ever uses anything else: an opinion seemingly shared by the many users we have talked to since the demise of Grundy Business Systems.

A few problems remain, however. In the early days a large number of faulty cassette leads were in circulation and some machines still find their way to us with 'tape loading problems' — sadly, customers all too often neglect to include their lead, when in fact 95% of tape faults can be traced back to either the leads, the cassettes or incompatible recorders. A small modification to the tape input can be carried out which makes it more flexible.

Incidentally, tweaking the sensitivity controls at the back of the machine will not improve tape loading, since the controls are on the output side of the circuits. So, if you must fiddle, do it when saving, and remember the controls require a feather light touch or they collapse.

At this point, an appeal to you, the reader — even the professionals can't solve them all! Some time ago we received a NewBrain for repair which, on investigation, was found to return a TOP of 190 bytes and a FREE of 63454 instead of 32768 and 30378 respectively. All efforts on our part to repair the beast failed miserably and it now smoulders in a corner. So, if anyone out there knows the answer, please send it to *PCW*'s communications column.

The most taxing faults to locate are those failures to boot: that is, the magic words 'NEWBRAIN BASIC READY' never appear on your monitor, and in the case of the AD the VF line display flashes meaningless hieroglyphics at you for ever. These problems revolve around the power-up sequence which downloads the alterable system parameters from RAM, checks for external ROM and tests all RAM locations. This is very useful, since if ever a faulty RAM's location is identified the system modifies TOP to be one below the fault. PEEKing and POKEing above TOP will then generally reveal which 'bit' is stuck, and hence which RAM chip is faulty. This is fine until the failure occurs low down in memory and the system parameters fail to download correctly, leading to the never ending power-up.

The sequence may fail, however, for other reasons. One is that the mod resistor on the internal power supply, intended to ensure that said supply starts correctly, has dropped off (not so uncommon as you might think). Another is the pull-up resistor on the 128k ROM (when fitted) wearing through the anodising on the heat sink because it is too long by a whisker (anyone who has seen the inside of a NewBrain will confirm that there's hardly room to swing a microbe there).

One of our favourite problems from the early days was the loss of character set 2. Those not initiated into the mysteries should be told that the NewBrain has four keyboard addressable character sets. All four of them are contained in one ROM, so why only lose one? Well, as it turned out, the character generator ROM sits close to one of the screw holes in the main circuit board. When the screws are inserted one pin of the chip can get trapped under the screw and hence shorted to 0v. Simple, when you know how . . .

The worst of this kind of fault is the 'bent under pin', when one leg of an chip folds under, instead of going in, and rests on top of the board. The resulting contact will survive for a while before becoming intermittent. Often the only way to identify these 'faults' is with a magnifying glass and a sharp eye.

I should say at this point that what is beginning to sound like a catalogue of disasters is not really. In fact the genuine failure rate of the NewBrain is around 3%, which is pretty good for any kind of machine.

While Grundy was still with us it was extremely helpful. Those ex-members of staff with whom we are in contact continue to assist.

The arrival of the add-ons, a post GBS development, has brought with it a new crop of problems, not only faults in the new units but in NewBrains which worked beautifully on their own but now fail with peripherals. My favourite so far has to be the 50-way expansion connector with one pin made from a particularly non-conductive plastic! But that's another story.

To sum up: if you already own a NewBrain, congratulations. If you don't, don't be put off by what I've said. Remember we're in the repair business, so if anyone is in a position to go off a machine, we are. Despite having repaired more NewBrains than anyone else in Britain we still think it's a great machine!

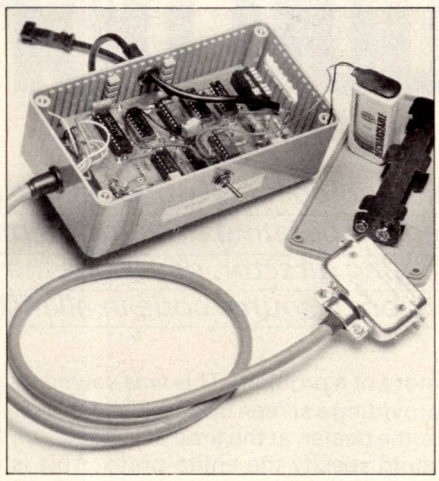
In 1977 Consultants in Office Power (COP) started work on a database processor to take advantage of winchester disk technology and the exploding market for microcomputer-based systems. When the NewBrain appeared in 1982 COP went for it, the result being the OfficeBrain, launched in April 1983. The OfficeBrain consists of a 5 or 10Mbyte winchester with a NewBrain attached, and workstations can be any other micros from a ZX81 to an Apple, or any combination thereof. Each workstation is interfaced to the OfficeBrain via an RS232 port. The unit itself sits comfortably on a desk (8in x 11in x 23in), and weighs in at under 20lb. The OfficeBrain with the 5¼in winchester plus four serial ports at 9600 baud costs £2800.

Two happy users of the system are Neil Hampson and Derek Farr. Until recently 16-year-old Neil was a schoolboy who did spare-time labouring duties at a timber yard in Willenhall near Birmingham. When his boss decided to computerise front desk ordering and stock control he chose the OfficeBrain and, hearing that Neil was a ZX81 owner, asked him if he could write the OfficeBrain software. 'We have over 3000 stock items,' said Neil. 'I was sent down to COP and it gave me the thumbs up, so I've now left school to be a full-time programmer.'

Another enthusiast is Derek Farr, manager of a market research company in London. He was the first in the field, in 1981, to use micros for telephone research, and now has 16 NewBrains linked to an OfficeBrain.

'Traditionally telephonists with pen and paper conducted phone interviews. With the OfficeBrain and software which we have helped to develop, our interviewers can set up questionnaires, conduct an interview with screen prompts and immediate response input to OfficeBrain memory, and last but not least analyse the data in store immediately. The software selects the next appropriate question according to the last response. The saving in paper alone quickly paid for the system, and since interviews are conducted more swiftly we save on phone bills as well. We've just completed 10,000, 45-minute interviews using our sixteen NewBrains interfaced to the OfficeBrain, at a price that competitors using traditional methods can't hope to match; and our results can be prepared without the bind of keying in data from paper questionnaires.'

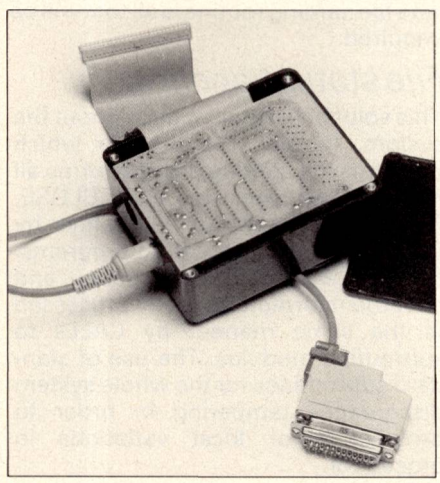
On the peripherals front, a serial to parallel convertor is available from Cambridge based Tyepro Ltd. Using an onboard clock generator and CMOS technology the grey plastic unit enables NewBrainers to use Centronics printers. *PCW* tested the unit, which worked well with an Epson printer, but only after tweaking a screw on one of the resistors in the unit. Director Ian Tyes said that although the units are preset, vibration during transit can cause the screw, which controls the output frequency, to turn out of true. The unit needs only a 9v battery and comes with Centronics and NewBrain plugs fitted. A set of dip switches provides a range of input baud rates: one switch for each speed. The unit costs £49.95.



TyePro Centronics convertor

A universal unit, suitable for a range of micros, is also available.

Another Cambridge firm, GFG Microsystems supplied us with its Micropage unit. This is a slim interface that plugs into the NewBrain's expansion port and takes up to four preprogrammed ROMs. It is well presented in a cream enamelled metal case to match the colour of the NewBrain itself. My review unit came complete with three programs on



Kuma modem interface

chip, Typing Master, Memopad and Chessboard.

To use the unit, you plug it in before power-up. The operating system notes that it is there, and the Micropage then offers the user a five point menu. Selections 1 to 4 refer to the programs in the four EPROM slots, while 5 takes you back into NewBrain Basic. Access to the slots is by undoing two screws and sliding the guts out of the metal case.

Apart from the fact that once you choose option 5 you cannot go back to select one of the EPROM programs, the unit is a joy to use — no more waiting for programs to load from tape.

Of the programs supplied, my favourite was Typing Master. Written by Anthony Ashpitel, who has versions of the program out on other machines including the BBC, it takes you through from 'looking at the keys typing' to touch-typing at a range of speeds from slow to the apparently impossible.

A first menu offers 'sight and type', touch-typing, practice exercises, a session monitor and an exit escape route. A sixth option, which I found by luck as it isn't offered on the screen, provides a further eight options to change printer baud rate, display special keyboard tests and set the tutor to use different NewBrain character sets.

This last is an excellent idea since you can learn how to get those special characters without referring to the handbook, so I asked Gerald McMullon of GFG why it wasn't on the menu. He said that the author of the program had made it a condition that the NewBrain version be exactly the same as versions for the other machines, and so GFG was not allowed to refer to the presence of the sixth option on the screen or in the documentation. This strikes me as very unreasonable on the part of Mr Ashpitel, since it deprives NewBrain owners of a valuable (and unique) feature.

Exit from any of the Micropage programs is via the stop key, which causes a 'want to quit?' message to appear on the VF display of AD NewBrains (and I assume on the screen of As). The Micropage sells for £34.95.

Finally, on the peripherals front, Kuma has brought out a NewBrain modem interface which permits software selection of any baud rate and comes with all the handshakes necessary for comms work. It provides the NewBrain with two independent RS232 ports which give access to any other equipment using the same standard. Unlike the existing ports on the NewBrain they are fully autonomous and allow rapid data transfer on both channels without the screen blanking and flicker that goes with the NewBrain's own ports. Kuma supplied *PCW* with a review interface, which worked well with a Dyneer D14 daisywheel printer.

Unfortunately we were unable to test it with a phone modem. As soon as we do we'll give you the result. The interface sells for £69.50, with external power supply at £6.95 extra, both excluding VAT.

That's it for this month: we'll finish our look at the NewBrain revived next month with a review of a wide range of software innovations from all the leading NewBrain software companies, including a sneak preview of what Tradecom has in store on the software front. **END**

CASE STUDY

Application portability

Systems Union has implemented its comprehensive accounting software, SunAccount, under a range of operating systems on many different machines. John Pemberton, managing director, describes the method of using the same version of source code in all instances.

Our principal design requirement was to produce a range of microcomputer accounting systems with the highest possible specification. To recover the very large investment involved, it was decided that the software would be implemented across a wide range of operating systems. Ideally, the source programs would remain unchanged as they were moved between operating systems — a truly portable design.

Cobol provided the greatest measure of compatibility between operating systems. When Systems Union commenced development three years ago, Micro Focus' religious adherence to the Ansi Cobol standard, while frustrating in some instances, guaranteed few concessions to operating system variations.

The goal of portability has now been achieved and the same version of source code is used in all instances.

Portability between different machines running the same operating system was found to present no problem: portability between operating systems required further consideration. This article is a description of the design considerations involved.

File naming

Given the use of Cobol, the initial and perhaps most obvious difference between the operating systems is the difference in the structure of filenames. For example, the structure of the whole 'file identifier' for CP/M type operating systems (including MS-DOS and PC-DOS), ICL's DRS20 and Unix respectively, is as follows:

a:filename.ext
n-cat.filename.ext
/usr/filename

The structure of the last part of the file identifier adopted as a standard was an eight character filename, followed by '.', followed by a three character extension. All the operating systems envisaged would accept this.

The prefix to the filename presents more of a problem. This was solved by providing a screen upon which the user or the dealer, at the time of installation, could specify the entire prefix. This is stored on disk and retrieved by the system when it is to be applied.

Ansi Cobol provides a single data name within which the programmer has to construct the whole file identifier from its several parts, and source code must be provided to perform this function. SunAccount achieves this by use of a Cobol subroutine, accessed by a CALL statement when the file is opened (see Fig 1).

It is unlikely that the generality of this solution to file naming will be challenged. If it is, an enhancement to the one file naming routine is all that will be required.

File status handling

This solution is applied throughout the system. In fact, the module which performs file naming also performs all file handling (such as OPEN, CLOSE, READ, WRITE) of the major files by CALLs from the application programs. Screen handling, device handling, and document formatting are all processed in the same manner by CALLs to subroutine modules. The use of standard subroutines for the whole system discourages tampering in order to provide minor local variations in procedure.

The file handler module encompasses another operating system variant: different values contained in the second byte of FILE STATUS when a disk access has failed. Each FILE STATUS failure to be detected is given a data name, such as FILE NOT FOUND or DISK FULL. A COPY file is created which contains these data names and the numeric values assigned to them for the particular operating system. It is therefore the data name which is tested by the software, not the numeric value: operating system variants are accommodatd by minor edits to the one COPY file.

Memory size

After designing solutions to the problems of file handling, the next major problem was fitting an advanced specification system into the memory offered by an 8-bit computer. The worst case is MP/M-II which only offers 48k of memory for programs. This includes the Cis Cobol run time system which itself occupies some 30k.

Fortunately the design of the programs is modular, adopting the conventional strategy of a menu program which CALLs a program performing an individual function when that function is selected on the menu. Even so, after allowing 6k for the menu and file handling programs — which must be loaded all the time to achieve a reasonable response time — only 12k was available for each function program.

Staying within this design brief accounted for a significant proportion of the development time. It's a frustrating requirement but it is necessary if the software is to be made available on 8-bit systems. The only relief is afforded by the ability to segment sections of the Procedure Division. In 16-bit systems this segmentation is removed to enhance processing speed.

Run time subroutines

The temptation is always present to implement the features which Ansi Cobol does not provide, or provides inefficiently, by use of assembler or 'C' routines embedded in the Cobol run time system. Micro Focus Cobol supports this feature, and it would be an admirable solution, if it were not for the requirement to transport the code to other operating systems. Unfortunately, the run time subroutines would have to be written all over again, or it might be impossible to implement the features at all under another operating system. It was therefore decided not to use this feature.

One exception has to be made to overcome CP/M's inability to reset the

disk system to recognise when a diskette has been changed. This routine does not spoil the portability, since it is only applicable to the CP/M implementation.

Another exception enables today's date to be read in from the host operating system, where the operating system has this capability.

The SunAccount system determines whether to use these routines by reading a flag on an installation file to reveal what operating system it is running under.

```
 IDENTIFICATION DIVISION.
 PROGRAM-ID. FILE-NAMER.
*
* This program module is given the constituent parts of
* a file name by the calling program.  It prepares from
* these the full file name on disk, and returns it to
* a calling program.
*
 DATA DIVISION.
*
 WORKING-STORAGE SECTION.
*
 01 CONCATENATED-FILE-NAME PIC X(22).
 01 CONC-CHARA             PIC X OCCURS 22
                           REDEFINES CONCATENATED-FILE-NAME.
 77 CONC-CHARA-NO          PIC 99 COMP.
* Concatenated file name built in this area from its
* constituent parts
*
 01 PART-FILE-NAME PIC X(11).
 01 PART-CHARA     PIC X OCCURS 11 REDEFINES PART-FILE-NAME.
 77 PART-CHARA-NO  PIC 99 COMP.
* Working area for constituent parts.  It must be at least
* one character longer than longest part it is to contain
* in order to avoid subscript overflow during processing.
* This is to ensure that the space character, used to test
* for the end of the part, is always present.
*
 01 FILE-EXT-WITH-SEPARATOR.
     02 FILE-EXT-SEPARATOR         PIC X VALUE ".".
     02 FILE-EXT-WITHOUT-SEPARATOR PIC X(3).
* Working area for file extension
*
 LINKAGE SECTION.
*
 01 LINKAGE-DATA.
     02 FILE-PREFIX      PIC X(10).
     02 FILE-NAME        PIC X(8).
     02 FILE-EXT         PIC X(3).
     02 DISK-FILE-NAME   PIC X(22).
*
*
*
 PROCEDURE DIVISION USING LINKAGE-DATA.
*
 MAIN SECTION.
**************
*
 MAIN-PROCESS.
* Include File Prefix
     MOVE FILE-PREFIX TO CONCATENATED-FILE-NAME.
* Include File Name
     MOVE FILE-NAME TO PART-FILE-NAME.
     MOVE 1 TO CONC-CHARA-NO, PART-CHARA-NO.
     PERFORM FILL-FILE-NAME.
* Include File Extension
     MOVE FILE-EXT TO FILE-EXT-WITHOUT-SEPARATOR.
     MOVE FILE-EXT-WITH-SEPARATOR TO PART-FILE-NAME.
     MOVE 1 TO PART-CHARA-NO.
     PERFORM FILL-FILE-NAME.
     MOVE CONCATENATED-FILE-NAME TO DISK-FILE-NAME.
*
 EXIT-PROGRAM.
     EXIT PROGRAM.
*
 FILE-NAMING SECTION.
*********************
*
 FILL-FILE-NAME.
*    Inserts and left justifies parts of file name
     IF CONC-CHARA(CONC-CHARA-NO) NOT = SPACE
         ADD 1 TO CONC-CHARA-NO
         GO TO FILL-FILE-NAME.
     PERFORM FILL-NAME-CHARA.
*
 FILL-NAME-CHARA.
*    Moves individual characters of parts into file name
     MOVE PART-CHARA(PART-CHARA-NO) TO CONC-CHARA(CONC-CHARA-NO).
     ADD 1 TO CONC-CHARA-NO, PART-CHARA-NO.
     IF PART-CHARA(PART-CHARA-NO) NOT = SPACE
         GO TO FILL-NAME-CHARA.
```

Fig 1. Call subroutine

Indexed sequential

Indexed Sequential files presented two problems when portability was first attempted. These resulted because Indexed Sequential organisation is achieved differently by the Micro Focus run time system under different operating system implementations.

Under CP/M (and MS-DOS, PC-DOS) two files are created, a data file and an index file. It is possible to ignore the index file, redefine the data file as Sequential organisation and read just this file. In particular, when unindexed access is sufficient, this gives much faster access to the records since no reading of the index file is necessary. This mechanism will result in records being obtained out of key order unless the file has been written sequentially and has never been updated.

The problem is that Indexed Sequential organisation is not achieved in the same way under operating systems such as Unix, Xenix and DRS20, because the indexes may be stored differently and the technique will not work. For complete portability it should therefore not be used.

The second problem arising from the different physical organisation arises when Indexed Sequential data files that are part of the application are copied from one operating system to another. The files can be copied, but they may be meaningless to the run time system on the target machine because the index data is recorded differently. The solution is to include a program to convert the files to one of the Sequential organisations — which have almost universal formats; this program is run before the files are copied. When the files are received by the target operating system, the program must convert the files back again to Indexed Sequential organisation.

Cis Cobol v Level II Cobol

When the design was commenced Level II Cobol was still on the drawing board. The software was therefore written in Micro Focus' earlier language Cis Cobol.

However, on some of the 16 and 32-bit machines only Level II Cobol is offered. It has therefore been necessary to compile the application code with this language. This did not present any problems, since the golden rule for this compatibility was adhered to, which is not to use any reserved words in Level II Cobol in the Cis Cobol source, in accordance with the published list.

Conclusion

On 8, 16 and 32-bit machines the response times are satisfactory, to say the least. This alone justifies the effort that has gone into producing a transportable design. END

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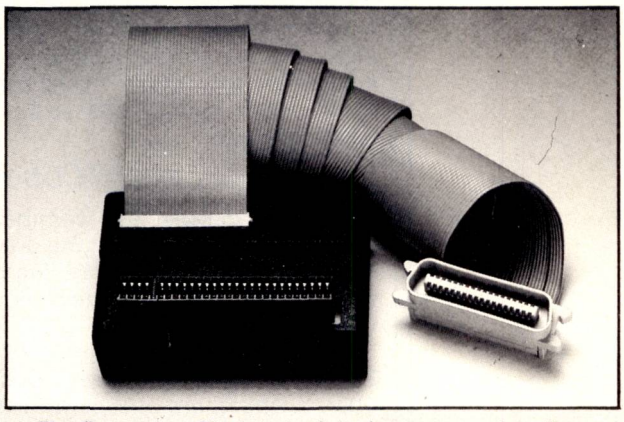

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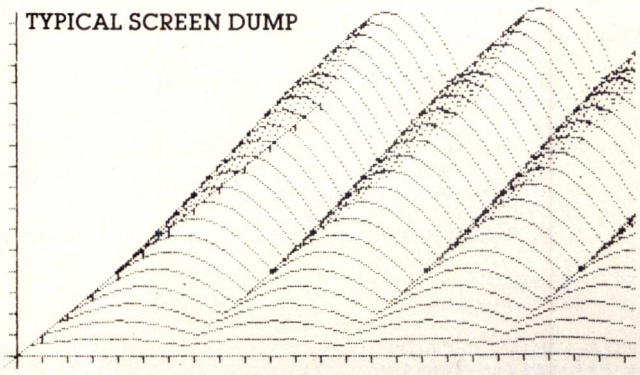

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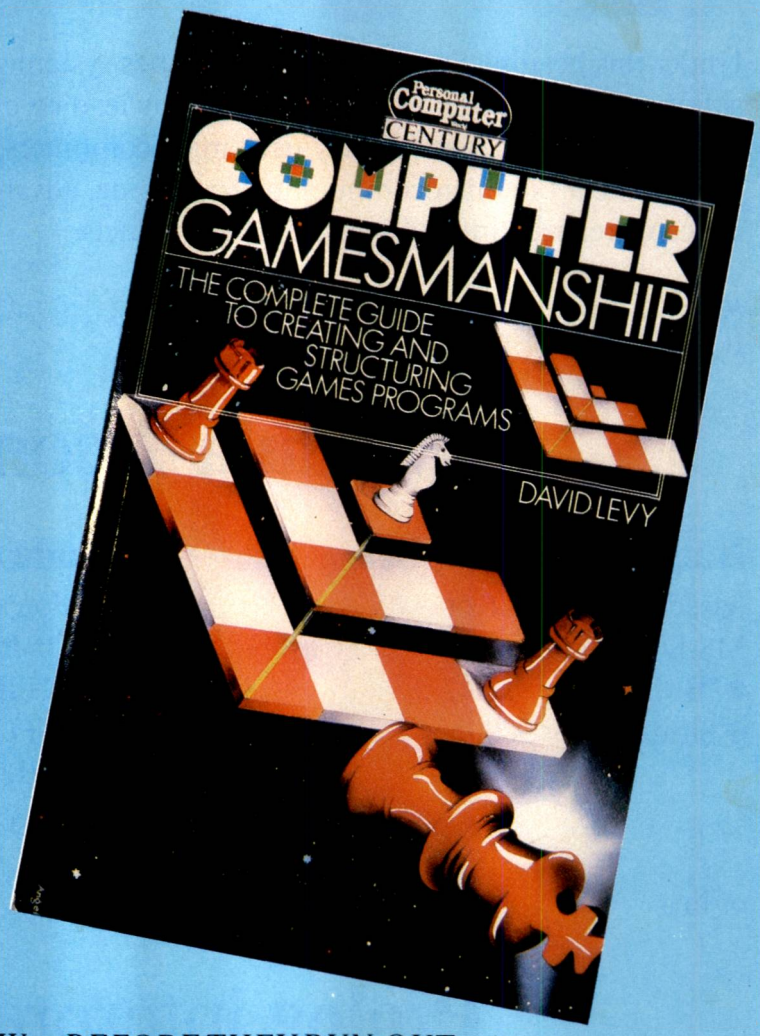

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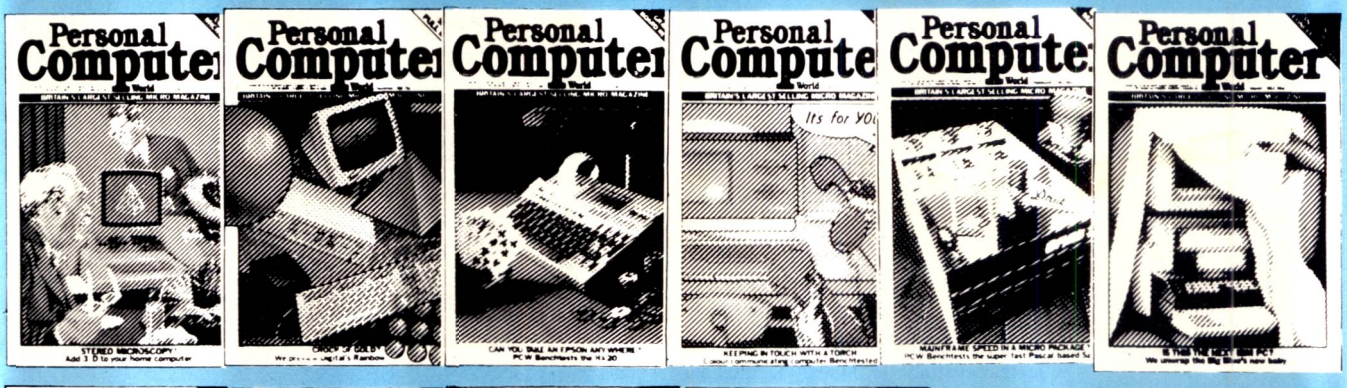

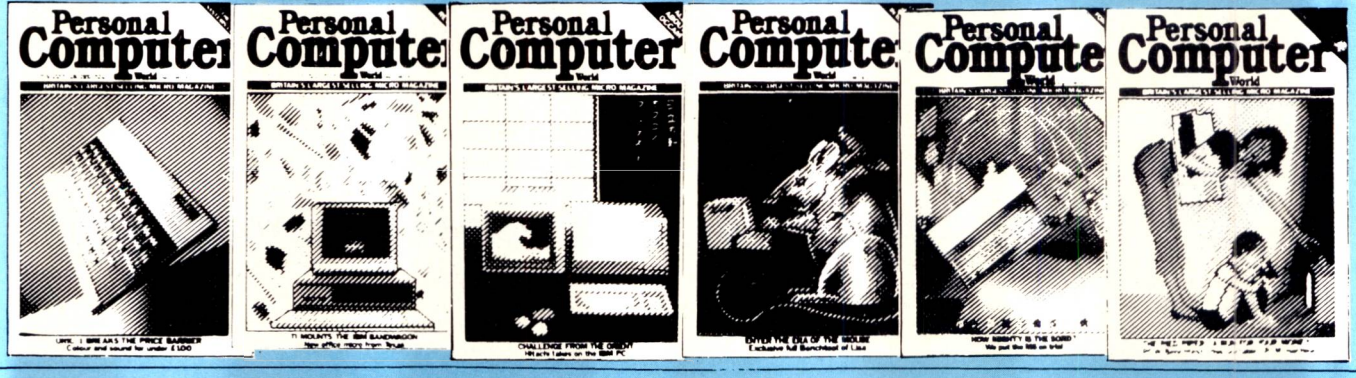



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Z80 RANDOM NUMBERS

We hope you all noticed when Professor Brian Ripley stepped out of Sub Set with his full-blown article on 'random numbers' entitled *Take Your Pick (PCW,* September '83).

Geoffrey Ticehurst, of Lutterworth, was inspired by Brian's description of the shift register generator, used in the BBC Micro, to rewrite it for the Z80 but using only a two-byte register. Geoffrey has tested his routine, RANDOM, using a histogram producing program for the range 0 to 63. After 20,000 numbers had been generated, the biggest difference in occurrence between two numbers was about 15% and the average much less.

DATASHEET

```
;= RANDOM - Random Number Generator
;/ CLASS:  2  (Code not position independent because of
;/             absolute addressing of 3-byte RAM storage)
;/ TIME CRITICAL?:  No
;/ DESCRIPTION:  Call to SEED seeds a three-byte Random
;/               Number Store in RAM.
;/               Call to RANDOM generates new Random Number.
;/ ACTION:   SEED stores the contents of the R register in the
;/           three bytes of store.  RANDOM exclusive-ORs bit 3
;/           of the middle byte with bit 0 of the first byte.
;/           This bit is then rolled into bit 0 of the third
;/           byte and the other two bytes rolled up one bit.
;/           This action is repeated 16 times.
;/ SUBr DEPENDENCE:     None
;/ INTERFACES:  Three-byte store in RAM.
;/ INPUT:    None
;/ OUTPUT:   New Random Number in the 2nd and 3rd bytes of store.
;/ REGISTERS USED:  None
;/ STACK USE:  6
;/ LENGTH:     52
;/ PROCESSOR:  Z80
RANDER: DEFS 3          ;random number store.
SEED:   PUSH AF         ;save                       F5
        PUSH BC         ;registers                  C5
        PUSH HL         ;on stack.                  E5
        LD   HL,RANDER  ;get store address in HL.   21 YY YY
        LD   B,+3       ;fill the three             06 03
SEEDA:  LD   A,R        ;bytes                      ED 5F
        LD   (HL),A     ;with the                   77
        INC  HL         ;contents of                23
        DJNZ SEEDA      ;the R register.            10 FA
        POP  HL         ;restore                    E1
        POP  BC         ;all                        C1
        POP  AF         ;registers,                 F1
        RET             ;and return.                C9
RANDOM: PUSH AF         ;save                       F5
        PUSH BC         ;registers                  C5
        PUSH HL         ;on stack.                  E5
        LD   HL,RANDER  ;get store address in HL.   21 YY YY
        LD   B.+16      ;repeat 16 times:           06 10
RANDO:  LD   C,(HL)     ;first byte to the C reg.   4E
        INC  HL         ;second byte to             23
        LD   A,(HL)     ;the A register.            7E
        SRL  C          ;move bit 3 in '            CB 39
        SRL  C          ;the C register             CB 39
        SRL  C          ;to bit 0.                  CB 39
        XOR  C          ;form a new bit             A9
        INC  HL         ;0 in the A                 23
        RRA             ;register.  Roll            1F
        RL   (HL)       ;it into the carry          CB 16
        DEC  HL          and roll the               2B
        RL   (HL)        other two bytes up         CB 16
        DEC  HL         ;one bit to                 2B
        RL   (HL)       ;produce a                  CB 16
        DJNZ RANDO      ;new random number.         10 EA
        POP  HL         ;restore                    E1
        POP  BC         ;all                        C1
        POP  AF         ;registers                  F1
        RET             ;and return.                C9
```

RELOCATABLE CODE

Rois Harder of Vancouver thinks that machine code documentation should indicate whether or not the code is relocatable and that, if it isn't, the addresses that would need changing, on moving the code, be clearly marked.

Sub Set documentation standards (last printed in full in May '83) state whether a routine is Class 1 or Class 2. Class 1 routines are re-entrant (usable by part of the program interrupting another part of the program that was using it), operate correctly wherever they are located in memory, do not alter their own instructions and return unaltered all registers and flags except those declared as being used to pass information to and from the routine. Other routines are Class 2.

All Class 1 routines are, therefore, relocatable but so are most of our Class 2 routines. No actual addresses are given in Sub Set routines because it's simply not practicable to allocate memory for them to suit many readers. The only Sub Set routines not relocatable are those containing jumps to absolute addresses, which are shown as YYYY in the machine code.

6502 BUBBLE SORT

ALSORT from Dennis May of London sorts a list of strings held continuously in memory into alphabetical order. A string bubble sort of this kind was last done in Sub Set in May 1982. BSORT for the Z80 was, surprisingly, just as long as the 6502 ALSORT.

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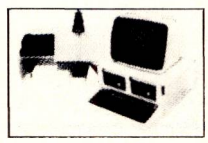

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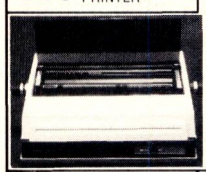

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'Quicksort' (which is the slowest of the lot in its worst case). The bubble sort is, however, very easy to implement and if you are dealing with elements of different length then it's perhaps the only practical method. All the exchanges are between two consecutive elements and there are no problems of spacing. The Quicksort, for example, could involve different sized elements from the start and end of the list being exchanged, and this would require all the intermediate bytes to be shifted by the difference between the two exchanged elements.

ALSORT could be improved in efficiency but possibly at the cost of making it longer. On the first pass the largest string is 'bubbled' along to the end, so on the next pass the last string need not be tested. On each successive pass one less string can be disregarded. Also, instead of starting each pass at the start of the list, you could start at the string before the first exchange in the last pass. This would mean saving the address of the first string exchanged.

Finally, if you are using the routine to rotate two consecutive blocks of memory (the 6502 version, RRL, was printed in Sub Set in September 1983), you could do the exchange by a subroutine call and remove the need for temporary storage.

DATASHEET

```
;= ALSORT - Alphabetic sort of variable length strings.
;/ CLASS:  2
;/ TIME CRITICAL?:  No
;/ DESCRIPTION: Alphabetically orders a RAM held list of strings.
;/              Maximum 65535 strings.  Maximum length 255 bytes.
;/              Strings must end with Carriage Return ($0D).
;/ ACTION:  Clear exchange flag
;/          Do for no. of strings - 1:
;/              Compare string with next string
;/              If unordered then exchange and set exchange flag
;/          Repeat if exchange flag is set.
;/ SUBr DEPENDENCE:  None
;/ INTERFACES:  RAM labelled TEMP able to hold longest string.
;/ INPUT:   M0,1 = list start address
;/          M2,3 = no. of strings in list
;/ OUTPUT:  List in alphabetical order.  M0 - 3 unchanged.
;/ REGs USED: P A X Y M0 to MA
;/            M0,1 is Input List Start Address (LSA)
;/            M2,3 is Input No. of Strings (INS)
;/            M4,5 is Next String Pointer (NSP)
;/            M6,7 is String Count (SC)
;/            M8,9 is Current String Pointer (CSP)
;/            MA   is Pass Exchange Flag (PXF)
;/ STACK USE:  1
;/ LENGTH:  161
;/ PROCESSOR:  6502
;
;test for more than one string. Exit if not.
ALSORT: LDX M2          ;INS lo-byte to X then A          A6 ZZ
        TXA             ;OR it with INS hi-byte to test   8A
        ORA M3          ;for zero strings. Exit if zero.  05 ZZ
        BNE ASB         ;continue test if not zero.       D0 01
ASA:    RTS             ;exit for less than two strings.  60
ASB:    DEX             ;decrement lo-byte to make it     CA
        TXA             ;zero if INS is one only.  Into   8A
        ORA M3          ;A for ORing with INS hi-byte     05 ZZ
        BEQ ASA         ;and exit if now zero.            F0 F9
;initialise SC, NSP and PXF for each pass.
ASC:    LDX M3          ;reset SC to INS                  A6 ZZ
        LDY M2          ;                                 A4 ZZ
        STX M7          ;                                 86 ZZ
        STY M6          ;                                 84 ZZ
        LDX M1          ;reset NSP to LSA                 A6 ZZ
        LDY M0          ;                                 A4 ZZ
        STX M5          ;                                 86 ZZ
        STY M4          ;                                 84 ZZ
        LDY #0          ;reset PXF to zero.               A0 00
        STY MA          ;                                 84 ZZ
;set CSP to next string from NSP.
ASD:    LDX M5          ;only if no exchange happened to  A6 ZZ
        LDA M4          ;last string pair does CSP get    A5 ZZ
        STX M9          ;next string address from NSP,    86 ZZ
        STA M8          ;else it is already there.        85 ZZ
;move NSP to next string along.
ASE:    LDY #-1         ;initialise index for loop        A0 FF
ASF:    INY             ;index next character, looping    C8
        LDA (M4),Y      ;until Y points to carriage       B1 ZZ
        CMP #$0D        ;return terminating character     C9 0D
        BNE ASF         ;then move the displacement into  D0 F9
        TYA             ;A for adding to NSP plus extra   98
        SEC             ;1 added with the carry so that   38
        ADC M4          ;NSP now points to start of       65 ZZ
        STA M4          ;next string.                     85 ZZ
        BCC ASG         ;allow for carry into NSP         90 02
        INC M5          ;hi-byte.                         E6 ZZ
;test for two strings in correct order or not.
ASG:    LDY #-1         ;loop from 1st bytes until strings A0 FF
ASH:    INY             ;do not match or until match      C8
        LDA (M4),Y      ;up to $0D terminator.            B1 ZZ
        CMP (M8),Y      ;Carry is set if strings match    D1 ZZ
        BNE ASI         ;or if string at NSP is greater   D0 04
        CMP #$0D        ;than string at CSP.  Carry       C9 0D
        BNE ASH         ;is reset if exchange is needed.  D0 F5
ASI:    BCS ASN         ;skip if pair are in order.       B0 34
;move string at CSP to temporary store at TEMP.
        LDY #-1         ;move from 1st byte up to and     A0 FF
ASJ:    INY             ;including $0D terminator byte    C8
        LDA (M8),Y      ;the string at CSP in to TEMP     B1 ZZ
        STA TEMP,Y      ;store as first part of exchange. 99 YY YY
        CMP #$0D        ;                                 C9 0D
        BNE ASJ         ;                                 D0 F6
;move string at NSP down to CSP. Point CSP past it.
        LDY #-1         ;from 1st byte to and including   A0 FF
ASK:    INY             ;$0D terminator, move string at   C8
        LDA (M4),Y      ;NSP down to start at CSP.        B1 ZZ
        STA (M8),Y      ;second part of exchange.         91 ZZ
        CMP #$0D        ;                                 C9 0D
        BNE ASK         ;                                 D0 F7
        TYA             ;now use displacement from Y      98
        SEC             ;plus 1 from Carry as length      38
        ADC M8          ;of shifted down string added     65 ZZ
        STA M8          ;to CSP to point it to area now   85 ZZ
        BCC ASL         ;free to receive string from TEMP. 90 02
        INC M9          ;add any carry to CSP hi-byte.    E6 ZZ
;replace stored string. Set PXF and Exchange done flag.
ASL:    LDY #-1         from 1st byte to $0D terminator   A0 FF
ASM:    INY             ;move stored string back as 2nd   C8
        LDA TEMP,Y      ;of the pair.  Third and last     B9 YY YY
        STA (M8),Y      ;part of exchange.                91 ZZ
        CMP #$0D        ;comparison leaves Carry flag     C9 0D
        BNE ASM         ;set on loop exit for use in      D0 F6
        ROR MA          ;setting PXF (bit 7). Set also    66 ZZ
        LDA #$FF        ;current exchange done flag for   A9 FF
        PHA             ;correct pointer movements.       48
        BMI ASO         ;skip to end of pass test.        30 03
;clear current exchange flag if no exchange done.
ASN:    LDA #0          ;necessary to ensure CSP will     A9 00
        PHA             ;get address from NSP.            48
;SC countdown. Pass ends when one string left.
ASO:    LDX M6          ;decrement SC.  Testing if lo-byte A6 ZZ
        BNE ASP         ;is zero when hi-byte also needs  D0 02
        DEC M7          ;decrementing.                    C6 ZZ
ASP:    DEC M6          ;dec lo-byte of SC.               C6 ZZ
        LDX M6          ;do OR of lo-byte minus 1 with    A6 ZZ
        DEX             ;hi-byte to give zero result      CA
        TXA             ;if SC = 1.                       8A
        ORA M7          ;if SC = 1 then pass ended so     05 ZZ
        BEQ ASQ         ;skip out of loop.                F0 05
;loop differently on state of current exchange flag.
        PLA             ;if flag set then exchange occurred 68
        BNE ASE         ;and CSP is already okay.  Else   D0 94
        BEQ ASD         ;loop to move NSP to CSP.         F0 8A
;another pass if any exchanges occurred else end.
ASQ:    PLA             ;tidy up stack.                   68
        BIT MA          ;test PXF (bit 7) and if reset    24 ZZ
        BPL ASR         ;get out of loop and end.         10 03
        JMP ASC         ;else do another pass.            4C YY YY
ASR:    RTS             ;exit for sorted list.            60
;end of ALSORT.
```

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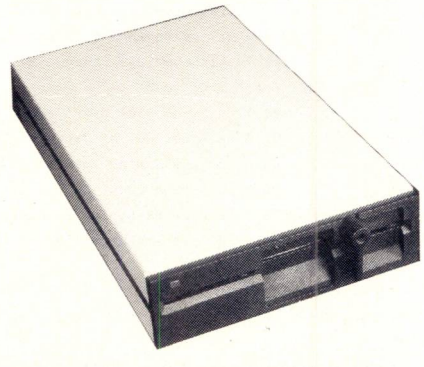

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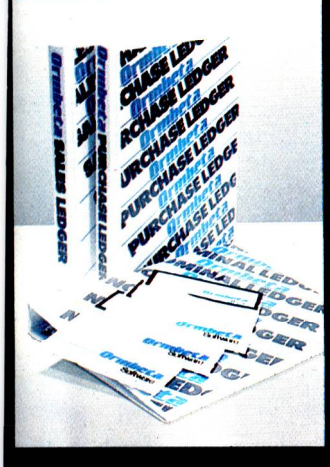

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The age of reason

An intuitive programming language? Or one which acts on perception of bodily gestures? Surya travelled to Cambridge, Massachusetts to talk to Greg Gargarian at Atari's research lab, to find out about two of the company's current research projects.

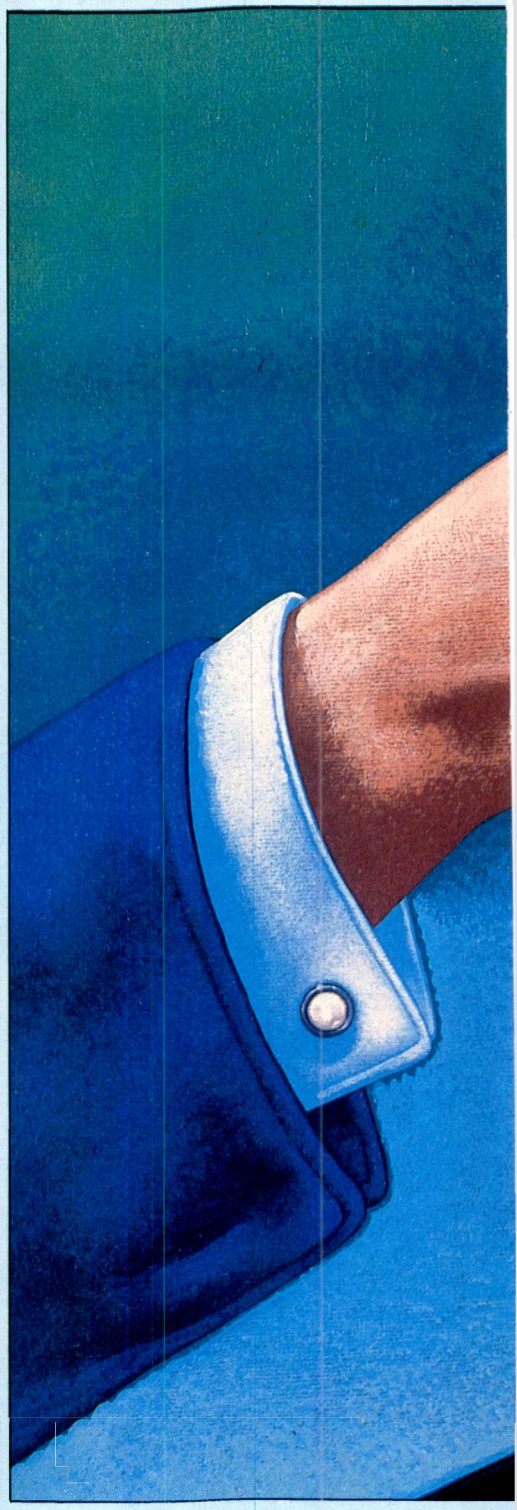


Illustration by Geoff Kelly

Atari's research and development lab is situated on the eighth floor of the Five Cambridge Centre: an office block on the edge of the Massachusetts Institute of Technology complex. I'm not sure what impression of a research lab I had in my head, but it definitely didn't include being greeted by BJ — a small, friendly black dog who wanders around the lab in search of people willing to stop and talk to him.

My visit was punctuated by occasional messages over the PA system ('If anyone knows why the Sage machine has half its memory missing, please call 271'). The staff, I was told, varied between five and thirty in number. Most are in their early twenties and dressed in blue denim. A4-sized terminals are scattered throughout the offices, linked to one of the Lisp machines. A large board, situated outside the computer room, is used to connect the terminals via a mass of interconnecting RS232 cables.

About half of the lab's staff had come from the Logo lab at MIT, and the Logo connection is evident in the work being carried out at Atari. One of the projects at the lab is the development of a form of Logo with the working name QLogo ('Q' standing for 'Quasi-'). QLogo combines Logo and Smalltalk in a hybrid language which could become a user friendly alternative to Lisp.

Lisp, which stands for LISt Processing, is the mainstream artificial intelligence language. The language was originally developed for database and mailing list applications. Given a number of relationships, Lisp could then 'draw conclusions' about implied relationships. Let's take a simple example.

You have a database of customers, and want to arrange a selective mailshot. Having specified that all *PCW* readers have good taste, and that readers of other magazines are suffering from a mild but curable affliction, you can then instruct your database to compose a mailing list of all those people who have good taste, and those who suffer from a mild but curable affliction. Providing that both qualities are exclusive (that is, reading *PCW* is the only evidence of good taste), the list will comprise people who read both *PCW* and any other micro magazine.

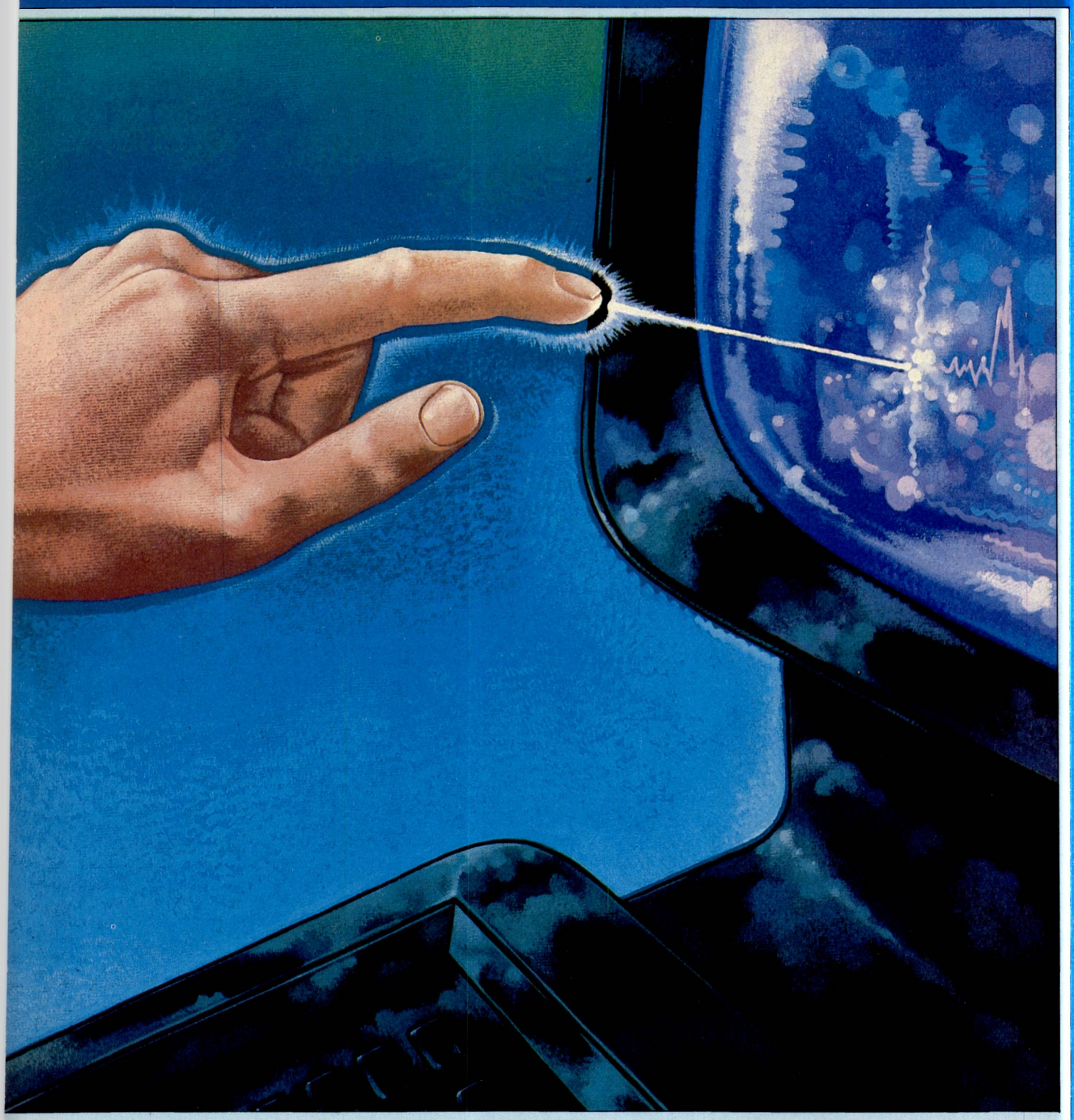
Smalltalk was designed to be addressed in something much closer to natural language than languages like Lisp. The language is oriented towards expert systems. These are computerised models of decision making, classifying and diagnostic processes. The idea is that an expert works out exactly how he will tackle a problem and then supplies the computer with a model of the decision making process. Non-experts can then interrogate the system as if it were the expert. Perhaps the most publicised use of an expert system is in the area of medical diagnostics. The system is set up to ask the patient a series of preliminary questions, each fresh question being determined or modified by the response to the previous one. The expert system is, of course, modelling the interview a doctor would have with a patient. It can then present the doctor with a summary of the exchange and perhaps a suggested diagnosis. The system is not intended to replace the doctor, but merely to save time prior to seeing the doctor.

QLogo

The basis of research into QLogo lies in the question: Can a programming language be intuitive? In asking this question, Atari is taking a slightly different tack from the more traditional AI question: Can we create a programming language capable of reasoned deduction?

There are those who will dismiss the possibility of an intuitive programming language out of hand, in the same way that many will argue that there is no such thing as artificial intelligence — only the illusion of intelligence. The question is: Can we create a programming language which succeeds in anticipating the goal of the user without step-by-step instructions?

What is the difference between a reasoning language and an intuitive one? Atari sees the difference in the intended user. Languages such as Lisp can be said to be reasoning in an as yet fairly crude sense, in that they are capable of deducing relationships which have not been explicitly stated. But Lisp, as anyone who has had even a



passing encounter with the language will know, has an extremely tedious syntax. Though dedicated Lisp hackers may not see what all the fuss is about, not everybody wants to spend six months learning a language. Five minutes with Lisp and most people will never want to see another bracket in their life.

Lisp and Logo both have a limited ability to model intelligence, but you have to learn complex syntax rules before you can make use of that ability. The user has to adjust to the models required by the language, rather than the other way round. *Greg Gargarian, technical services manager of the lab:* 'Seymour Papert talks of Logo as a means of creating microworlds (computer-simulated environments). The problem is that it's difficult for a non-technical user to probe on conventional systems. They can't just play around and create something which almost works, and then try to debug it. They can produce something which generates friendly error messages, but that's not quite the same thing! We're trying to design something that will enable people at least to get close to what they want, without having to know too much about programming.'

Microworlds was the name coined by Seymour Papert to describe computer-simulated environments, in which the user specifies the rules governing the environment and the computer organises the simulation according to those rules. Flight simulator programs can be thought of as a form of microworld. The computer is programmed to simulate a particular aircraft, and the simulator will act and react in ways consistent with the characteristics of that aircraft.

Seymour suggested that Logo is an ideal language in which to create microworlds (see 'Learning with Logo', *PCW,* December 1983). But Atari argues that, whatever Logo's merits, it still requires its users to spend a fair amount of time learning a programming language. As with any other language, Logo is fussy about syntax and will blindly do exactly what the programmer tells it to — even if to do so will only generate an error message or, worse, harm the program or data.

QLogo takes a different approach. 'Through it,' says Greg, 'Atari hopes to provide the means of designing more natural interactions.' Instead of requiring explicit step-by-step instructions, QLogo attempts to process more general or vague directions from the user. One of the ways in which it will assist the user in organising and expressing his needs will be through a Lisa-like windowing system.

Briefly, a windowing system presents the user with a number of different screens on which the tasks in hand are presented. Each part of the task to be done is given its own screen, and the user can switch between tasks by enlarging tiny windows to the corresponding screens. He can switch between a cash flow analysis on a spreadsheet, draw figures from a database and write a report on a word-processor — switching backwards and forwards as required. This is a much easier and friendlier method than the traditional 'one thing at a time' approach, and gives the user far greater control over the work without requiring in-depth computing knowledge.

Full details of Lisa can be found in the July 1983 issue of *PCW*.

Atari has in mind non-programmers, children particularly, using QLogo in a similar way to create microworlds. A physicist may want to create a microworld in order to test the practicality of a theory. A teacher might want to illustrate the way in which a frictionless universe would operate. A musician could compose a piece of music, and then hear it played on different instruments, at different tempos, transposed up or down, in different styles, or with different rhythm backings. A child could grasp the meaning of a formula by having it displayed in graphical form and watching it change as different values are entered. A games designer may want to experiment with a particular environment before building a game around it . . .

Atari is particularly interested in using QLogo with music. The close relationship between music and mathematics is such that some mathematicians have described composition as a branch of applied mathematics. *Greg Gargarian:* 'We're talking about taking a piece of Bach, and using QLogo to play it in a ragtime style, for example. In education, there are lots of possibilities; to a child, music is probably the most significant form of mathematics.'

I was unable to see a demonstration of QLogo linked to a synthesiser, as the machine to be used for this purpose turned out to be the Sage of missing memory fame (the Lisp machines at the lab are all named after spices — Salt, Pepper, Thyme, Sage . . .). Everyone seemed at a loss to know how 256k of Symbolics RAM could disappear without trace, but whatever the explanation, the unceremoniously downgraded machine wasn't playing.

Without the front end, QLogo is something of a cross between Lisp and Logo in syntax, the Smalltalk influence being less visible. With a friendly front end, however, the language could make the power of an AI language accessible to non-programmers for the first time. It should be of great benefit to children, especially.

Gesture

A programming environment which responds not to keyboard input but to perception of physical movement sounds like a strange idea. Yet this concept is another of Atari's current research projects called Gesture.

I describe Gesture as a programming environment because that's the most accurate description. Programming language isn't right, since the user doesn't relate to Gesture through language. Perhaps a physical interface to microworlds is a more accurate, if more jargonistic, description. Gesture uses devices like touch sensitive screens in place of keyboards, so that the same physical device is used for both user input and direct feedback. I asked Greg Gargarian to explain the difference between Gesture and a conventional programming language.

'Other programming languages relate to people intellectually. Information is presented on a screen, users have to interpret it and then indicate their responses through the abstract medium of language. Gesture relates to the user both intellectually and physically; for example, we can use devices which give direct sensory feedback.

'We see the prime use of Gesture as an educational tool. Seymour Papert has used the analogy of the perfect ski slope, one on which a non-skier can begin at the top, and eventually reach the bottom a competent skier: no explicit tuition is necessary because the ski slope itself teaches implicitly. It's designed in such a way that the slope guides the novice through all the movements necessary to learn the skills involved in skiing. We're trying to explore Gesture in this sense.'

The idea of linked kinetic, auditory and visual feedback is not new. The full scale flight simulators used to train airline pilots are an obvious example. What is new is the idea of a complete programming environment, perhaps using QLogo, in which an unlimited range of sensory microworlds can be created and used. The possibilities both in the area of games and in more practical applications are tremendous. Imagine a Grand Prix racing game in which a steering wheel is geared to present a varying degree of resistance to a turn, the amount of resistance depending on the speed of the car. Think of the resistance of a real steering wheel if you were to attempt a sharp turn at 200mph.

Consider a piece of dangerous equipment like a lathe or drill. Imagine being able to simulate not only the visual and auditory reactions of the machine, but also being able to give kinetic feedback — the warning vibrations which may signify danger, and so on. Or take a more sophisticated form of the Grand Prix game, and turn it into a simulator for elementary driving lessons.

On a different tack, Gesture could be used as part of an image processing system. Images could be captured and displayed on a touch sensitive screen, and then manipulated using that screen to create an animated sequence. This leads back to Seymour's concept of 'subversive learning' — learning that is implicit, or indirectly related to the task in hand. In creating an animated sequence, children will learn about composition, continuity, design and all kinds of other peripheral skills.

Of course, most of these possibilities are demanding, in terms of both hardware and software: demanding and expensive. Greg argues that this is true of most projects during the research period. They start as huge systems running on sophisticated minis or mainframes, and eventually filter down to more reasonably priced systems as hardware capabilities increase and prices fall. Logo could be run only on one of half a dozen systems around the world while it was being developed. Today it runs on all machines costing a few hundred pounds.

'What is new is the idea of a complete programming environment, perhaps using QLogo, in which an unlimited range of sensory microworlds can be created and used.'

QLogo requires about one megabyte of RAM, and either a 68000 or 16032 processor. Today these things cost in the region of fifteen thousand pounds; in two or three years' time we'll find that sort of power in a standard desk-top micro.

Gesture offers a significant advantage over dedicated simulators in that it's under software control. The software is accessible to the user, and can be changed as required. The fact that the same system can form the basis of a large number of simulations will make the price appear more reasonable.

Gargarian wants to stress that both QLogo and Gesture are in the early stages of development. The research lab is concerned only with the development of ideas; it's the marketing side of Atari that has to make the decisions on whether to make a product commercially available. 'Most of the applications we have talked about are just ideas right now, but the possibilities are there,' Gargarian concluded.

END

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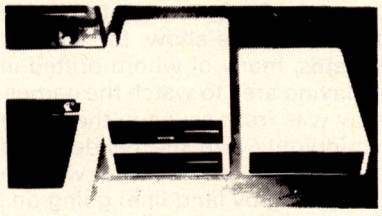

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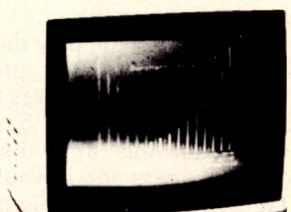

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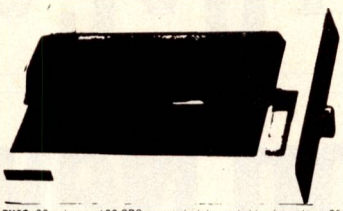

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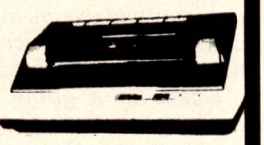

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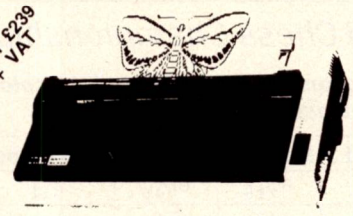

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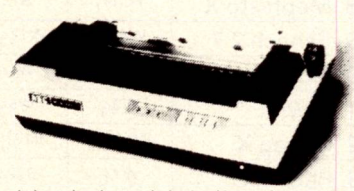

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MICROCHESS

Blitz on New York

Tony Harrington reports on the New York 4th World Microcomputer Chess Championships.

Micro Chess — a guide for beginners

Micro Chess covers all the news and events in the busy world of computer chess. With new chess programs and new chess computers appearing all the time, we evaluate their strengths and weaknesses as they become available. We shall be presenting profiles of programmers, both amateurs and professionals, which will cover their methods and their interest in chess programming, and we shall be talking to suppliers and looking at their plans.

Computer Chess affects computer enthusiasts in two different ways. For some, the fact that they can now play chess against either their home computer or a dedicated chess computer has opened up the delights of the game. For others, the real interest is not so much in playing chess as in trying to build a chess program. Micro Chess aims to meet the interests of both.

Chess is a game that can be as exciting for the beginner as it is for the grand master. So if you haven't played before, get yourself a good introduction to the game — there are dozens in the bookshops — and get to it. Remember, with computer chess a game can be as fast or as slow as you want.

In October 1983 three British entrants took part in the 4th World Computer Chess Championships. This event is held every three years under the joint auspices of the ACM, the main US professional body for data processing personnel, and the ICCA.

The ACM puts up the cash for the competition and helps entrants to pay for hotel expenses, and so on. The ICCA sanctions the results of the competition. This, by the way, is not a homely little affair for micros. It is an open event, where supercomputers like the mighty Cray make their appearance. This doesn't stop the micros from entering, but it doesn't do a great deal for their winning chances.

This time the event was held at New York's luxurious Sheraton Hotel. By no coincidence at all, the ACM held its own three-yearly conference at the same time and place, so the tournament acted as a side-show for the ACM delegates, many of whom drifted into the playing area to watch the games.

Play was from seven in the evening till midnight, with the resident programs (that is, those who were not participating by land-line) going on till two in the morning on occasions. If this leads eventually to some of the watching DP specialists taking up the mysteries of mini-max search theory and producing their own fledgling chess programs, so much the better.

The three British entries among the 22 who took part were: the 1982 and 1983 *PCW* European Chess Tournament winner, Advance 3.0, by Dave Wilson and Mike Johnson; BCP by Don Beal and intelligent Software's Philidor chess program.

Don Beal has been to all four of these tournaments. Like the other British participants, he was impressed by the improvements made in chess programming in the three years since the last World Championships.

'It was clear from the play that there had been definite steady progress. What I noticed particularly was that the best of the microcomputer based entries did better this time than ever before. Three years ago it would have been fair to say that the micros were struggling to come bottom. Now they were holding their own in the middle of the field,' Beal commented.

He reckons that the improvement in over-the-board play has a lot more to do with improved programming than it has with added speed and processing power. Though when it comes to a program like the Cray Blitz, which ran not just on any ordinary old Cray, but on a special experimental model consisting of three linked Crays, the relative effects of hardware and software became a little difficult to sort out.

The twin surprises of the competition were both associated with Ken Thomp-

Results table for the 4th World Chess Championships

(The number on the left of each column indicates the opponent and the colour of the pieces; that is, Cray Blitz was black against Fidelity X in round 2.)

Program	Round 1	Round 2	Round 3	Round 4	Round 5	Total Pos
1 Cray Blitz	W14/1	B10/2	W6/3	B5/3.5	B7/4.5	1st
2 Awit	W15/1	W6/1	B12/2	W19/3	B13/4	2-3rd
3 Bebe	B11/0	W20/1	W9/2	B10/3	B5/4	2-3rd
4 Chaos	B9/0.5	W21/1.5	B19/2.5	W7/2.5	W6/3.5	4-5th
5 Nuchess	W20/1	B11/2	W7/3	W1/3.5	B3/3.5	4-5th
6 Advance 3.0	W22/1	B2/2	B1/2	W8/3	B4/3	6-9th
7 Belle	B13/1	W8/2	B5/2	B4/3	W1/3	6-9th
8 Mephisto X	W18/1	B7/1	W16/2	B6/2	W15/3	6-9th
9 Schach 2.7	W4/0.5	W12/1.5	B3/1.5	B11/2.5	W10/3	6-9th
10 Fidelity X	B16/1	W1/1	B18/2	W3/2	B9/2.5	10-13th
11 Merlin	W3/1	W5/1	B13/1.5	W9/1.5	B19/2.5	10-13th
12 Novag X	W17/0.5	B12/0.5	W2/0.5	B21/1.5	B14/2.5	10-13th
13 Phoenix	W7/0	B22/1	W11/1.5	B17/2.5	W2/3.5	10-13th
14 BCP	B1/0	W18/0	B22/1	B16/2	W12/2	14-16th
15 Ostrich	B2/0	W16/0	B20/1	W18/2	B8/2	14-16th
16 Pion	W10/0	B15/1	B8/1	W14/1	W17/2	14-16th
17 Bobby X	B12/0.5	B19/0.5	W21/1.5	W13/1.5	B16/1.5	17-21st
18 Conchess	B8/0	B14/1	W10/1	B15/1	W20/1.5	17-21st
19 Patsoc 2.0	B21/0.5	W17/1.5	W4/1.5	B2/1.5	W11/1.5	17-21st
20 Philidor	B5/0	B3/0	W15/0	W22/1	B18/1.5	17-21st
21 Shy	W19/0.5	B4/0.5	B17/0.5	W12/0.5	B22/1.5	17-21st
22 Stinks X	B6/0	W13/0	W14/0	B20/0	W21/0	22nd

son's Belle. The American Chess Federation decided to acknowledge Thompson's contribution to computer chess. Belle has an outstanding record. Before this tournament, Belle had never, in any of its many versions, lost a game to another computer. It had also come joint second with several players at the 1982 US Speed Chess Championships. So the Federation awarded Belle a US international master title at a little ceremony half way through the tournament. Belle promptly responded by losing its first two games ever, one to Nuchess and one to Cray Blitz (this last, annotated by David Levy, is given in full in the February issue).

The West German chess journalist, Friedric Friedel, reckons that both losses were 'statistical'. Belle simply found itself in what happened to be two losing positions. He and other Belle watchers still believe Belle to be the strongest program. In the game against Nuchess, for example, it found the winning line for Nuchess, but just happened to be playing with the losing pieces. Chess is a strong game in which World Champions have found themselves with lost positions on occasion inside 20 moves.

For those of you who might be scanning the results table for clues to the strength of the commercial chess machines that will appear later this year, remember that a five-round Swiss tournament with 22 entries produces some funny results in the middle orders. A better guide to strength than overall positions would be to look at a particular machine's opponents. A full point taken off Sfinks X, for example, which came last with zero points, is not quite the same thing as a full point taken off Belle!

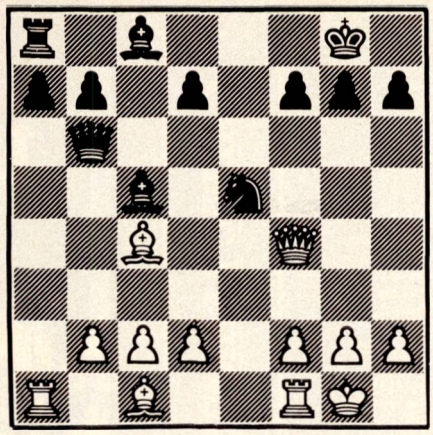
Games Section

Inevitably attention has to focus on the performance of Cray Blitz. It had an awesome amount of processing power behind it, probably more than any computer chess program has ever enjoyed in any competition anywhere. Tactically, this gave it an overwhelming superiority. But as a careful scrutiny of its games demonstrates,, despite its ability to play the most hair-raising tactical positions, Cray Blitz, with all its hardware, is capable of playing the odd planless move. This might sound like a churlish comment, but look at the way it plays the late middle game against Beal's BCP.

The table shown, reproduced from the official tournament bulletin, gives the full list of participants in order of their final placings — my thanks to the organisers.

Last month's game, annotated by David Levy, was the exciting final round clash between Cray Blitz and Belle, in which Belle lost for only the second time in its eventful history. This month's game shows Cray Blitz's first round game against Don Beal's BCP.

Beal was unfortunate to find his



program drawn against the mighty Cray right from the start. With so large a field, there was a reasonable chance that he might have avoided playing it altogether. His troubles were multiplied by the fact that what looks like a carefully prepared book opening, the Nimzowitsch variation 2 . . . Nf6 in the Sicilian Defence, found the Cray's huge openings repertoire fully prepared.

The point of pre-programming the Nimzowitch variation as black is to avoid the main lines of the Sicilian, where Beal would have expected one of the larger programs to have a comprehensive openings library with many prepared tricks in store. Against an opponent with less memory than the Cray, Beal might well have been successful. Here, however, he found an opponent who could play what was supposed to be an unusual line effortlessly from its library.

1 e4 c5 2 Nf3 Nf6 3 e5 Nd5 4 Nc3 e6 5 Nxd5 exd5 6 d4 Nc6 7 dxc5 Bxc5 8 Qxd5 Qb6

So far everything is according to book. This is the natural attacking move. Black has given up a pawn for active piece play and now threatens to win it back immediately by taking the pawn on f2 with check. In one of the book lines, white counters this threat by duplicating it: he plays 9 Bc4 which puts the Black King's Bishop pawn under fire. Black takes the pawn on f2 and castles once white plays Ke2, removing the threat on his own pawn on f7. White then has active piece play and a very complex and unclear position results. Cray Blitz rejected this line.

Computers do not like giving up pawns when no clear measurable advantage results. Making predictions about the complex evaluation functions of programs like Cray Blitz, Belle and Nuchess is a thankless task. But at least as far as the more 'down market' computer programs are concerned, their scoring functions rate a pawn win as a solid plus and they want to see some tangible gain if they are going to give up this plus. BCP has got this far because it is 'in book'. The Cray shows a touch of class here by varying from book in a line that gives the pawn back without immediate material advantage.

Cray Blitz retreats the queen to cover f2:

9 Qd2 0-0 10 Bc4 Re8

The fun begins. Black has the white e pawn in its sights, but material equality is not everything. To be fair to Beal's BCP, it is not immediately clear what black's plan should be other than to win the e pawn. His pieces are boxed over on the queen side and white has good chances for a king side attack.

11 0-0 . . . a move which invites Nxe5. I was curious to see if one of the better commercial dedicated chess computers, like the Novag Constellation, would find and play such a move. On level 6 it immediately looked at and rejected 0-0 and opted, after around two minutes of analysis, for the vastly inferior 11 Qe2 to protect the pawn.

Nxe5 12 Nxe5 Rxe5 13 Qf4!

A natural and obvious move. After black's thirteenth move, Constellation found 13 Qf4 immediately in my test run. But seeing one move ahead is never a great difficulty. The critical test was to spot this position as advantageous back on move 11. White puts both the f7 pawn and the rook on e5 under threat. Black could now play 13 . . . Re7, but his blocked white bishop will slow him down badly. In reply to this white could simply play 14 Bd2 (ignoring the threat 14 . . . Qxb2) and 15 Rael with a winning attack. In the event, Black settled for wrecking his position with 13 . . . Qf6. (Constellation, in the same position, opted for 13 . . . Re7, and, playing both sides of the position, quickly discovered the win for white.)

13 . . . Qf6 14 Qxf6 gxf6

At this point I would rather be white, but there may be ways for black to make a game of it. Cray Blitz finds a very strong continuation.

15 Kh1 d5 16 f4 Rh5

This is the sort of move that most human chess players would quite sensibly reject out of hand. The rook has no safe retreat squares once it gets trapped on this flank and the two white bishops should be able to force a favourable exchange. BCP cannot see all the way to the inevitable capture, so the evaluation function gives priority to keeping the rook 'active'. It's one of those positions that really tests the programmer.

18 Bb3 d4 19 g3 Rh3 20 f5 Kg7 21 Kg2 Rh6 22 Bxh6+ Kxh6

And so the exchange is forced. From here Cray Blitz goes through a fairly mediocre patch before finding the win, which, from this position, was simply a technical exercise.

23 Bd5 Kg7 24 Rad1 a5 25 Kh1 Ra6 26 Be4 b5 27 Rfe1 Bd7 28 Rd2 Bc6 29 Bxc6 Rxc6 30 Re8 Bb6 31 Rb8 b4 32 Rb7 Kf8 33 Re2 Bc7 34 g4 Rc5 35 Ra7 Bb6 36 Ra6 Rc6 37 Rd2 Rd6 38 Rd3 Kg7 39 c3 Kg8 40 a4 Kg7 41 cxb4 axb4 42 a5 Bc5 43 Rxd6 Bxd6 44 Rxd4 Bc5 45 Rd5 Be3 46 Rd3 Bc5 47 Rd7 Be3 48 a6 h5 49 gxh5 Kf8 50 Rd3 Bc5 51 Rg3 Ke8 52 h6 Bd6 53 a7 Ke7 54 Rd3 Bc7 55 a8=Q Bd6 56 h7 b3 57 Qb7+ ke8 58 h8=Q+ Bf8 59 Qe4 checkmate. 1-0 END

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You may replace the questions in this program with your own (create a bank of up to 250 questions with a 48K Spectrum). Any subject area may be chosen.

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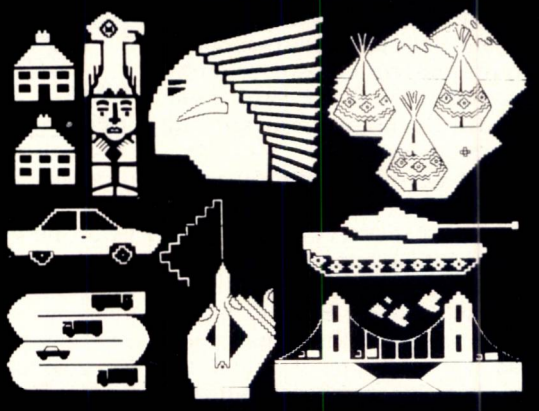

1 TENS AND UNITS ADDITION
2 TENS AND UNITS SUBTRACTION
3 PICTURE PLOTTER
4 NORTH AMERICAN INDIANS

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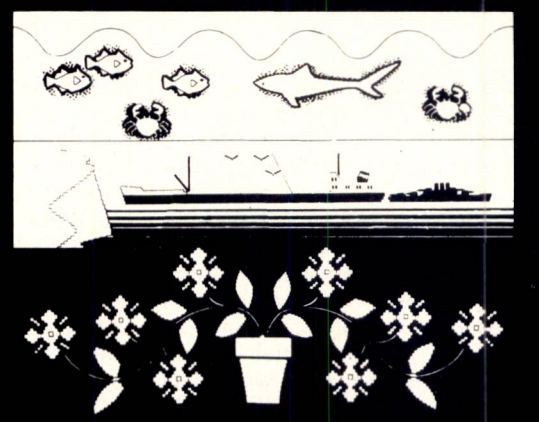

9 NOUNS, VERBS, ADJECTIVES AND ADVERBS
10 VERB PRACTICE
11 THE STRUCTURE OF THE FLOWER
12 LONG DIVISION

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History maker

Responsible for launching the Good Housekeeping *Early Learning series, Linda Richardson, managing editor of Ebury Software, is putting her multifarious skills to good use. Margaret Spooner finds out how it all began . . .*

Linda Richardson radiates energy and enthusiasm when she talks about her work. As managing editor of Ebury Software she is the driving force behind the recently launched range of *Good Housekeeping* Early Learning programs. She became quite animated describing young children's excitement the first time they use a computer and is delighted to find herself in a position where she can influence the development of software to make learning fun for them.

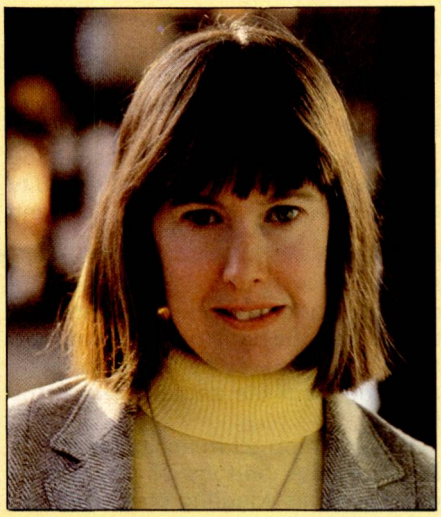
Linda's job is to decide the publishing policy of Ebury Software and ensure that it is carried out. Ebury Software is part of the National Magazine Company which publishes *Good Housekeeping* and other women's magazines and owns the book publishers, Ebury Press. 'I co-ordinate the teams of authors and programmers involved in creating the programs,' she said. 'I also liaise with the educational advisers who help devise the titles and I work closely with the *Good Housekeeping* Family Centre so that we end up with a product with which we're both happy.'

The publishing policy she formulated covers three main areas. The first is a concern with quality.

The second aspect of her publishing policy is to provide broad-based education which is not too formal in its approach and reflects the ideals of *Good Housekeeping*. 'We're interested in the ways in which people can use the computer in the home — what they will do with a micro when they're tired of playing games.'

The third facet of policy is to encourage women to use computers. Linda said: '*Good Housekeeping* is a name women know and we hope it will give them the confidence to try the programs. The Early Learning series is designed for use by the parent with the child and this usually means the mother. That's why in our packaging we have a picture of a woman with a child.' This contrasts with most publicity for computers and software showing men and boys at terminals.

Although Ebury Software places much emphasis on programs to use in the home, Linda is pleased that they are also being bought by schools. 'Our software is designed bearing in mind the things teachers will be looking for. We want to supplement the teacher's role, not take over.'



Above: Linda Richardson

'We're interested in the ways in which people can use computers in the home . . .'

Background

Linda became managing editor of Ebury Software in April last year. Before that she had worked in Longman's self-study unit and at the National Extension College commissioning a 30-hour Basic course, part of the book which accompanied the BBC's television series, *The Computer Programme*.

Although her involvement with computers and education seems far removed from her academic background — she did a PhD in the history of medicine — her interest in education started early.

During vacations she worked as a nursery assistant in a pre-school education programme in the US, and became more familiar with computers. She had bought an Apple II and recalls: 'When I did my PhD we were living in a tiny flat. The bedroom was filled with bed, thesis and computer. It was on a door supported by trestles.'

Having emerged from her increasingly specialised education she became a curator at the Museum of the History of Medicine, but when the collection was transferred to the Science Museum — which is subject to the Official Secrets Act — she was unable to follow because she is an American citizen.

However, her job at the Museum had an educational content — talking about the history of medicine to school parties and providing information for 'O' level and CSE students. When she had to look for another job she decided to use this experience. 'I kept applying for jobs in publishing where I could use my interest and skills in education.'

Progress

Her subsequent job as courses editor at the National Extension College gave her the chance to increase her knowledge of computing, too.

From a past which concentrated on a narrowly specialist area, Linda now looks forward to work that will involve her in a wide variety of topics as Ebury Software expands its range of titles into new areas. 'The future is full of possibilities. One is to have interactive databases in the home with people collecting all the information about a subject in which they are interested and tailoring it to their needs. As computers become more powerful the things you can do with them become more exciting. At present we are restricted by the limits of the medicine. Many people only have cassettes and this has to be considered in our current software design.'

She regards the 'information explosion' of the computer age as analogous to the period that has absorbed her academically, the 16th century, when printing first made information widely available. So it seems appropriate that her job now involves her in spreading information and playing a part in today's historical process. **END**

Photograph by Jeff Veitch

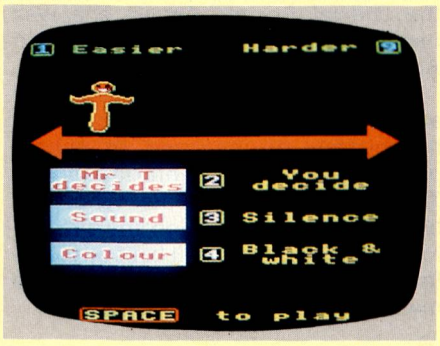
Schoolplay

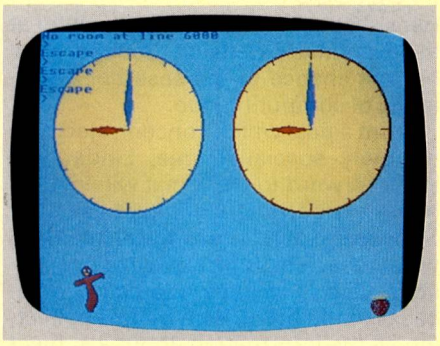
Microcomputers have their role to play in providing a rudimentary education. Margaret Spooner gets back to basics with a selection of programs for the BBC Micro and the Spectrum.

Linda Richardson, managing editor of Ebury Software, is keen for the Ebury imprint to be recognised for the high quality of its software. The initial range of six programs, three of which are reviewed below, introduces Mr T, a little, animated T-shaped character who waves his arms victoriously when a correct answer is given.

Much thought has been given to devising ways of allowing young children to control the computer, generally by use of the space bar.

A parent menu is provided, enabling the parent to select the level of difficulty required, whether colour or black and white are to be used and whether sound is wanted. The default is colour and sound. All the games have attractive graphics and bright colours. The care given to pace, presentation and documentation provides a standard to which other educational writers might well aspire.





Mr T Tells the Time

Machine: BBC Micro (also ZX Spectrum)
Publisher: Ebury Software
Available from: Retail outlets and direct mail
Price: £12.95
Age range: 3 to 6 years

The four programs on this tape are designed to introduce children gradually to clock times. The first program, 'Working Clock', shows a clock face with movable hands, with the clock ticking and hours chiming, to give children an appreciation of the pattern of movement around the clock face.

In 'Matching Hours', two clock faces are displayed without numbers. The child must identify when the hands of the clock on the right match the ones on the left. In this way he learns to judge the time from the angle between the hands.

When 12 correct matches are made, Mr T at the bottom of the screen completes his wiggling progress from one side to the other, eats the waiting strawberry and gives his victory wave. The matching occurs at three levels — sequentially through the hours, randomly through the hours, and, finally, using half hours and quarter hours. The six difficulty levels gradually increase response times.

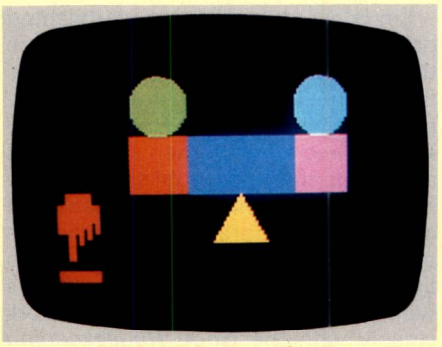
The third program, 'Clock Numbers', brings numbers back onto the clock face. Initially, five numbers are missing. At the side of the screen a column of the missing numbers is shown, and when Mr T is beside the correct one to fill the flashing gap on the clock face, the player must press the space bar, until all five have been correctly identified. At stage two, the missing numbers flash out of sequence and at the third stage of the game all the numbers on the clock face are missing.

The final game introduces the word 'O'clock', and the child learns to recognise the written hours and match them against the time on the clock face.

Unfortunately, the review version of Mr T Tells the Time had a bug in the 'Matching Hours' game. Under certain conditions, the message 'No room at line 6000' appeared and attempts to 'Escape' or move on by pressing the space bar were unsuccessful.

Documentation: Excellent

Conclusions: Apart from the bug already mentioned (which Ebury says has now been eliminated), these games provide a gentle introduction to help children learn how to tell the time.



Mr T's Shape Games

Machine: BBC Micro (also ZX Spectrum)
Publisher: Ebury Software
Available from: Retail outlets and direct mail
Price: £12.95
Age range: 3 to 6 years

This program introduces triangles, squares and circles and gives children the chance to become familiar with their shapes by matching them, playing and building patterns with them.

A game called 'Jigsaws' is used to allow children to match the shapes. A pattern is displayed in red which incorporates the shapes in a variety of ways (I found at least 12 different patterns at the simplest level). From the top of the screen, one of the components of the displayed pattern (in green) descends and the child must hit the space bar when it passes over the matching section of the original pattern. Once all sections are matched (and consequently the original pattern has changed from red to green), a new pattern is presented.

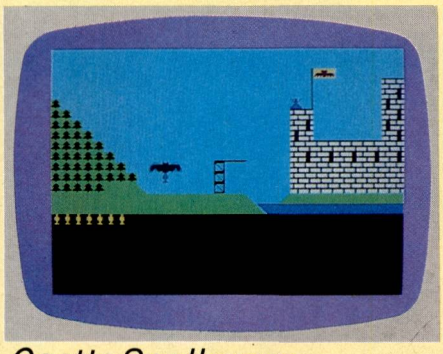
The simplest patterns have only two shapes and as the level of difficulty increases more complex patterns are made up of a greater number of pieces. The game is well paced and a child could play it alone, almost at once.

Shapemaker, the other game on this cassette, relies on adult help. It starts with text that is beyond the reading ability of this age group, so the parent must help the child choose three colours from a list of eight; choose a shape from among a square, circle, equilateral triangle and right angled triangle; move it (up, down, left or right); turn it (clockwise or anti-clockwise); change its size (bigger, smaller, taller, shorter, wider or narrower), or forget the shape. Having decided on shape and size the child can opt to keep it and colour it in, and in this way build up a picture. Not only does this allow the child to become more familiar with the shapes but, if a particular picture is envisaged — for example, a sailing boat — a considerable amount of planning and logic is required. Older children will also find this enjoyable.

The manual suggests that parental help is needed 'to develop and explore ideas, talk about shapes and expand vocabulary'. It also attempts to extend the educational benefits of the games by suggesting additional activities using shapes — for example, spotting shapes on car journeys.

These games are well devised, but for this young age range accessibility is important so it's probably necessary to load the game into the computer and allow the child to play whenever the moment seems right.

Documentation: Excellent
Conclusion: Attractively presented and well-paced but at £12.95 it's an expensive way of learning to distinguish shapes.



Castle Spellerous

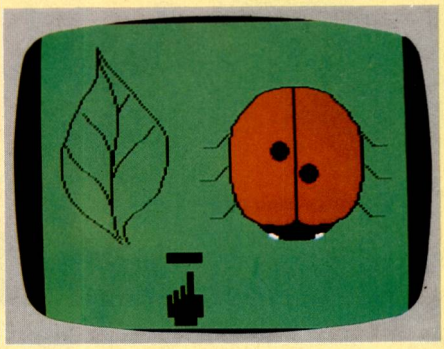
Machine: 48k Spectrum
Publisher: Sinclair Research
Available from: Retail outlets
Price: £7.95
Age range: 5 to 12 years

Loading proved difficult, but once accomplished Castle Spellerous provided an exciting game which successfully masks a spelling test. A 400-word vocabulary at ten levels is provided and it's possible to add your own lists. If you wish you may view the vocabulary of the level you choose before playing.

In the game you have ten men to rescue a princess who has been captured by the magician in Castle Spellerous. The word to be spelt is briefly displayed and you then have two chances to key it in correctly. If you get the answer right another section of the rescue tower will be built (it takes ten correct answers to rescue the princess). If you spell the word wrongly your man will become a butterfly, bat or toad. To keep you on your toes the wizard, in the guise of a vampire bat, sometimes launches a surprise attack. To foil it you must quickly press a requested key or you lose another man — a sure way to increase familiarity with the keyboard. When the tower has been completed you carry the rescued princess to safety in a ship, but if all your men are lost the wizard comes for you (looming large and flashing on the screen).

Each word to be spelled is displayed in small but legible characters and only for a few seconds. This gives the game a good pace but may be difficult for poor spellers. However, since it's possible to view the vocabulary beforehand, a careful study of the words can be made then, and plenty of time is available to type in the correct word.

Documentation: Adequate
Conclusion: A well paced game with attractive graphics. Castle Spellerous holds the player's interest and makes spelling practice fun.



Mr T's Number Games

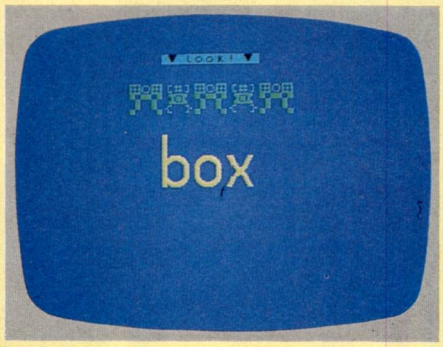
Machine: BBC Micro (also ZX Spectrum)
Publisher: Ebury Software
Available from: Retail outlets and direct mail
Price: £12.95
Age range: 3 to 6 years

The simple procedure of moving the dots from a ladybird to a leaf is used in one of these games to introduce the numbers 1 to 9. It's desirable that an adult should be around to count the dots with the child. By pressing the 'N' key the child can transfer the dots back again. It seems rather a tedious way to introduce numbers — I suspect for most young children counting footsteps when out walking with mother or playing a game of dominoes to gain visual recognition of low numbers would be more pleasurable. The outline of the number is also displayed on the screen.

Once the child has become familiar with the numbers a counting game can be played. The ladybird now appears with a random number of dots on its back and again the child transfers them to the leaf. If the child presses the 'N' key the correct number of times, followed by the space bar, the matching number will appear on the screen.

A further advance occurs in the next game in which the child is required to use the number keys on the keyboard; the number typed is drawn on screen. In the ladybird game a ladybird with a random number of dots appears and the player has to press the correct number key. Mr T waves his congratulations after nine correct answers have been given.

Documentation: Excellent
Conclusions: A graduated selection of number exercises and games which should prove fun as children learn to count — limited to numbers 1 to 9.



Wordspell

Machine: 48k Spectrum
Publisher: Griffin Software
Available from: Retail outlets
Price: £6.95 plus VAT
Age range: 5 years upwards

The packaging and explanatory booklet which accompany Wordspell inspire confidence. As the name implies, Wordspell is a program to teach spelling and the booklet explains that it contains 116 different word lists to test different aspects of the English language, and that you can use your own word lists.

Unfortunately, no imagination has gone into the design of the program so it's drill and practice of the most tedious kind. The word to be tested is displayed clearly (for about 30 seconds, but you need not wait this long) and you must then type your version. If your answer is correct you are congratulated ('well done') and the word is displayed again; if your answer is wrong the incorrect letters are placed in a litter bin and the correct ones inserted and you are given another try — this process can be repeated indefinitely. Each test contains seven words from the selected word list and at the end you are informed of your score and time taken, then invited to do another test.

Documentation: Good
Conclusion: Not recommended.

END

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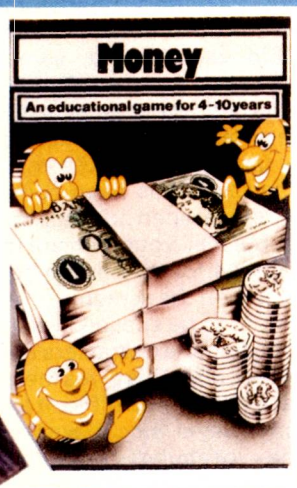

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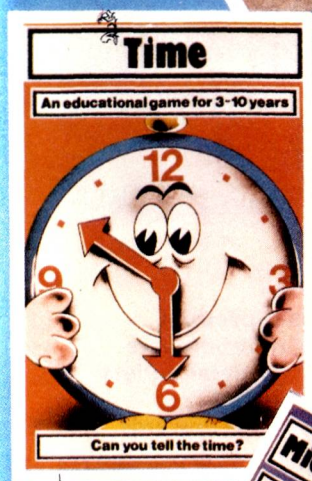



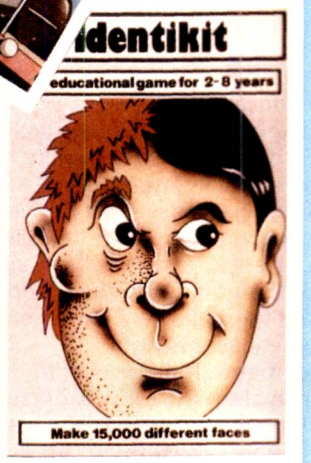

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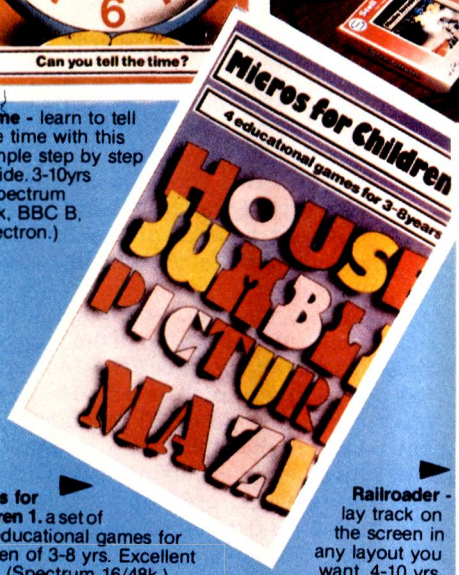



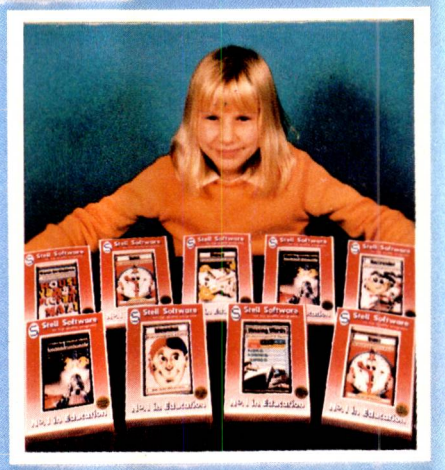

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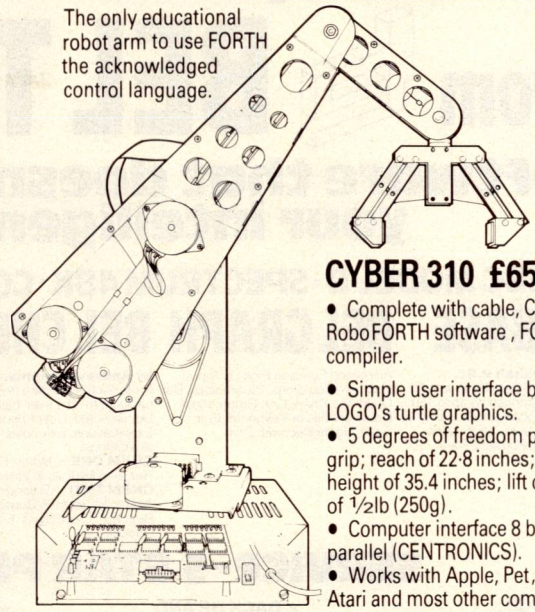

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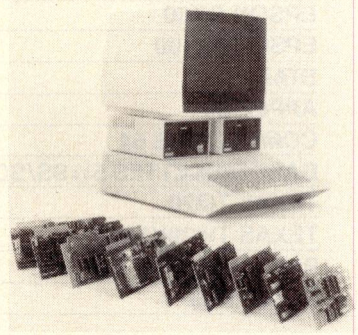

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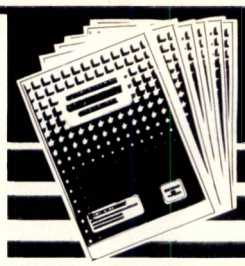

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From Stateside Sol Libes reports on software broadcasting, Microsoft's MSX-DOS and Commodore's new home micro.

Random news bits

Zilog Inc, creator of the popular Z80 microprocessor chip, has disclosed that, after nine years of consistent losses, it had a quarter with an operating profit. Hooray! Zilog is a wholly owned subsidiary of Exxon Corp . . . Microsoft has announced that it has licensed its MS-DOS operating system to nearly 100 companies. Digital Research, however, is still the leader with about 300 companies licensed . . . STM Electronics, Menol Park, CA has announced the STM-PC; a 17lb IBM-compatible with a 16 line × 84 character display (540×200 pixels), 40-column printer, built-in modem (300/1200 baud auto dial/answer), speaker phone and dual disk drives (1.6Mbytes of storage) for $3000. And, as if that were not enough, it also features a Centronics printer port, two serial ports, video output, SASI hard disk I/O, bus expansion connector and software for word processing, spreadsheet, database management, modem communications, utilities and MS-DOS 2.0. All I can say is—wow!

★ ★ ★ ★ ★ ★ ★ ★ ★

Apple news

Apple will soon introduce a high resolution graphics printer made by C Itoh Electronics Inc, Japan. Also due is a cluster controller that will allow up to seven Lisa, Apple III or IIe computers to communicate with an IBM host mainframe as 3270 terminals.

In late January Apple Computer introduced its much vaunted 'Macintosh' computer (see the Benchtest in this issue), a much lower cost version of the Lisa. First year sales of the Lisa have been disappointing and are estimated to have been only 15,000 units. Thus, the success of the 'Mac' becomes even more critical than previously introduced products. As one industry pundit put it 'as Mac goes, so goes Apple.'

John Sculley, Apple president, has indicated that the industry shakeout is fully under way and that '84 will be a critical year. Also, the Lisa has demonstrated that leading-edge technology does not sell computers. Even Apple's cutting of the Lisa price from $9995 to $8190 has not stimulated sales. Some of the Lisa's problems were that despite its introduction in January '83 shipments to dealers did not get under way until June and even then there was a distinct lack of software support.

Apple appears to have learned from the Lisa experience. Thus, dealer shipments of the Mac are expected very soon after its introduction. (Prototype units have been in the hands of software developers for many months so that ample software support is expected soon after introduction.) It is estimated that Apple expects to sell over 200,000 units a year.

Apple has also quietly reduced the price of the Apple IIe by $150 down to £1145. Dealer cost is $895. A dealer here was advertising the Apple IIe in the local paper for $885. I can't figure out how he stays in business!

Apple Computer continues to enforce its Apple II copyrights. Together with the US Customs service it recently implemented an undercover investigation that led to the seizure of about 400 alleged Apple II copies being sold in California. Apple hired private investigators who posed as large-volume buyers in a 'sting' operation. Previously, the Customs service had seized Apples entering the US. This is the first time machines have been seized in the domestic market. The seized machines, selling for about one third of the list price of the IIe, were copies of the Apple II, which is no longer made by Apple.

Apple says these machines were imported into the US with dummy ROM chips that did not violate Apple's copyright. The importers then replaced the ROM chips with ROMs which were duplicates of Apple's copyrighted ROMs.

Apple Computer currently has about 50 copyright infringement cases pending in 16 countries.

In another action a federal district court has upheld a prohibition by Apple of mail-order sales of Apple computers. The case was brought, in 1981, by six former Apple dealers who charged that it was illegal restraint of trade under the Sherman Act.

★ ★ ★ ★ ★ ★ ★ ★ ★

Rumours and gossip

Olivetti Corp is rumoured to be readying an IBM-PC compatible made by Corona Data Systems . . . Japan's Kyocera Corp is rumoured to be developing an IBM-PC compatible battery operated 'lap' unit for Tandy . . . Apple is said to be working on a wireless mouse using an infra-red link . . . Apple is also rumoured to be working on a new version of the IIe based, the new, 16-bit version of the 6502 discussed in this column last month. It will be able to address 16Mbytes of RAM and have a new high resolution graphics display . . . Sony Corp is expected shortly to announce a 5Mbyte version of its 3.5in microfloppy drive. The current version stores 1Mbyte . . . Commodore will announce a new $500 home computer with built-in word processor, spreadsheet and graphics software. The unit is expected to have a built-in voice synthesiser and a Lisa-like user interface. The system is intended to compete with the Coleco Adam and IBM PC Junior. The machine is not expected to be compatible with the C-64 or VIC 20. Also rumoured coming soon from Commodore is a new improved version of the VIC 20 to be called the VIC 20-II . . . Digital Research is expected to release, near the end of the year, a new version of Concurrent CP/M-86 with full-colour windows.

★ ★ ★ ★ ★ ★ ★ ★ ★

IBM news

Demand for the IBM PC and XT systems continues to be very high with about 60% of the PCs and 80% of the XTs being purchased by major corporations. It is estimated that about one million IBM and IBM-clone personal computers were made by the end of 1983.

The PC Junior is already in dealer's hands (Benchtested in this issue). Well, at least one per dealer for demo use. Initial shipments for sale were expected in late January with the supply being tight through June. The success of the PC Junior is still unclear as the machine is considered very expensive for a home machine . . . a single drive system with display and modem is close to $2000, substantially more than other home systems. IBM appears to be pinning its hopes for the machine on IBM PC/XT owners who want a lower-cost machine at home to back up the one in the office.

It should be noted that IBM has also introduced versions of the PC/XT which emulate an IBM 3270 intelligent terminal and a single-user IBM-370 mainframe. Demo units of the 3270/PC are already in IBM offices with delivery to customers expected soon. The unit has a colour display and windows. Thus, up to four tasks can be run concurrently on the host with a PC-DOS task run on the

3270 while each is viewed in separate windows on the display.

The 370/XT is a standard XT with the addition of three PC cards (with 68000 processors) that allow running the IBM VMS operating system and most IBM-370 software. A standard XT may be upgraded to the 370/XT by purchasing the additional boards. Demo units are not yet in the hands of IBM offices and thus delivery to customers is not expected until around mid-1984. Both the 3270/PC and 370/XT are in the same price range as the Apple Lisa and are thus considered to be direct competition.

It should be noted that IBM, through its scientific instruments division, is currently selling a 68000-based machine with the Microsoft Xenix operating system. Xenix is a version of the popular Unix operating system.

IBM appears to be meeting its competition on all fronts.

★★★★★★★★★

Osborne's venture

Adam Osborne has launched a new venture called Software Seed Capital Corp ('SSCC') which will fund start-up software companies and market their products. Adam promises that SSCC, of which he is chairman and chief executive, will invest $10 to $15 million in these start-ups and hopes to have 50 to 60 programs on the market in about 12 months. SSCC will do the manufacturing, marketing and distribution leaving the developers free to concentrate on software development.

Osborne is still chairman of the board of Osborne Computer which is still operating under Chapter 11 of the bankruptcy law (see below) and claims that his day-to-day involvement in OC ended last February and 'after that I really wasn't certain of what was going on.' Furthermore, he has stated that 'with the damage done from March to September there's really nothing left of the company I created.' And that 'there's not much point in me going in to pick up the pieces.' He described the OC situation as 'a tragedy' that was 'totally unnecessary' and that OC 'went down the tubes when I brought someone else in to run it.' Here he was referring to Robert Jaunich, former president of Consolidated Foods, whom he hired to be president of OC.

★★★★★★★★★

Microsoft's MSX-DOS

The Microsoft MSX operating system for home computers has received a less than enthusiastic response by US home computer makers and Japanese companies planning to ship units to the US. This is due to the fact that MSX relies on ROM cartridge software rather than disk-based software. And Digital Research has introduced the 'Personal CP/M' operating system for low-cost home computers.

But never fear Microsoft is not one to give up a market to DR and has just announced a disk-based home computer DOS to be called MSX-DOS. Like MSX it will run on a Z80-based, 8-bit computer. Microsoft promises that it will run standard CP/M-80 software. Thus the users will be able to run Microsoft's Multiplan, Cobol-80, Fortran-80 and MBasic. The DOS is claimed to take up only 8k of memory.

★★★★★★★★★

CP/M-86 version 3.1

Digital Research has announced that it expects to start shipping an enhanced version of CP/M-86. The new version, designated version 3.1, will add window-like structures to terminal screens. Furthermore, it will have the capability of running MS-DOS and IBM-PC-DOS based software. The question now is: will Microsoft add the capability to run CP/M-86 software to MS-DOS and PC-DOS? The Microsoft MSX-DOS operating system for low-cost, Z80-based home computers can run CP/M-80 software.

★★★★★★★★★

Software broadcast

Atari and Activision have formed a joint venture to broadcast video game and home computer software via radio. The user would plug an adaptor/receiver into his/her video game console or computer to receive the software with pay-as-you-play charges. Atari is planning a test involving its 2600 video game units.

Control Video Corp, Vienna, VA, is currently transmitting video game and home computer software via telephone and modems. Coleco and AT&T have also announced a telephone-based distribution project. And Romox Inc is currently offering a system to transmit software via phone to retailers for installation into cartridges.

Furthermore, Playcable, a TV cable distribution company, has been furnishing games software for Mattel Intellivision games for three years. However, Mattel is expected to halt its participation shortly.

★★★★★★★★★

Osborne to reorganise

Osborne Computer Corp has filed a bankruptcy reorganisation plan which is expected to put the company back in business. The company still owes more than $41 million. The company will get a new president with current president, Robert Jaunich, and chairman of the board, Adam Osborne, being relegated to directors. Creditors will be paid in stock and additional financing is being provided by three banks. The company will contract out production and R&D. It intends to concentrate on bringing out the products now in development and enhancements for the after-sale market and specific market niches.

★★★★★★★★★

Software report

According to a report released by Future Computing ('FC'), a Richardson TX marketing research organisation, Microsoft was the largest independent personal computer software publisher last year, with revenues of about $70 million. FC estimates that IBM and Radio Shack each sold about $110 million worth of software and that Apple sold close to $70 million. Second on the list of independents was Visicorp which sold about $55 million worth of VisiCalc. Here is how FC projects the ten leading software publishers for the last year:

IBM	$110m
Radio Shack	$110m
Apple Computer	$68m
Microsoft	$68m
Visicorp	$54m
MicroPro	$52m
Digital Research	$46m
Lotus Development	$40m
Ashton-Tate	$35m
Peachtree	$22m

The following are the most popular programs, listed by category, with the FC estimated monthly shipments. The list excludes software bundled with computers.

Spreadsheets	
Lotus 1-2-3	24,000
VisiCalc	21,000
Multiplan	17,000
SuperCalc	7,000
Word Processors	
WordStar	17,000
Apple Writer	15,000
Easy Writer	6,000
Database Managers	
PFS: File	10,000
dBase II	8,000
PFS: Report	7,000
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Home Accountant	13,000
BPI General Accounting	7,000
Peachtree General Ledger	4,000

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Homelink

Nothing much on television tonight? Don't switch off— How about watching your bank accounts! Jerry Sanders became a member of Britain's first home banking system and got a preview of how George Orwell's vision of 1984 has just come one step nearer.

A major obstacle must be overcome before Orwell's Big Brother gets a grip on our society. The state will have to equip each street corner and living room with a duplex audio and video communications system. Such a system would have to be failsafe if subversion were to be eliminated.

The system would be provided and maintained by the state — not everybody's idea of a free gift. As well as enabling Big Brother to monitor you, it would provide a permanent open channel to the centre of government — of dictatorship in Orwell's novel. This may have been science fiction in the 1940s, but it could be fact tomorrow. The technology exists now. What's more, our 1984 scenario improves on Orwell's in one very important respect. We can switch Big Brother off at will.

The medium is the telephone line. Used in conjunction with a television set or the small display on a portable communications terminal, the phone line puts you in communication with a central computer. The generic term viewdata or videotext system is given to this kind of set up. The central computer can belong to government, to a large company or a special interest group.

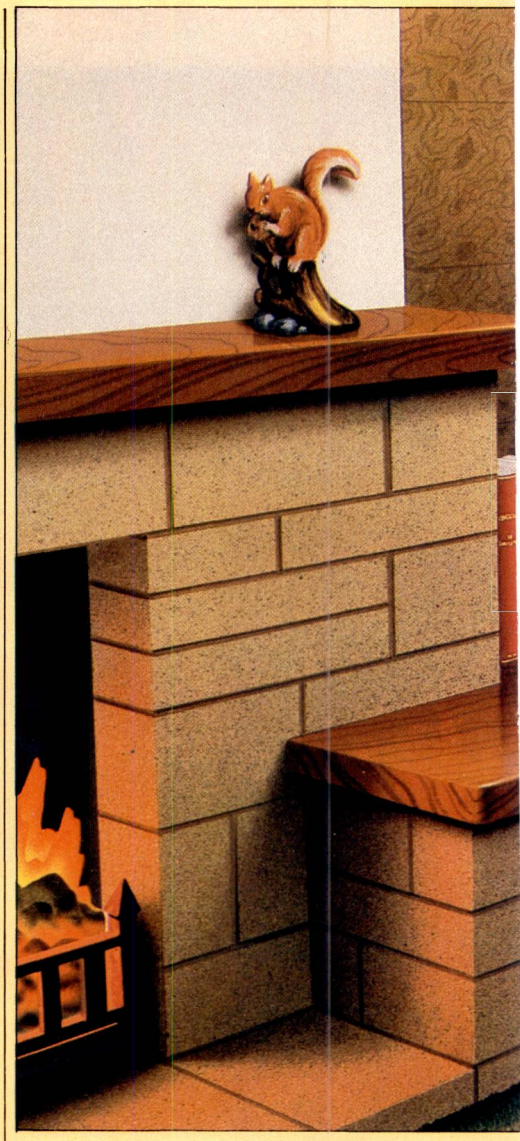
In terms of forecasts made in the late 1970s, the market penetration of public videotext systems has fallen below expectations. Nevertheless, a scenario of March 1983 still indicates four million, two-way videotext sets installed in the EEC in 1990. Public videotext represents a potential mass consumer market that may rise suddenly and expand much more quickly than current predictions envisage.

Over 100 private viewdata systems already exist in the UK. On the public front Prestel is British Telecom's viewdata system, offering two-way communication and message holding features to any telephone subscriber in the UK. You'll also have heard of two other information services: Ceefax and Oracle. These are provided by BBC and ITV respectively and are information services only — you can't talk back. They don't use the telephone because the information is transmitted straight to your television aerial along with *Coronation Street* and *Dallas*. You do, however, need a television set adapted to decode these signals and display them.

For commercial firms the advantages of either public or private systems are manifold. Sales teams can communicate directly with head office computers to check stocks and register orders. Drug firms needing swift response from doctors carrying out clinical trials can have the data they need sent straight into their computers in a specified format. Eventually stores such as Marks and Spencer or Debenhams will use them to transfer funds directly out of your Visa or Access account into their own — when you make a purchase, that is.



TD1400 Homedeck with infra-red remote-control keyboard



For the general public, the days of old newspapers, libraries and reference books may be drawing to a close. It's conceivable that telephone directories will disappear from our houses in the near future: Prestel already holds directories of its own subscribers which you can access from your living room. It has been predicted that by the year 2000 polling stations will be a thing of the past as electors read manifestos and cast their votes over the telephone, while sitting at home in front of the television. This may have a serious effect on the future governance of Britain, since the Conservative Party will lose the advantage it has up to now enjoyed on rainy election days (more Conservative voters have cars).

In April 1983 the Nottingham Build-



ing Society ('NBS') became the first financial organisation in the UK to offer customers a home banking service, and the Bank of Scotland ('BoS') became the first clearing bank to do the same. Together NBS and BoS have left the others standing. This technological *coup* was achieved in an atmosphere of top secrecy thanks to the foresight of the NBS and cooperation from Prestel.

The launch of NBS's Homelink scheme in 1983 followed years of planning. During the mid seventies High Street expansion programs by the major building societies led to the investment of millions of pounds in new branches. Many of them subsequently introduced computer technology in the form of cashier terminals which permit passbooks to be updated at the branch. The latest to do so, announced only recently, was the National and Provincial which will spend £5.5 million with Olivetti on equipping its 366 branches with an on-line enquiry system.

According to Mike Fitzsimons, assistant general manager, NBS, Homelink began life as a ten year plan circa 1975. 'We were convinced that the telephone would become a far more important medium than it was ten years ago. We also had to plan for the change in image being forced on building societies as banks went into the mortgage market.'

'One or two building societies were going into cheque books, but we decided to look for a partner. The BoS was looking to expand south of the border, and although we spoke to most of the main clearing banks, discussions had to be on generalities, not specifics, because of the dangers of giving too much away. The BoS was able to come in on the ground floor with us.'

According to a BoS spokesman this may have been because the English banks feared losing customers to the NBS, something that didn't bother BoS since its customer base below the border could only benefit from the NBS tie up, and there are no NBS branches in Scotland.

Mike Fitzsimons continued: 'We were seeking a new delivery method for our services before Prestel existed. We'd put a lot of thought in already, so when it came along we were poised to take advantage of it: our plans fitted in well with those of the BoS.'

The NBS's decision to go for the Homelink scheme was prompted by the introduction of Prestel in 1979: suddenly the way ahead was clear. Yet even when Prestel got involved in 1982, the most Prestel employees knew was that negotiations were under way with an important mystery client — important because Prestel was going through a sticky patch. A key element to Prestel's future success was to find a way into the consumer market, as opposed to the business and trades users of Prestel such as travel agents. Homelink was such a way, a trigger product which Prestel was keen to encourage.

Research

One of Prestel's first tasks was to begin the search for some hardware for the NBS to supply to its customers.

Anonymous approaches were made both in the UK and the Far East, but no-one was willing and able to produce the equipment at an acceptable unit price: no-one, that is, until Prestel narrowed the search down to a UK company called Tandata which at that stage didn't have the product NBS is now using. Tandata had, however, produced the first alphanumeric Prestel adaptor: a little white box called the Alpha Tantel. The eventual NBS terminal developed from this after John Webster, managing director of the NBS, had specified his requirements

for a remote-control keypad.

'Tandata showed a refreshing and innovative approach to our requirements for full alpha keyboard and infra-red remote control,' said John. John had a clear picture in his mind of Homelink's potential users, and this influenced his specification of a small remote-control terminal. 'The product was targeted at Mr & Mrs Everyman, not at computer buffs. We are hoping to attract family bank account holders rather than computer-age teenagers. We therefore had to cater for people who, not having been brought up in the computer age, required a relatively simple terminal — their only contact with electronic gadgetry might be a TV remote-control keypad. We specified remote-control so that no trailing wires would clutter up a sitting room — the deck sits by or under the TV and the keypad on a coffee table.'

Tandata produced a specification and got the contract from NBS. The result was the TD1400 — the model I used for my coffee table test of Homelink.

Electronic money

To qualify for membership of Homelink you need a minimum £1000 investment with the NBS. This entitles you to subsidised membership. With over £4000 invested you get the whole set up free of charge (see shot 1). Not being an investor with the society I wondered whether I would be able to test the system out.

Thanks to the marvellous concept of electronic money, the NBS and the BoS were each able to create accounts for me, with a total of £4000 credit to play with. This should go down in the record books as the most unusual review item so far in *PCW*.

I was warned that to avoid washing machines and lingerie (two of the products available on Homelink's teleshopping pages) accumulating on my doorstep, none of my transactions would actually get as far as the shops. On the other hand, all monies that I moved about between my bank and building society accounts would be recorded on statements which I, like any other Homelink customer, could view at will on my TV.

Qualifying account holders are supplied with a communications terminal which plugs into a PST telephone socket (the new-style square one). A television set is the only other piece of equipment they need to use their account seven days a week, 24 hours a day. Cooperation by the BoS means that you can run your investment, mortgage and current accounts entirely from home, eliminating the frustration of having to confirm in writing any instructions you may give over the phone to your bank.

The hardware I received was a Tandata TD1400 terminal. This is a combination of modem (a device that codes a computer signal and transmits



1



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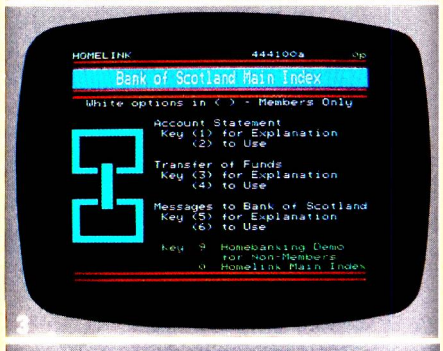

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5



6

it along a telephone line), a keyboard and a small amount of non-volatile memory, linked together by electronic chippery.

The difference between a terminal such as this and a micro computer lies in the ability of the latter to carry out any valid instructions a user places in its memory. A terminal, on the other hand, can only act as a transmitter/receiver and data-store. The TD1400 is the link between the Prestel, NBS and BoS mainframe computers (where all the information is stored) and your TV set (where it is displayed).

Chips

For the technically minded among you, the guts of the Homedeck are three chips: a Rockwell micro processor, a Texas Instruments TCX-3101J modem chip and a Mullard 9735 combined video and oscillator chip. The Rockwell contribution is a masked microprocessor called the 6500-11; 1983 technology in which an enhanced 8-bit, 6502-based processor is combined with ROM and RAM on the same chip. The mask-part is a super-set of instructions specific to the end-users task — in this case, the programs that manage the communications. These are hard-wired into the chip at the production stage. In some TD1400s this single chip is emulated by the 6501Q which does not have the onboard ROM, but still has 192 bytes of non-dynamic RAM.

As the NBS was aiming at households where a micro didn't necessarily reign supreme, it was clear that a terminal rather than an acoustic coupler was required. There's no reason why you shouldn't use your micro on the system though — the TD1400 has an RS232 port — or you could use your micro with an acoustic coupler or modem. If you simply want to get onto Prestel you may think the TD1400, at £300 per unit, is a bit expensive. Tandata's commercial director, Stephen Ramsden, pointed out that there are many modems in the same price range that don't auto dial and for which extra software is needed. He added that it was important to get the highest quality communications for the home banking application, which meant a chip modem rather than an acoustic coupler. 'When you download information on your bank statements, you want to be sure of it.'

In fact, despite the quality of the modem, British Telecom succeeded in sending the occasional burst of interfering blobs to my TV screen down the phone line during my Homelink trial. At no time, however, did this seriously impair use of the facility.

Is Homelink really free?

The minimum amount required in an NBS account in order to use Homelink is £1000. One of the items in the new *Users' Guide* tells you that if you try and

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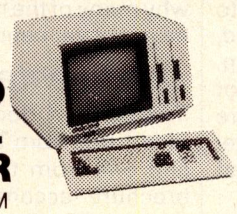

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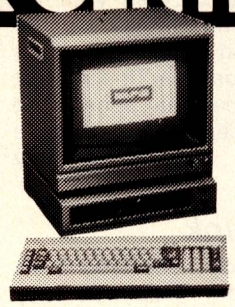

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spend money so as to make your balance fall beneath £1000 your request to spend that money will be denied. So, is using Homelink costing you a rent of £1000 per year? In a sense it is, although what really happens is that you have £1000 per year in a share account earning building society interest.

Using Homelink

The first Homedeck I received from Tandata didn't work. This was very frustrating, and only partly compensated for by assurances from Tandata that a TD1400 had never, but never, been received faulty by a customer before. A video output component was repaired and this time everything went according to the book. After switching on the deck and the television, I tuned a vacant channel on the TV until I obtained the picture transmitted by the deck's ROM: a menu for me to fill in my Prestel phone numbers. Once done, this enables the deck to dial up Prestel for you automatically at the touch of a single key on the deck. The auto dialler is a big help because the telephone number, customer ID and password together can add up to 25 numbers!

In fact, customers are advised against programming in identity numbers and personal passwords for security reasons. I disregarded this good advice because there wasn't any real money there to be stolen. Once you are through to Prestel these numbers are fed in on prompt from the computer memory which has its own lithium batteries. A 9v battery fits into the Homedeck keypad for remote use — but not if anyone or anything obstructs the remote pad's line of sight to the base unit. In my case the 'someone' was 'children'. Have you noticed that along with their other instincts kids are born with the ability to locate themselves unerringly between grown-ups and television sets?

Having done the programming according to the documentation supplied with the terminal, the hard part of using the system is over. You then choose one of the phone numbers and press the corresponding menu number and a dialling tone is heard through the little speaker in the console.

The call continues with an ordinary ringing tone, which follows immediately the connection is made by a high pitched computer tone (known as the 'carrier') like the one on a cassette tape immediately before a program. Its purpose is to set levels on the input hardware. This is immediately followed by a welcome message to 'the world's first home building society, banking and teleshopping service'.

Homelink is menu-driven as are most other Prestel pages. As a subset of Prestel, Homelink gives you access to all other Prestel pages not restricted to closed user groups. On the other hand, Homelink is itself a closed user group, and so some of its pages are not available to Prestel users who are non-members. If you are on Prestel yourself, you'll find information about Homelink available on page 444.

My television picture was crackly to start with because I have an aerial splitter to enable me to use my home computer and the television without having to plug and unplug aerials. By removing the splitter and just plugging the Homedeck UHF aerial plug into the TV I got a much better picture. The interference went, but I had to readjust the colour to get the best picture.

'This (the ringing tone) is immediately followed by a welcome mesage to "The world's first home building society, banking and teleshopping service".'

At the top of the first menu was a friendly sign which said 'New users key 4'. As I was, I did. This led me to a Help and New Users index with options 11 through 27, and a flashing message inviting new users to key 11.

This brings me to another message for new users — Key 1 (out of seven options). Here I am given the first of ten frames which will, I am told, take me 15 minutes to read.

Background information follows, written in a very user-friendly style. One of the great attractions of Homelink for me was that for the first time I felt I was being personally and considerately addressed by a large institution.

Admittedly, membership of Homelink *is*, at the moment, membership of an exclusive club (how many ordinary people can afford to let thousands of pounds sit on deposit?). This impression comes across because as a user you have a direct communications line into the very heart of the building society, where a number of senior executives are literally hanging on your every word . . . not in fact just hanging, but almost itching to talk back to you. A quote from the new user pages will illustrate the point:

'Customers have been using the service and helping us to develop new features since early 1983. Nevertheless you may find room for more improvements: you may also have ideas of your own. Do please tell us: we really want your comments and suggestions. However, please bear in mind that while many ideas and suggestions may seem common sense they can involve an enormous amount of computer development work. That will explain why many of the more obvious features have not yet been included.'

Documentation

Two sets of documentation are provided, one from Tandata with the Deck, and one from the NBS. The Tandata brochure accompanies the terminal and provides details of normal use and more advanced interface use. From the NBS I received a full customised Prestel folder containing three typewritten A4 sheets of Homelink 'background information', a guide to Homelink costs for sub-£4000 users, two plastic wallets containing Homelink operation checklists, a series of Prestel guidance sheets, and a BT Prestel directory. Oh, and a set of NBS monthly competition photographs, about which more later.

The 20 checklists cover subjects from switching on and registration of first number to teleshopping and home-banking operations. The Prestel sheets are not strictly necessary — I was able to use my equipment by reference to the NBS literature alone. Moreover, onscreen help facilities are excellent.

Security

As a new member of Homelink the first thing I did was to enter my Prestel customer ID number and password. That was enough to get me onto Prestel and into the Homelink pages, but in order to do any home banking I then had to create my own personal identification number (PIN), known only to me. Obviously the NBS and BoS are being extremely cautious: there are up to ten different security levels in the system, details of which, for obvious reasons, are not available. In the course of time I expect that some of these will be done away with.

I've now got into the PIN changing menu and I've got with me a list of transaction numbers which seem to be randomly generated numbers. Each time you use a Homelink facility, to either change your PIN or spend money or do a banking transaction, you have to use a transaction number. They come to you under separate postal cover, and are produced in the same way that Cashcard PINs are, that is, printed through a carbon envelope so that no human being is in contact with or has sight of the number.

The PIN change menu connects me to an 'external' computer: this connection takes five seconds or so and is made whenever you wish to carry out a banking transaction with NBS or BoS. I then have to enter my NBS account

'One of the great attractions of Homelink for me was that for the first time I felt I was being personally and considerately addressed by a large institution.'

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Many popular home computers (e.g. BBC models, Apple II and Commodore Vic 20 and 64) can be linked via a modified Home Deck which has an RS232 interface. This unit allows independent access to HOMELINK through a remote control keyboard and in addition the facility to link to the microcomputer to download software programs from Prestel and edit messages off line. The Sinclair Spectrum 16K and 48K can be linked via a conversion kit – the VTX5000 modem. Remarkably, kits can be FREE* to thousands of micro users.

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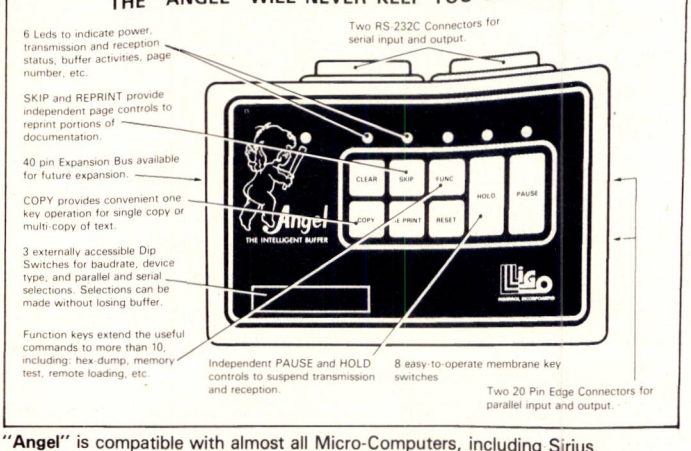

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number, my PIN number and a transaction number from the list sent to me. The hash key sends this data off to the external computer. When the transaction is successfully completed a message reminds me to delete the used transaction number from my list. This procedure is used for any NBS transaction, but the BoS does not require the use of transaction numbers for statement viewing. A list of transactions available is given in Fig 1 and shots 2 and 3.

Homelink opens up more than just home banking. The NBS provides opinion polls, auctions, both normal and Dutch (where the *first* valid bid secures the item as the price reduces day by day), a classified ad service for both goods and jobs, and teleshopping (see shots 4, 5 & 6).

Some bargains are to be had in the auctions: a beginner's equity share portfolio supplied by Prestel worth £505 went for £451. A Christmas food hamper worth £48 went for £35.51 and a Raleigh Burner bicycle costing £99 went for £56. The best bargain I saw was a blue spruce tree, valued at £100, which went for £32.

Security routines have to be executed for all auctions; this involves registering your bid twice, once each on two computers. NBS took specialist legal advice about running these auctions, and once a bid is successfully registered you will be legally committed to buy the item if your bid is successful.

Homelink also has a regular competition, currently to judge the height of a hot air balloon pictured in photos supplied in the Homelink folder. The regulations have been devised to discourage customers from making regular withdrawals from their NBS accounts, but instead use a BoS Visa card. The BoS likes this arrangement because you are using its Visa card and the NBS likes it because you aren't making lots of withdrawals or transfers out of the NBS account.

The teleshopping side is currently represented by the Literary Guild and bookclub associations, Telefusion, Comet, a London supermarket, Wines and Spirits, lingerie and jewellery.

The HL London Supermarche was not fully operational when I wrote this article, but the plan is to make it available to people living within a five mile radius of Big Ben, Monday to Friday. Over 600 products are planned: if your order is received before 5.30 pm on any weekday it can be delivered to you the following day. Delivery is free, but you should be at home to receive the order or you will be charged a £3 delivery fee.

Drawbacks

One possibility I missed on Homelink is a credit transfer form on screen to move money out of your account to another. At the moment you can request a cheque to be issued, but the ideal development is to be able to key in the destination bank and account number and have the money transfer across, then utility bills and birthday present money could all go out from your living room. The security codes are a necessary nuisance in these early days, but let's hope they will be reduced in number in the future.

The competition

The only UK clearing bank in contention at the moment is the Midland which is now running an experimental system. David Bayliss, manager of Electronic Banking Development, told me that the Midland expects to be offering a public service 'in the late 1980s'. The current pilot scheme offers only limited facilities to London customers involved, such as on screen balances and statements, cheque book ordering and information/quotation requests. Customers will need the basic equipment, that is, viewdata TV or terminal. David added that: 'We are trying to avoid being compared with NBS because we're trying to work out what the potential is, so we don't want to go too deeply into it.'

Check the Nottingham Building Society and Bank of Scotland account statements on screen.

Transfer money between the Bank and the Building Society and vice versa.

Look at an up-to-date statement of mortgage account.

Apply for a mortgage or a further loan to improve the house.

Order and pay for consumer durables that will be delivered to the home.

Make holiday and travel reservations — order travellers cheques, obtain special holiday packages and up-to-date notice of late availability.

Participate in a range of new membership services, competitions, etc.

Pay domestic household bills

Fig 1. Range of Homelink tasks

Russell Smith, promotions manager at Lloyds, said: 'We have no such service nor is there a possibility of such a facility being introduced in the near future. However, we are monitoring the situation closely.'

For Barclays, Anthony Eves, manager of the Hampton branch, said that 'an experiment in home banking is under way, restricted to Barclays' staff in their office environment. There are no plans in the immediate future to make this available to customers.'

Robert Sim, manager of the Clydesdale Bank, Lombard St, points out that his bank 'is the only UK bank currently offering the facility for customers to order a cheque book and/or statement through Prestel, and we are actively investigating the ability to transfer funds, although it may be some time before it is implemented.'

Results: good business?

According to Mike Fitzsimons, response to the NBS scheme has been excellent, although he wouldn't go into too much detail. 'The competition would love to know how we're doing,' he said. 'We have had a good response to our advertising, up to 1000 enquiries per day. It takes time to process them: our results won't show in our 1983 figures because our year ends on 31 December. This is in a sense bad news on the corporate side because the figures won't show how well we are doing, but good news because it keeps our competitors in the dark. We currently have 170,000 investors: keep an eye out for next year's figures if you want an idea of Homelink's success as a recruitment aid.'

My BoS contact wasn't prepared to say how many new customers the system was generating, but commented that customers of the Bank were moving mortgage savings accounts to NBS branches or to Nottingham head office from other building societies. 'The new technology means you no longer have to live round the corner from your branch: this is the true meaning of central banking.'

Regarding Prestel's plans, Richard Hope-Smith said that Prestel, although still encouraging 'Information Providers', wants to identify more trigger products. 'A potential customer may well now make a decision to purchase Prestel on the basis either of Micronet or Homelink, and we want to increase the number of these trigger products. The growth in residential users (as opposed to commercial users) has trebled in 1983, more than likely due to Micronet and Homelink. We have to bring other products of this kind through. The NBS has exclusivity on special promotions and we have negotiated a rate accordingly, but there is no bar to other home banking applications coming onto Prestel if other banks decide to use our system. For 1984 Prestel has two products coming onstream: one in education, in cooperation with the Council for Educational Technology, and one in teleshopping.'

The opinion polls on Homelink are significant as a precursor of the way political polls may be held in 20 years' time. But as John Webster says, NBS now has mainframe computing power available to all its customers, and Homelink will be offering other options to customers. One of these will be a game which can be played at home but uses mainframe power. The NBS will be inviting *PCW* readers to suggest ideas for such a game in a competition to be launched in next month's issue, with £2000 worth of prizes to be won. *Real money this time!* END

C♦H♦E♦C♦K♦O♦U♦T

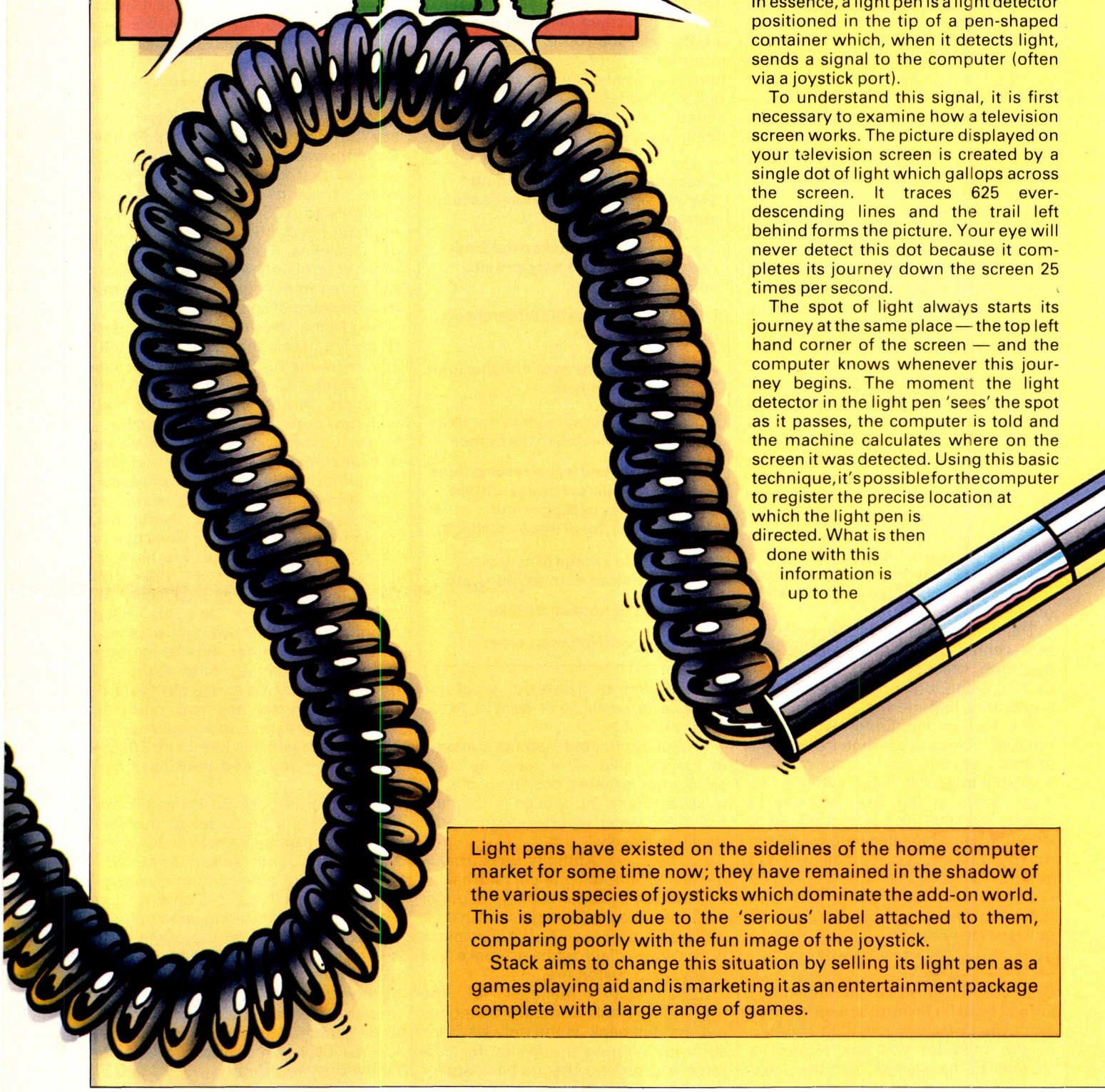
THE STACK LIGHT PEN

Tony Hetherington explains what a light pen is, how it works and looks at some specially selected games written for the Stack Light Pen.

In essence, a light pen is a light detector positioned in the tip of a pen-shaped container which, when it detects light, sends a signal to the computer (often via a joystick port).

To understand this signal, it is first necessary to examine how a television screen works. The picture displayed on your television screen is created by a single dot of light which gallops across the screen. It traces 625 ever-descending lines and the trail left behind forms the picture. Your eye will never detect this dot because it completes its journey down the screen 25 times per second.

The spot of light always starts its journey at the same place — the top left hand corner of the screen — and the computer knows whenever this journey begins. The moment the light detector in the light pen 'sees' the spot as it passes, the computer is told and the machine calculates where on the screen it was detected. Using this basic technique, it's possible for the computer to register the precise location at which the light pen is directed. What is then done with this information is up to the



Light pens have existed on the sidelines of the home computer market for some time now; they have remained in the shadow of the various species of joysticks which dominate the add-on world. This is probably due to the 'serious' label attached to them, comparing poorly with the fun image of the joystick.

Stack aims to change this situation by selling its light pen as a games playing aid and is marketing it as an entertainment package complete with a large range of games.

programmer, since the relevant x and y coordinates are stored in memory.

One possibility is that pixels are given colours at these stored coordinates to create the illusion of the light pen 'drawing' on the screen. A more usual and practical application is for the light pen to be used to 'read' from the screen. One obvious application of such reading is a strategy game where the coordinates directly correspond to squares on a board. Note that a light pen can only detect the passing of the dot and takes no notice of colour or shading, which leads me neatly to the Stack pen in particular.

The Stack pen

The Stack light pen is presented in a neat and professional manner; the light detector is housed in a black plastic 'pen', connected via a coiled lead to a small connection box which plugs into the joystick port. The review model and all accompanying software was for use with the Commodore 64, although the device is also available for the BBC B, VIC 20 and Atari computers.

The pen has two metal rings, or 'contacts', along its length. These contacts provide a control over the light pen; for example, it can be programmed not to read the screen until the contacts are touched. Without this feature, the light pen would 'see' the screen as you approached with the pen *before* you were in position.

This is one of the better features of the Stack pen and, although not unique, it's been implemented well. Some light pens require the user to press a key before the pen will register a reading, but this is odd, particularly in an application such as menu selection where it makes the pen almost redundant. However, I found the Stack contact system relatively easy to use and not at all cumbersome.

Light pens in general are not without drawbacks and the Stack pen is by no means an exception. The main problems lie in the pen's resolution and its sensitivity.

A light pen's resolution is a measure of the detail it can read from a screen, measured in terms of the smallest object it can detect. On the Commodore 64, each screen character is constructed from 64 pixels arranged in eight rows of eight. However, the light pen divides this same area into four rows of two blocks because the light sensor is wider than a single pixel. Nevertheless, this poor resolution will no doubt affect any software the light pen uses.

The other problem is common to all light pens — they are designed to read light, and anything impeding that light (dust trapped in the light pen, or a dirty screen) will degrade the performance of the pen. The Stack pen is also unable to register dark colours, such as red and green.

Given suitable attention, the Stack can be programmed to read or write on a television screen in blocks — there are eight of these blocks per screen character. This ability can be incorporated into software ranging from games to user friendly business packages.



Games

The major advantage the Stack light pen has over the other models currently available is the range of available software. Most light pens are accompanied by a manual extolling their many uses, from menus to graphic design, with the more sober uses being demonstrated on an accompanying cassette. After the tape, you're left to your own devices.

Stack, however, takes a different approach — that computers are fun things for playing games, and the same view applies to light pens (Stack's manual fails to mention the more mundane uses). The accompanying cassette is a strategy game called Concentration.

Concentration is a computer version of the classic memory card game: the object is to find pairs among 54 face down cards. If you find a pair, you score a point and the cards are removed. Should you fail, the cards are replaced face down and the game continues. More cards are revealed briefly before they're replaced and the players must remember their positions in order to make more pairs and score more points.

A light pen is ideal for this type of strategy game as the player can simply point the pen at the required space rather than the more usual system of entering coordinates (A-4, for example). Consequently, this isn't the only strategy game available for the light pen: seven of the nine games supplied for review were strategy games (or very similar).

Many of the games are adequate versions of the classic strategy, but with one or two curious omissions. The games covered are Othello, Go (the ancient oriental territorial game), Battleships and Cruisers (under the guise of Seek and Destroy) and Shuffler, a version of the puzzle in which square pieces are moved around in an attempt to achieve the correct sequence in the lowest number of turns.

Chess and Backgammon would seem obvious additions to the range but such titles don't exist. Instead, versions of computer classics Life and Simon complement the other games.

The last two games, Crossword Twister and Lost in the Labyrinth deserve further comment.

Crossword Twister is a word game designed to send the mind reeling. As in all the best games, the rules and mechanics are ridiculously simple.

The object of the game is to fill a grid with letters to make as many words as possible and thereby score as many points as possible. Unfortunately, you have no idea what letters will be available to you or in which order they will come.

In each turn you are supplied with a letter which can be placed anywhere on the grid. It's highly likely that you won't know where to place it, so you can either store it in one of the four storage boxes or dump it altogether. Both these options lose you points so should be used sparingly.

Instead of requesting the next letter, you can place one of the stored letters or one of the vowels: one of each is available but only once. All the respective boxes and stores are clearly dis-

C♦H♦E♦C♦K♦O♦U♦T

played on the screen to form an interesting display. When played, the game takes the form of a mind-bending puzzle as the player tries to juggle the letters in an attempt to create words.

If you do master the small grid of letters then the large grid awaits. For variety, either grid can be filled to form a crossword-style display.

Once the grid has been filled you are given the opportunity to change letters to form longer, higher-scoring words. Then follows the scoring routine. You are asked to enter the number of words of each length you have made, both vertically and horizontally. As the computer has no vocabulary, it's up to you to decide such moral issues as whether 'wuggerwumf' is an eligible scoring word.

This challenging word game will appeal to crossword freaks and Scrabble fans alike, and is an excellent addition to the Stack package.

Lost in the Labyrinth is as far removed from the cerebral-juggling Crossword Twister as it's possible to be, but they share a common aim — the accumulation of points as a measure of success.

Labyrinth, as I'll refer to it from now on, is a maze game probably more suited to a joystick than a light pen. The object of the game is to escape from the maze or labyrinth by the unlikely means of catching moving staircases. Unlikely, because these staircases aren't moving in the sense of escalators, but actually propel themselves around the maze by unknown but fascinating means.

The maze is populated by a variety of creatures with a common aim — to kill you. These creatures are a strange mixture, as is the fate awaiting the unwary should they meet them unarmed.

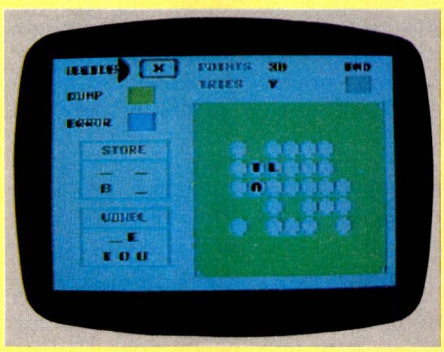
You are given three lives, which is just as well since you may be strangled by a robot, eaten by an Asian tiger, crushed by a giant ape, stabbed by a troglodyte or bitten by a werefox or a ghoul.

The graphics of the game are disappointing, particularly the creatures — they would look more at home in a bowl of alphabet soup. They do their job, however, by blocking your way to the staircases.

Also in the maze you will find numerous objects to help you in your quest, including swords, spears, daggers and bombs. A wall kit can be used to quickly build a wall, or there's a hammer to break one down. Special objects like the foxbane protect you from specific monsters such as the werefox. I have yet to find a use for the carcass that seems to be present wherever I go — I suspect it's the remains of previous players, and since I died there many times, treat any you find with a gentle touch — I might rise up and seek revenge.

Although I feel the game would be better played with joysticks, the use of the light pen is innovative and perfectly adequate. To move, point the light pen at the relevant section of the direction area of the screen. Below that is another interesting screen area, for picking up and using the objects found. Up to four objects can be held at any one time and can be used or dropped by touching the appropriate box.

With the exception of Crossword Twister and Labyrinth, the games are all of the same type. This may be a drawback, as people will no doubt become bored with playing the same type of game: they may overlook the light pen in favour of another add-on, or a few zap-pow games.



Crossword Twister



Concentration



Lost in the Labyrinth

Conclusions

Although the light pen is used well in these games, I feel that more innovative applications are required if it's ever going to contest the joystick as the number one add-on.

A screen resolution of eight boxes per sixty four screen pixels is far from brilliant, as is the inability to register red, green or any other dark colour.

The light pen is aimed directly at the games market and this could be its downfall, as the majority of the games launched are of the less popular type. It appears that the majority of computer games players prefer to use their fingers rather than their minds. END

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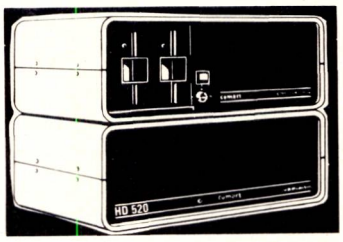

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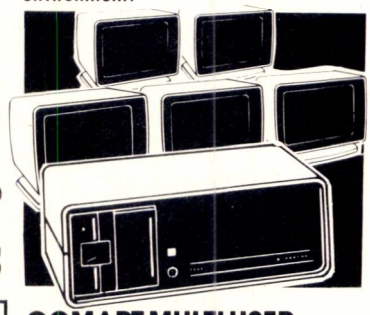

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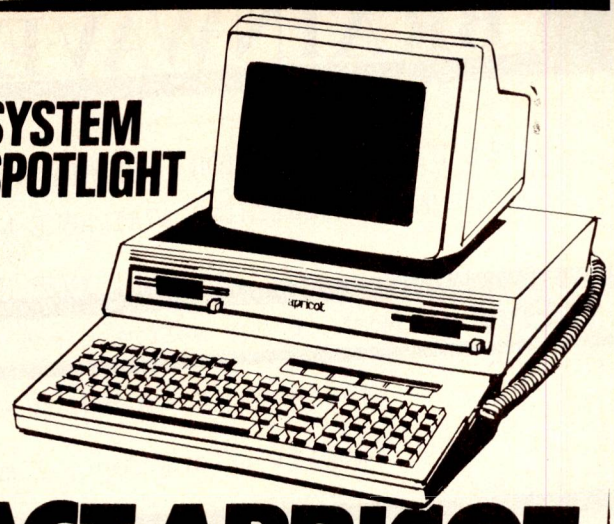

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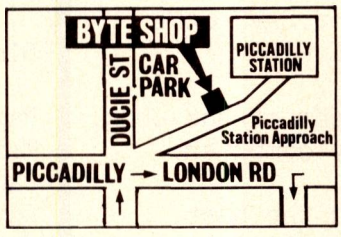

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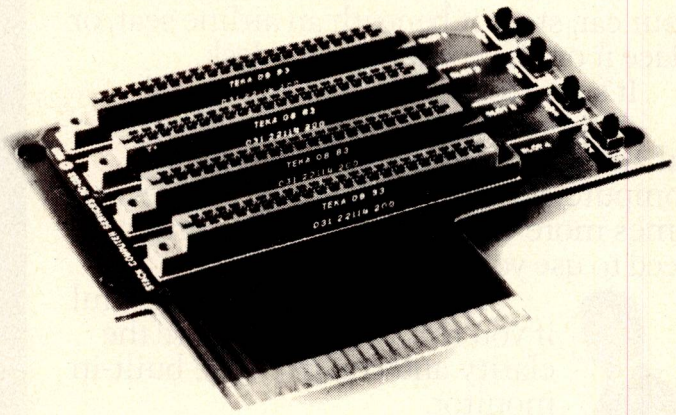

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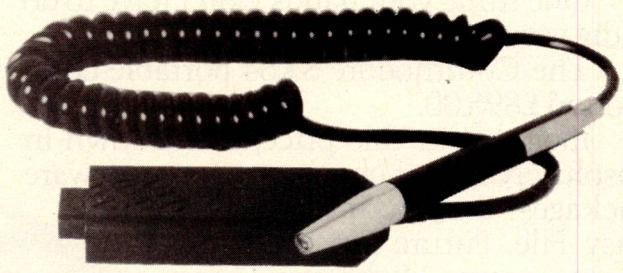

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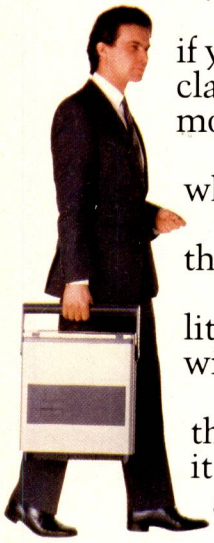

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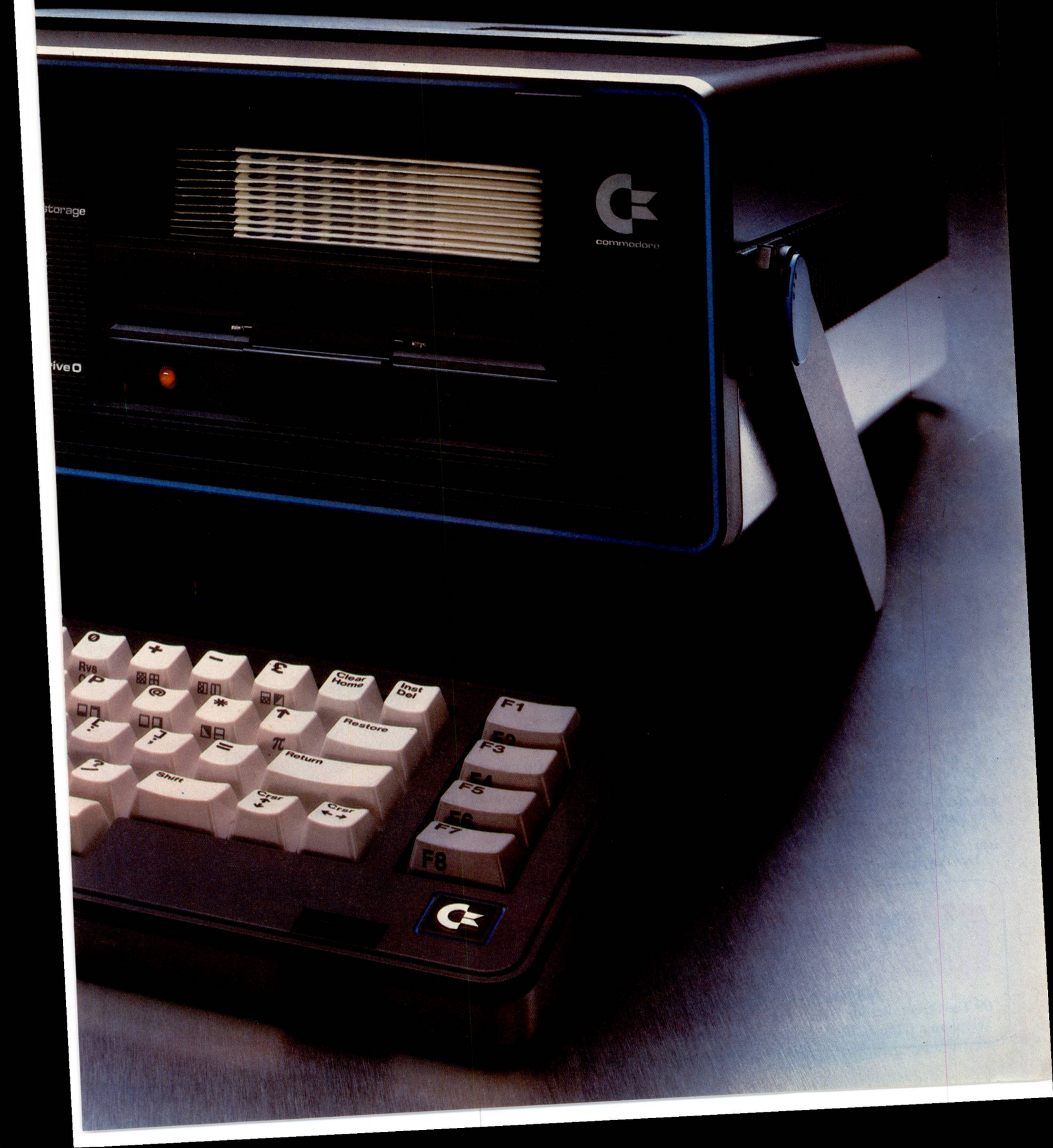

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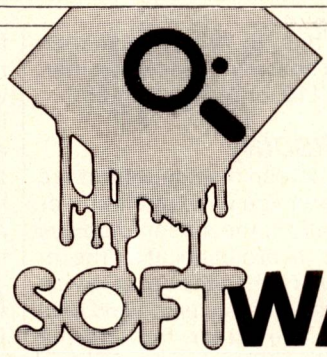

Personal Data Base

Simple and straightforward information can be handled easily with the Personal Data Base for the IBM PC from US company, Supersoft. Kathy Lang checks it out.

And now, as they say, for something completely different. Last month I looked at Everyman, a sophisticated data base management package for handling complex data structures. This month, I shall be looking at a package at the other end of the market in terms of complexity, breadth of features — and price. Although called 'Personal Data Base', this package is not a true data base management system capable of handling a group of related files, but a simple program for handling simple data of the kind that you might already have on a manual card index.

Personal Data Base comes from Supersoft, an American company well-known for its range of language compilers, and is available only on the IBM PC. It comes set up to use the PC monitor (black and white or colour as the user indicates) and keyboard. Several of the PC's special keys are used to good effect. Personal Data Base is executed through a series of menus; the main menu is shown in Fig 1. The package is very simple to use, and provides correspondingly simple features. However, you may well find that this level of feature is enough for what you want to do; if so, and if you have an IBM PC, then maybe Personal Data Base is for you.

```
 1 = ADD to, SEARCH or
     UPDATE a file
 2 = REPORTS program
 3 = Start a NEW file
 4 = Open a DIFFERENT file
 5 = MAILING labels
 6 = Display file ORGANISATION
 7 = Display or Change screen
     LAYOUT
 8 = DELETE a file
 9 = Change MONITORS
10 = End of session

Enter Selection NUMBER . . .
```

Fig 1. Main Menu

The main constraints on data handled by Personal Data Base are shown in Fig 6. The most significant is the restriction to 50 characters in a field, and to 20 fields in a record. There is no special provision for dates — the Personal Data Base manual advises you to use character format.

File creation and indexing

File creation is carried out in two stages. First, you tell Personal Data Base what the name, type and length of each field is to be. Then, you set out on the screen the format which is to be used to display each record. The layout definition is accomplished by moving the asterisk character around the screen with the cursor, pressing the function key End when the asterisk is at the place where you want the first field to begin. This process is repeated for each field in turn. This is a very easy way to set up a layout, but the editing facilities allowed are very limited — when you set up a format you must continue until the definition is complete, and then do any necessary editing; this editing is confined to further movement of the existing fields, and you can't alter the format much — you can't insert a line, for instance.

There is no need to allocate key fields, since Personal Data Base does not have a mechanism for allowing direct access by field value. All direct access — in which the package goes directly to the desired record rather than having to read each record sequentially to see if it is the desired record — is by a unique

What is a Database?

If you want to process information which has some form of structure (such as accounts, personnel records, job costing), you can use an off-the-shelf package which will probably not be quite what you want, and hard to adapt. Alternatively you could write a program specially, which will cost a lot in time and money and still contain errors. The third possibility is to buy a data management package. These packages allow you to store, process and report on structured information.

Most of the cheaper packages are based on a traditional card index, where each card or set of cards about one person, order or item of stock is stored in a single record, and a group of like records are stored in a file (corresponding to the index card box). Each item which would be recorded on the card — name, job title, part number, stock quantity — is stored in a field within the record. Usually, each record within one file must have the same number and size of fields — they are 'fixed length fixed format' records.

Some more sophisticated packages can relate several files together, so that you can process groups of unalike but related records. The costs range from £155 for a simple card-index-like system to nearly £1000 for a complex package which can be used by several people at the same time.

record number allocated by Personal Data Base. The only other form of record retrieval is through a search mechanism.

```
1 = Add NEW Record
UPDATE:
    2 = SELECT record by number
    3 = Define SEARCH
    4 = Find FIRST record
5 = Show current SEARCH option
6 = REPORTS program
7 = MAILING labels
8 = Open a DIFFERENT file
9 = CLOSE file (all done for now)

Enter Selection NUMBER . . .
```

Fig 2. Add or Update Record Menu

Data input and updating

When you need to enter and amend records, you use option 1 on the main menu, which brings up another menu (Fig 2). To add a record you give option 1, and then a blank record is displayed. Moving around this blank is very straightforward: RETURN gets you from field to field, 'backspace' deletes characters in the current field, and that's it. If you notice a mistake in a field after you've left it, you have to throw away your entries in this record and start typing again at the first field.

To update a record, you indicate which record you want by giving its number, or by setting up a search (see 'Selection', below). Once you have initiated a search, you can continue to retrieve records in the search sequence, or you can ask for the next or previous record in the numeric sequence. So if you have set up a search for all your customers whose offices are in Plymouth, after finding the first of them, which has No 109, you can then either get the next Plymouth customer, or record No 110, or record No 108.

```
SCREEN REPORTS
  1 = Set up FORMAT for SCREEN report
  2 = SCREEN report (with search)
  3 = SCREEN report (all records)
  4 = Display CURRENT SCREEN report layout
PRINTER REPORTS
  5 = Set up FORMAT for PRINTER report
  6 = PRINTER report (with search)
  7 = PRINTER report (all records)
  8 = Display CURRENT PRINTER report layout
  9 = Define SEARCH
 10 = Display CURRENT search definition
 11 = ADD to, SEARCH or UPDATE a file
 12 = Open a DIFFERENT file
 13 = Close file (all done for now)

Enter Selection NUMBER . . .
```

Fig 3. Reports Menu

Screen display

Two kinds of screen display format are provided. When you wish to amend or enter information, the screen displays one record or record blank at a time, in the format set up when the data file was created. The alternative is to view sets of records on the screen through the Screen Report function. This is accessed through the Reports menu (Fig 3). You can select which fields are to be displayed and in what order, but the format of such a report is fixed: each record occupies one line on the screen, with each field shown across the page in the order you requested. When such a format is used, you may apply selection criteria, and also ask for the list of records to be shown in a particular order — more about these features below.

```
1 = Set up FORMAT for labels
2 = Display CURRENT label format
3 = PRINT labels
4 = Define SEARCH for selecting labels
5 = Display CURRENT search definition
6 = ADD to, SEARCH or UPDATE a file
7 = REPORTS program
8 = Open a DIFFERENT file
9 = Close file (all done for now)

Enter Selection NUMBER . . .
```

Fig 4. Mailing Labels Menu

Report formats

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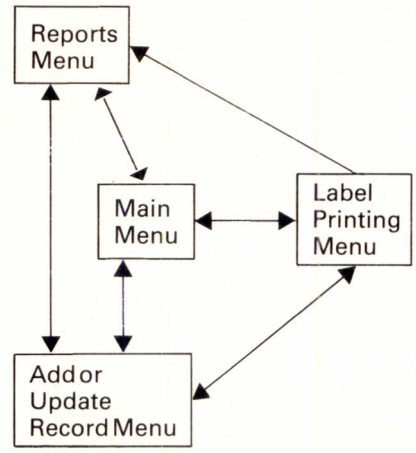

Fig 5. Road Map for Personal Data Base

Package	Personal Data Base	Data validation	Average
Maximum file size	PC-DOS limit	Screen formatting	Paint-a-screen
Max record size	1000	Unique keys	Record number only
Max no fields	20	Report formatting	Default format
Max field size	50	Store calculated data	No
Max digits	NS	Totals & Statistics	Totals
Max prime key length	NA	Store selection criteria	No
Special disk format?	No	Combining criteria	And, Or
File size fixed?	No	>1 criterion/field?	Yes
Link to ASCII files?	No	Wild code selection?	String Starting with
Data types	Numbers, characters	Browsing methods	Any field
Fixed rec structure?	Yes	Interaction methods	Menus
Fixed record length stored?	Yes	Reference Manual+	No
Amend rec structure?	No	Tutorial Guide+	****
Link data files?	No	Reference Card+	No
No data files open	NA	On-Line Help+	***
No sort fields	2	*Hot-line?	NS
No keys	1 (record number)		
Max key length (chars, fields)	NA		
Subsidiary indexes kept up-to-date?	No subsid indexes		

Notes: NA = Not Applicable; NP = Not Possible; NS = Not Stated; * = Rating, max 5 stars; Hot-line = Free.

Fig 6. Summary of constraints and functions

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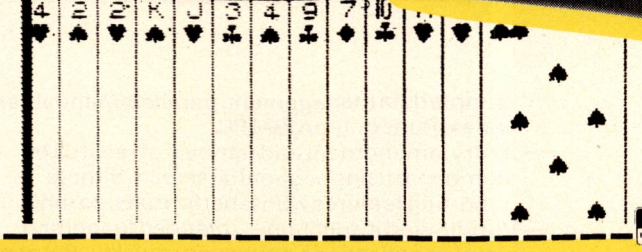

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first echoes the screen viewing option — you give the names and order of the fields to be printed, and the report is printed in a standard format: search and sort options are available. The alternative is to use a standard label format through the Labels menu shown in Fig 4. This allows you to use labels of a standard size (3½in × 15/16in), mounted two-up across the backing sheets. You may have one or two fields printed on each label line, and each label may contain up to five lines of information.

For each data file, one report format and one label format (the most recent to be set up in each case) are saved on disk for subsequent re-use. These cannot be amended — not that you would really need to, since the format is so simple. But it does seem a pity that you can't store several different named formats, as this would save a lot of typing.

Selection and sorting

For editing, screen viewing and printed reports, Personal Data Base allows you to set up a search, which allows you to test each record on up to three criteria. Where more than one test is used, you may combine them in such a way that all tests must be passed, or just one or two of them. For character fields, the test is passed if the value of the field in the file is equal to or starts with the characters specified in the test; for numeric fields, the field value may be less than, equal to or greater than the value specified in the test.

On any report, whether to the screen or printer, you may specify that the records are to be sorted into ascending or descending order. Two sort fields are allowed in any sort operation.

File deletion is provided within the package, and you can also display the format of any file. No copying or other 'housekeeping' facilities are provided.

There is no hint in the manual of any facility for reading in files from outside, nor can you tailor Personal Data Base to suit special environments.

User image

Personal Data Base is very good in some areas of its appearance to the user but not so good in others. The menu system is clear and simple, and the links between menus have been well thought out — though I would have preferred a different list of functions on the first menu, which might have avoided always having to use two levels of menu to carry out any commonly used function. A 'Road Map' showing the links between menus is shown in Fig 5.

Personal Data Base gives good indications about what is going on at most stages, including displaying the available options in a particular function on the 25th line of the screen.

The most serious drawback I found, which I think comes close to being called a bug, is that the shift lock is automatically on when Personal Data Base is in use, and cannot be turned off for more than one character. So to enter a name like Smithers, you have to press Shift once for each lower case letter — you can't even keep your finger on the shift key, but have to keep pressing and releasing it. That is very tiresome in a package which will be used a good deal for material such as names and addresses, for which you would commonly use joined-up writing. However, by the time you read this, this 'bug' should have been fixed.

Documentation

Personal Data Base comes with one manual: a simple, tutorial guide to the package. It begins by showing you how to use the display and search features on an example file which comes with the package. Then you are led through the sequence needed to set up a specific format, before being let loose on your own data layout. These are also some further examples of possible data file formats. Throughout, there are well-presented diagrams of how the screen will look at each stage. Personal Data Base isn't really complex enough to need a reference guide. The manual contains only 50 pages including a detailed glossary, and the pages are generously laid out with plenty of screen diagrams.

Conclusions

This package is clearly aimed at owners of IBM PCs who wish to handle simple information in a straightforward way. There are some nasties, particularly the problem of entering lower-case information. By and large, though, Personal Data Base could be a very useful way for PC owners to get started with data management and handle small amounts of information for which a more complex package would be too cumbersome. END

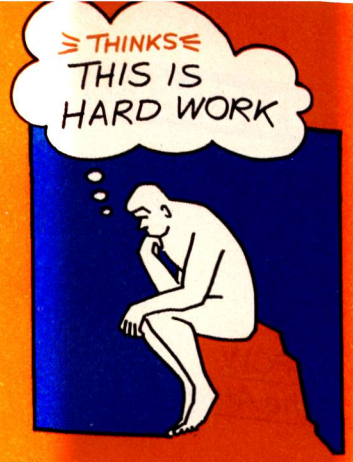
BM1	Time to add one new record	Inst
BM2	Time to select record by primary key	4secs
BM3	Time to select record by secondary key	NA
BM4	Time to access 20 records from 1000 sequentially on 3-character field (same field as in BM2 key)	3secs/18secs
BM5	Time to access record using wild code	3secs/5secs
BM6	Time to index 1000 records on 3-character field	NA
BM7	Time to sort 1000 records on 5-character field	17mins 40secs*
BM8	Time to calculate on one field per record and store result in record	NA
BM9	Time to total three fields over 1000 records	14mins 35secs*
BM10	Time to add one new field to each of 1000 records	By program
Time to import a file of 1000 records:		

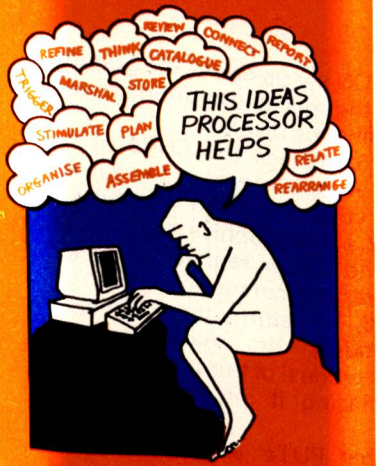
Notes: NT = Not Tested; NP = Not Possible; F = Failed during test; * = Scaled up from figure for 200 records.

Fig 7. Benchtests

Summary

Package Type	— Simple data management, parallels manual card index. Runs only on IBM PC.
Facilities	— Entry, amendment and retrieval of records by number or using sequential search. Simple reporting features with label formats, sorting.
Drawbacks	— Very limited in function — intended for getting simple applications going very quickly. Entry of lower case information very tedious at present.
Ease of Use	— Good; easily understood menus and sensible menu structure.
Error Messages	— Adequate.
Documentation	— Good tutorial guide, no reference manual (but package not really complex enough to need it).
Price (ex-VAT)	— £83.33 including hot-line support.
Manufacturer	— SuperSoft, Illinois, USA.
Supplier	— Micro-Technology Ltd, 51 The Pantiles, Tunbridge Wells, Kent TN2 5TE. Tel: 0892 42949







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Atari

This month, Surya continues his analysis of each machine on the PCW Convertor Chart with a look at graphics and sound capabilities on the Atari microcomputers.

The Atari is available in the UK in three forms: the 400, 800 and most recently, the 600XL. The three models are upward-compatible, and all have the same graphics capabilities.

The Atari supports nine different screen modes, numbered 0 to 8. Of these, the first three are text modes, the rest graphics. A summary of the modes is given in Fig 1.

The statement GRAPHICS x is used to select the desired mode. Mode 0 is the default.

Mode	Type	Resolution Full screen	Split screen	Colours	RAM required
0	Text	40x24	Not available	2	993
1	Text	20x24	20x20	5	513
2	Text	20x12	20x10	5	261
3	Graphics	40x24	40x20	4	273
4	Graphics	80x48	80x40	2	537
5	Graphics	80x48	80x40	4	1017
6	Graphics	160x96	160x80	2	2025
7	Graphics	160x96	160x90	4	3945
8	Graphics	320x192	320x160	1	7900

Fig 1. Atari screen modes

In Fig 1, I refer to full screen and split screen. Normally, in a graphics mode, the bottom lines of the screen are reserved for text. By adding 16 to the mode, this text window can be converted to graphics use. Thus, GRAPHICS 2+16, or GRAPHICS 18, selects mode 2 without a text window. In a graphics mode, PRINT prints to the text window, while PRINT#6; prints to the graphics area.

The Atari has a 'palette' of sixteen colours, these being known as hues. The hues are numbered from 0 to 15:-

0	grey	8	blue
1	gold	9	light-blue
2	orange	10	turquoise
3	red-orange	11	green-blue
4	pink	12	green
5	purple	13	yellow-green
6	purple-blue	14	orange-green
7	blue	15	light orange

Colour register

A maximum of five colours may be displayed at any one time, and this only in modes 1 and 2. Therefore, Atari gives us a 'working palette' of five colours from which to choose; these are known as the colour registers. The colour register defaults are shown in Fig 2.

To select one of these colours, the COLOUR statement is used. Thus COLOUR 0 will select orange as the current foreground colour. Colour settings apply only to graphics modes.

The default colour registers can be reset using the SETCOLOUR statement. SETCOLOUR takes the format: SETCOLOUR colour register to be reset, hue colour number and intensity. The intensity is an even number between 0 and 14: the higher the number the brighter the colour, so SETCOLOUR 1,4,5 sets colour register 1 to a moderately bright (5) pink (4) from its default of bright green (1). Very bright colours (12 and 14) appear almost pure white.

All characters on the Atari are printed in upper case by default. The statement POKE 756,226 switches to lower case; POKE 756,224 goes back to upper case.

Once the business of selecting graphics modes and colours has been sorted out, there are then seven graphics statements supported: DRAWTO, PLOT, LOCATE, POSITION, PUT, GET, X10.

Colour register	Default hue number	Physical colour
0	2	Orange
1	12	Green
2	9	Dark blue
3	4	Pink-red
4	0	Black

Fig 2. Colour register defaults

DRAWTO x,y draws a line in the current foreground colour from the last point visited to the specified coordinate. (0,0) is at the top left of the screen.

PLOT x,y plots a single point in the current foreground colour at the specified coordinate.

LOCATE x,y,var is similar to the Microsoft Basic POINT statement: it returns the colour of the specified coordinate. In the text modes, it returns a number between 0 and 255 indicating the ASCII code of the character plotted there, and places it into the specified variable.

POSITION x,y positions the graphics cursor at the specified coordinate without affecting the display.

PUT #6,z places the CHR$ of the specified ASCII code (z) at the current graphics cursor position in modes 0 through 2. In the graphics modes (3-8), it plots the colour register (z) at the current graphics cursor position.

GET #6, var returns the ASCII code (text modes) or colour register (graphics modes) of the specified coordinate, placing it into the specified variable.

Note that PUT# and GET# statements only refer to the screen where the specified stream is 6; other values refer to other devices.

X10 18,#6,0,0,"S:" is a specialised use of the X10 (general-purpose input/output statement). It is used to paint a predefined area with a predefined colour. To use the statement, the bottom right-hand corner of the area to be filled is PLOTted. Next, a DRAWTO the top right-hand corner is executed. Thirdly, the cursor is POSITIONed at the bottom left-hand corner, and address 765 is POKEd with the colour register of the desired colour. Finally, the X10 18,#6,0,0,"S:"§ is executed.

How is the text colour set in modes 0 through 2? Why this can't be something as straightforward as COLOUR x, I don't know. The method for achieving this modest task is very strange and absurdly complex, involving referral to two separate tables and not a little arithmetic. It involves setting SETCOLOUR to some unlikely-looking value, but my advice is just choose a text colour which looks pretty on the machine you're converting to.

Sound

Sound is handled with a statement called (wait for it) SOUND. SOUND has four parameters which, for want of anything more original, we'll call a,b,c and d.

Parameter a specifies the voice (channel) in the range 0-3; b is the pitch (0-255); c the distortion (0-14, 10 giving a pure note, any other channel being filtered through one of the 13 fixed envelopes); d is the volume, from 1 (barely audible) to 15 (audible).

Middle C is pitch 121, each semi-tone is either 6 or 7 steps.

END

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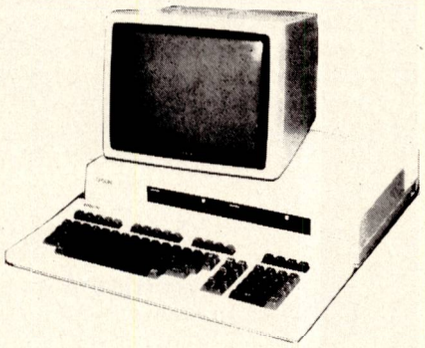

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Epson FX-80/100 Editor
(Version 1.2)

The FX-80 editor provides the ability to create character sets, or modify existing ones, and then download them to the printer. Several character sets are provided on the disk. Unlike using the printers graphic mode to print different characters, these replace the standard set and thus can be used in normal text printing.

Hardware requirements
The minimum requirements for the FX-80/100 editor are a 48k Apple] [+ or Apple //e, with a DOS 3.3 disk drive and, of course, an Epson FX-80 (or FX-100) printer with a parallel interface card in slot 1.

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NETWORK NEWS

Peter Tootill gives his summary of what's happening in the telephone networking world.

New UK bulletin boards

CBBS systems

There are a couple of new CBBS systems to report this month. CBBS is popular partly because of its low cost (around £50) and the fact that it runs on CP/M systems. Of course, there's no such thing as a standard CP/M system, especially when it comes to the RS232 ports, and CBBS has to be configured to suit your particular machine. However, I understand that this is not too difficult. More details are available from CBBS-NE.

The new CBBS systems and their numbers are:-

CBBS-SW, 24 hours a day, tel: (0626) 890 014

CBBS-Helsinki (system times unknown), tel: 010 358 0 722 272

BASUG

BASUG, the British Apple Systems Users Group, is planning to start a bulletin board, running on an Apple. This will be the first Apple BBS in the UK, which is perhaps somewhat surprising as Apples and TRS-80s dominate the bulletin board scene in North America. The BASUG board should be running by the time you read this. The telephone number is (0742) 667 983. The system times are initially to be 6pm until midnight.

Foreign bulletin boards

Here are a few numbers of systems a bit further afield for those of you with adventurous natures, and/or bottomless telephone money boxes! These are in Australia and South Africa, and are presented courtesy of CBBS-NE.:-

Australia

MICOM CBBS Melbourne, tel: 010 61 3 762 5088

RCPM Telecom/Microlab, tel: 010 61 2 663 0138

Mi Computer club, Sydney, tel: 010 61 2 662 1686

Software Tools, Sydney, tel: 010 61 2 997 1836

Sorcerer Users, Melbourne, tel: 010 61 3 836 4616

South Africa

Connection 80 Cape Town, tel: 010 27 21 457 750

Ape Computer Club, Cape Town, tel: 010 27 21 215 363

Connection 80 Johannesburg, tel: 010 27 11 834 5135

Durban, tel: 010 27 31 66 356

Johannesburg, tel: 010 27 11 642 3722

Commercial networks

A further commercial network has been brought to my attention. ADP Network Services operate an international packet switching network which includes such things as electronic mail, bulletin board facilities and a database system containing information on companies, economic indicators and the like. Other features include videotex services and facilities for information providers (similar to those provided by Prestel). Mainframe processing power is also available with a wide range of languages and there is a text management system.

Local call access is available for standard (V21) and Prestel type modes in 12 UK cities. Costs for the Mailbox service are around £3 per month per mailbox, plus £8 per hour of online access time. For more details contact:-

ADP Network Services Ltd
204 Gt Portland Street
London W1N 5HA
Tel: (01) 388 1912

RS232 interface for Oric-1

Modular Concept Peripherals has launched an RS232 interface for the Oric-1. It will handle a variety of baud rates and some software is included. The interface connects to the Oric expansion port, and the connector is carried through to enable other devices to be connected at the same time. The price is £31.50. For more details contact:-

Modular Concept Peripherals
13 High Street
Clydach
Swansea SA6 5LF
Tel: (0792) 844 465

Network jargon

This month we have some information about the more common modem standards used for data communications on 'dial up' lines as opposed to special high quality leased lines for high speed data transfer. The most common modem standard is the 300 baud CCITT V21 standard used among others by bulletin boards and mainframe computers that operate as timesharing systems (used by telephone from terminals, not so common now that micros are so cheap and powerful).

The next most common is the Prestel standard, which is really a subset of the V23 standard. These are both 'asynchronous' which means that there is no timing signal sent by the modem. The timing information is derived from start and stop bits at the beginning and end of each character, and the time between each character is not important.

Another, less common, standard is the CCITT V22, which is a 1200 baud full duplex standard. This was developed using synchronous techniques (the modem actually sends data in strictly timed blocks with timing information being transmitted as well), although it still communicates with the terminal in the same asynchronous way as the other two types.

There are many other standards in use but these tend to be in commercial applications with mainframes, leased lines and the like, and are unlikely to be encountered except in larger companies with DP departments. The American Bell equivalents are also given in the following tables, together with some indication of the compatibility.

CCITT Modem Recommendations

Speed Bits/sec	Format: Asynchronous or synchronous	Full/Half Duplex	CCITT Reference	BT Datel Service	US Bell Ref.	Compatible? with CCITT
0-300	A	Full	V21	200	103	No
1200 2400	A&S	H/F	V22 V22bis	1200 —	212A	Yes at 1200b/s
1200 1200/75	A A	Half Full*	V23 V23	600 600	202	Sometimes

**** The Prestel 1200/75 type of service is sometimes referred to as 'asymmetric duplex'.***

NETWORK NEWS

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 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.

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.

UK networks:

CBBS North East . . . Tel: (0207) 543555. Hours: 2.30pm-9am daily. Hours: midnight-8.30am Bell (US) standards.

Mailbox-80, Stourport . . . 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.

Forum-80 Milton . . . (TRS-80 Users Group 80-Nett) Tel: (0908) 613004. Electronic mail, library, newsletter, TRS-80 information system. Hours: any reasonable time.

Mailbox-80 Liverpool . . . 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.

Note: Estelle. Tel: (0279) 443511 V21 (Datel 200); (0279) 441188 (Datel 600); (0279) 441222 (Datel 1200). For customers of STC Electronic Services. Office hours only.

Southern BBS. Tel: (0243) 511077. Messages, down-loading. Hours: 8pm-2am daily (ring-back system).

*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 010.463 1690754	75/1200 baud 300 baud

*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.

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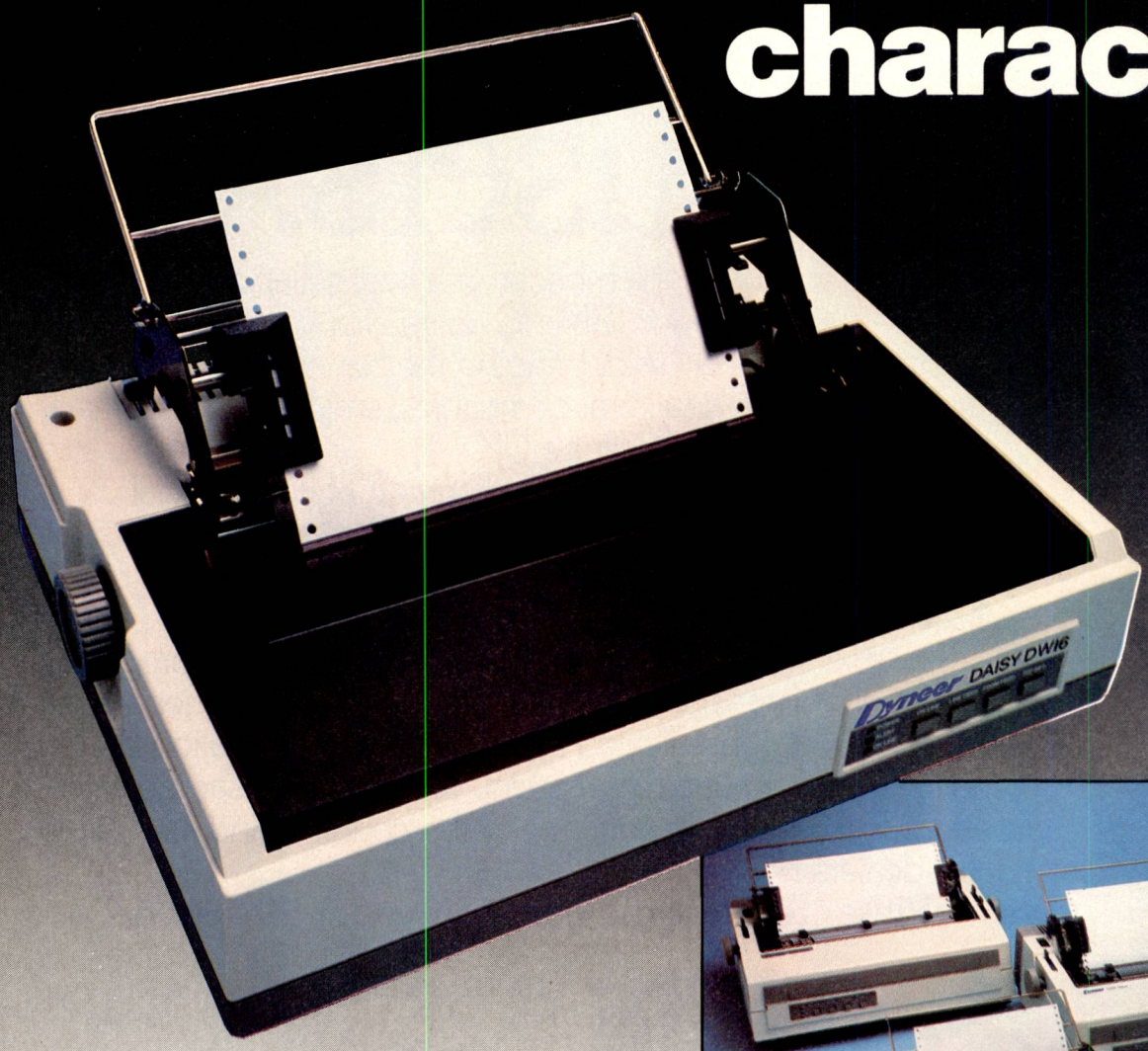

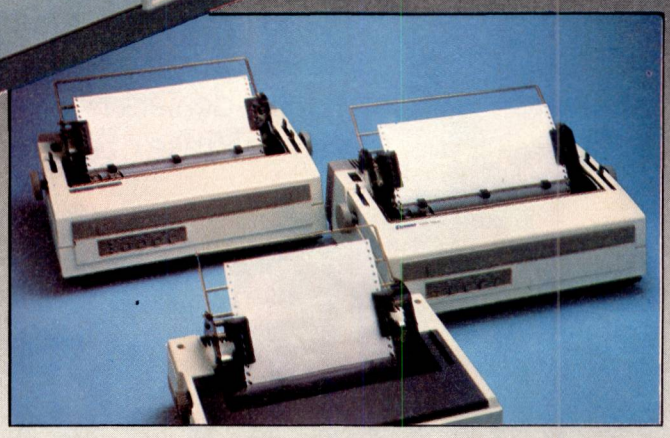

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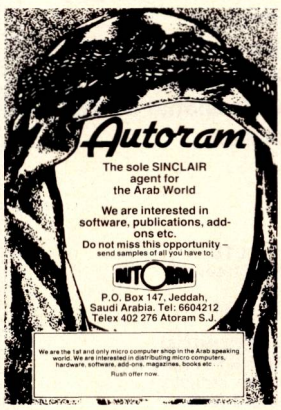

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While every effort has been made to ensure the accuracy of the information provided, Xitan are unable to accept any responsibility for errors.

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Business Systems, Financial Planning, Accounting					
Accounting Plus	Mediatech	■	•		
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Datebook	Digital Marketing	■			
Easy Planner	IUS			★	
Milestone	Digital Marketing	■	•		
Multiplan	Microsoft	■			▲
Pertmaster	Abtex	■			
PlanStar	MicroPro	■		★	
Satellite	Mediatech	■	•		
SuperCalc	Sorcim	■	•	★	
SuperCalc 2	Sorcim	■	•	★	
SuperCalc 3	Sorcim			★	
Communications					
BSTAM	Byrom Software	■	•	★	▲
BSTMS	Byrom Software	■			
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Cardbox	Caxton	■		★	
DataStar	MicroPro	■	•	★	
dBase II	Ashton - Tate	■	•	★	▲
EasyFiler	IUS			★	
EasyMailer II	IUS			★	
Friday!	Ashton - Tate	■		★	▲
InfoStar	MicroPro	■	•	★	
Personal Pearl	Pearl Software	■	•	★	
ReportStar	MicroPro	■		★	
Graphics					
dGRAPH (for dBASE II)	Fox & Geller	■		★	
DR GRAPH	Digital Research		•		
Fastgraphs	Innovative Software			★	
GSX	Digital Research	■	•		
Languages					
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BASIC Interpreter	Microsoft	■			▲
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C Compiler	Digital Research		•	★	
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COBOL	Microsoft	■			▲
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Eco - C	Ecosoft	■			
FORTRAN	Microsoft	■			▲
Level II COBOL	MicroFocus	■	•	★	▲
MS-Pascal	Microsoft				▲
muLISP/muSTAR	Microsoft	■			
mu/MATH/muSIMP	Microsoft	■			
Pascal/MT+	Digital Research	■	•	★	
Personal BASIC	Digital Research		•		
PL/I	Digital Research	■	•	★	
Pro-FORTRAN	Prospero	■			
Pro-Pascal	Prospero	■	•	★	▲
XBASIC	Xitan	■	•		
Operating Systems					
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Concurrent CP/M - 86 (IBM PC)	Digital Research		•		
CP/M	Digital Research	■	•		
CP/M-86 (IBM PC)	Digital Research		•		
CP/M Plus	Digital Research	■	•		
CP/NET	Digital Research	■			
MP/M	Digital Research	■	•		

		CP/M-80	CP/M-86	PC DOS	MS DOS
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Access Manager	Digital Research	■	•	★	
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Autocode (for dBASE II)	Stemmos	■	•	★	
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Edit	Microsoft	■			
Forms 2	MicroFocus	■	•		
Macro (M80)	Microsoft	■			
Micro/SPF	Digital Research			★	
M2CBASIC	Digital Research	■	•	★	
Programmer's Utilities	Digital Research	■	•	★	
Quickcode	Fox & Geller	■		★	▲
SID	Digital Research	■	•	★	
SPP	Digital Research	■	•		
WordMaster	MicroPro	■	•		
XASM	Avocet	■	•	★	
XLT-86	Digital Research	■			
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Hands-On COBOL	MicroCal	■	•		
Hands-On Level II COBOL	MicroCal	■	•		
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Filestar	MicroSec	■			
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Microlib	AMT	■			
MUCOPY	Wheatcroft Hards	■	•		
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StarBurst	MicroPro	■	•	★	▲
SuperSort	MicroPro	■	•		
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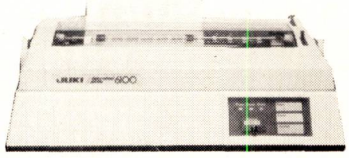

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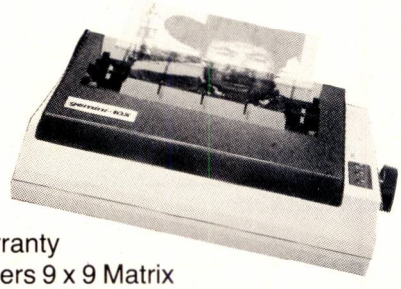

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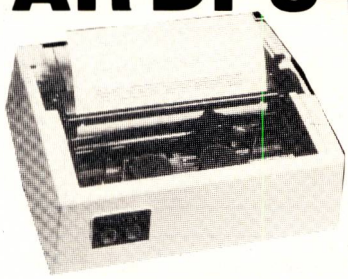

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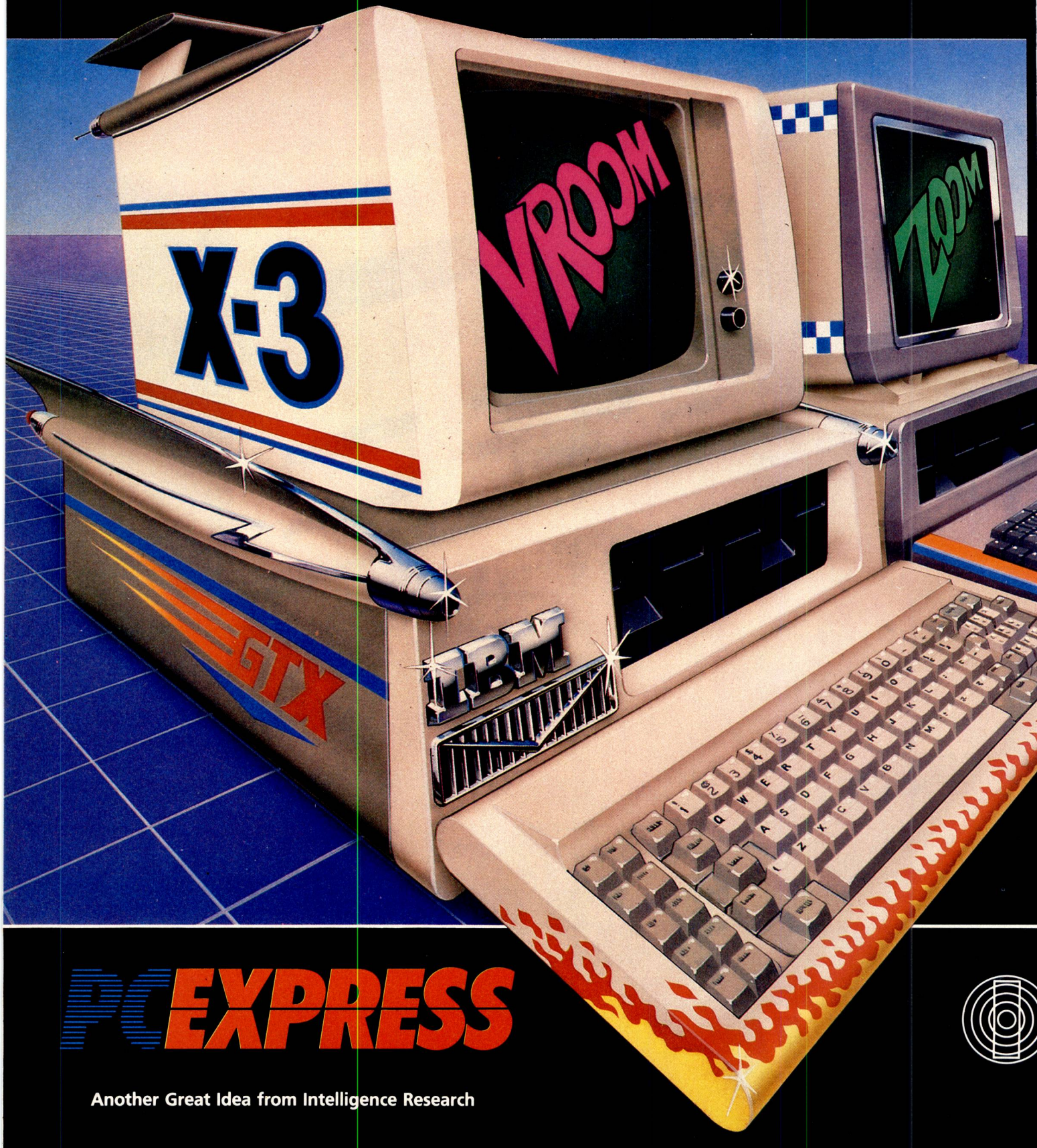

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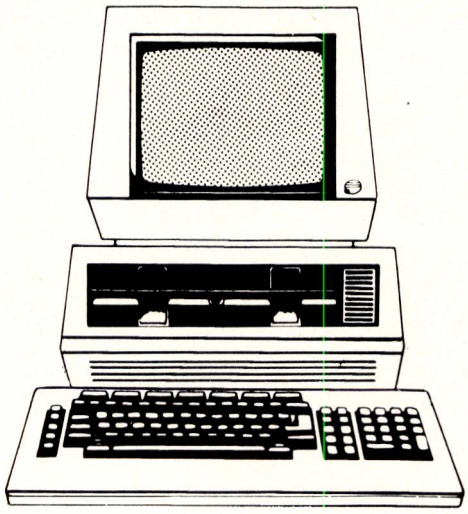

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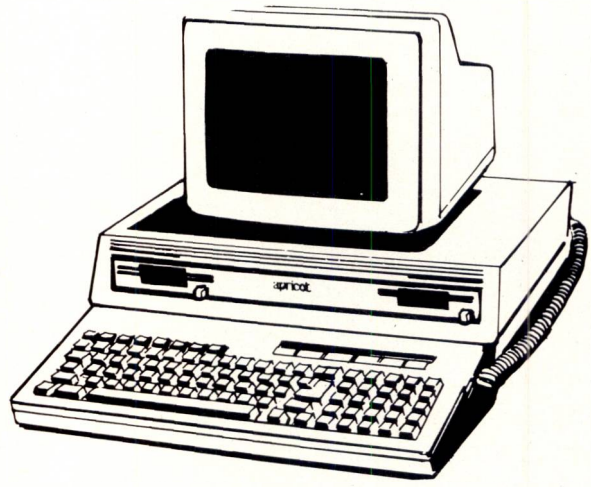

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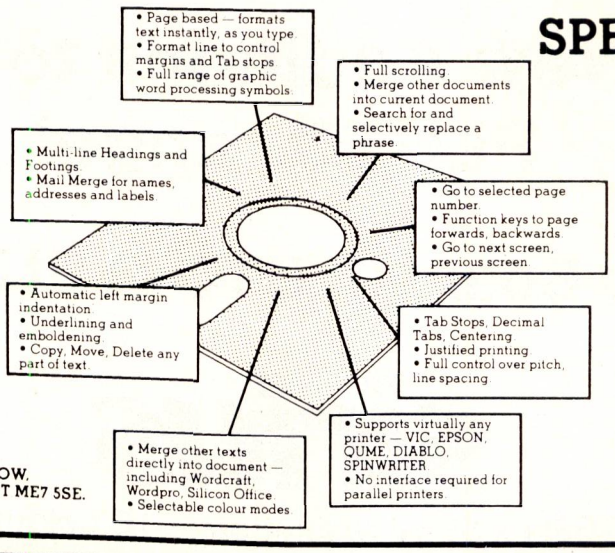

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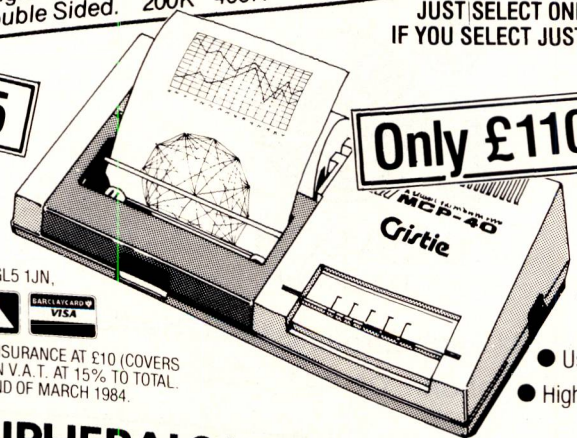

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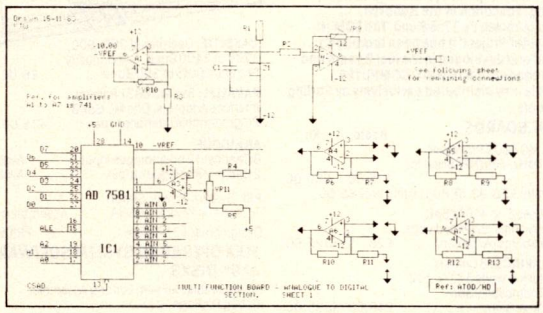

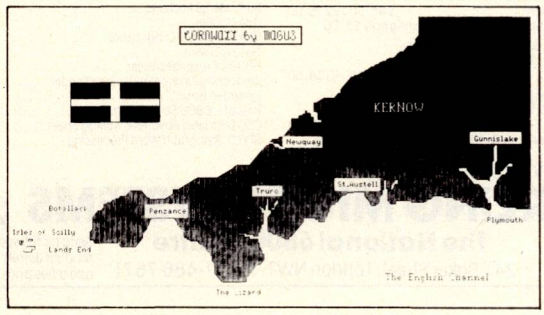

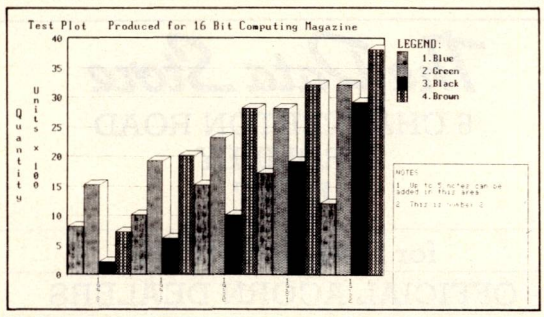

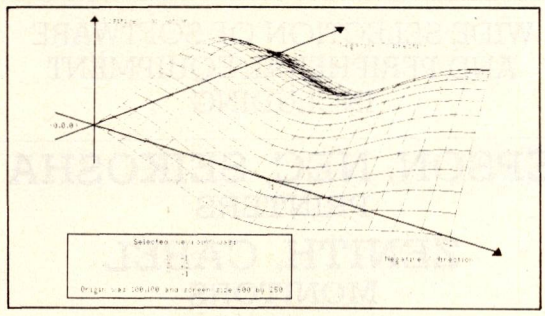

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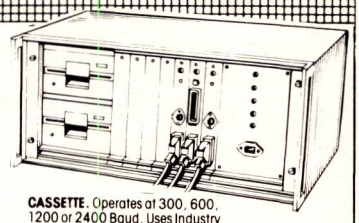

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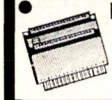

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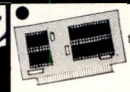

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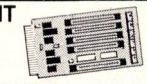

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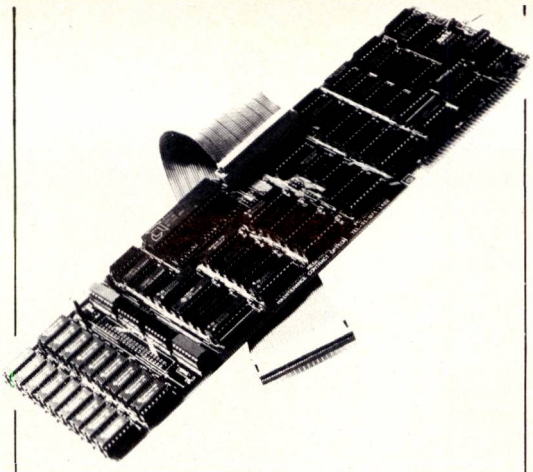

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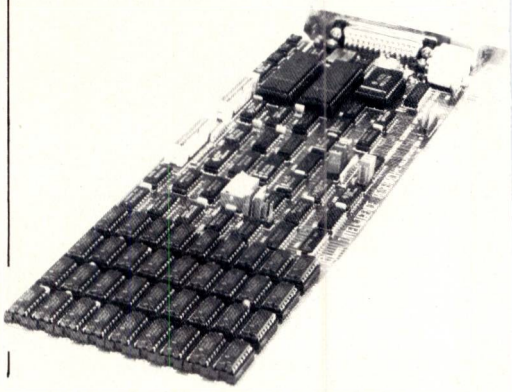

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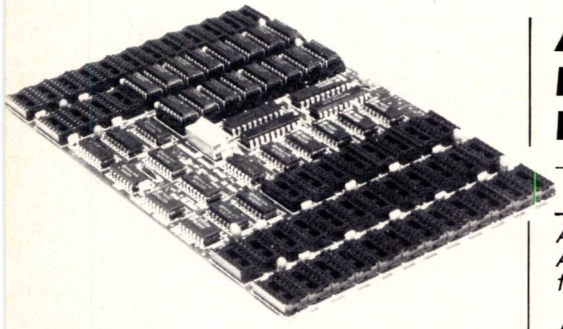

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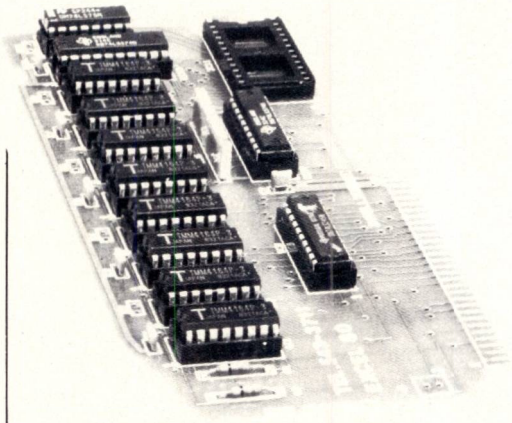

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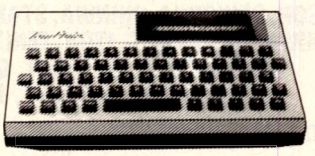

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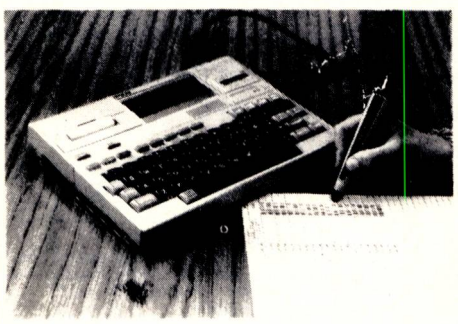

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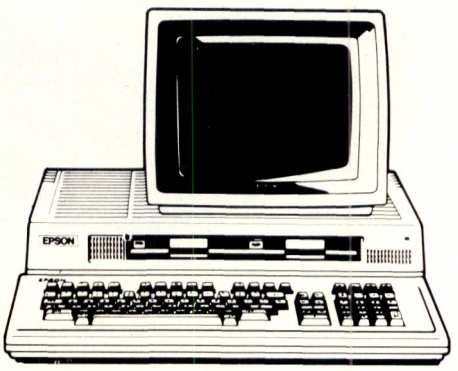

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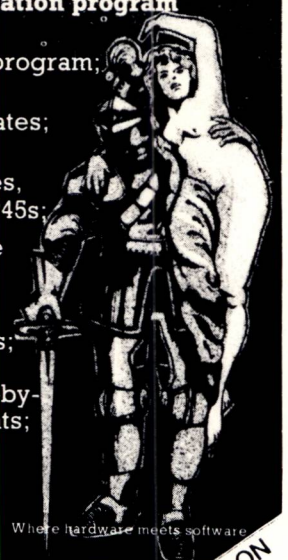

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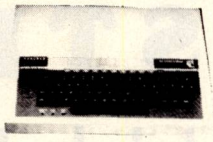
BBC MICRO  **MODEL B £399.00**

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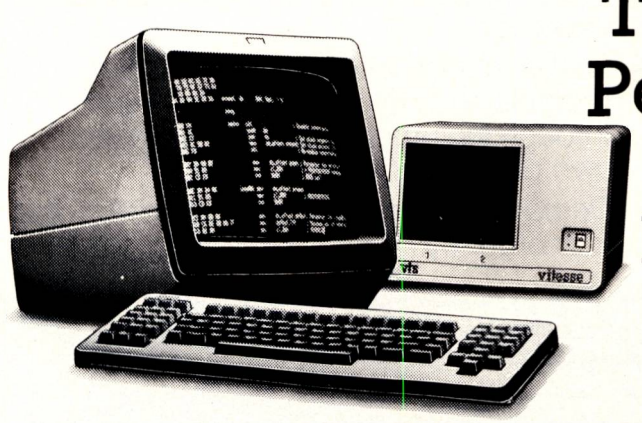

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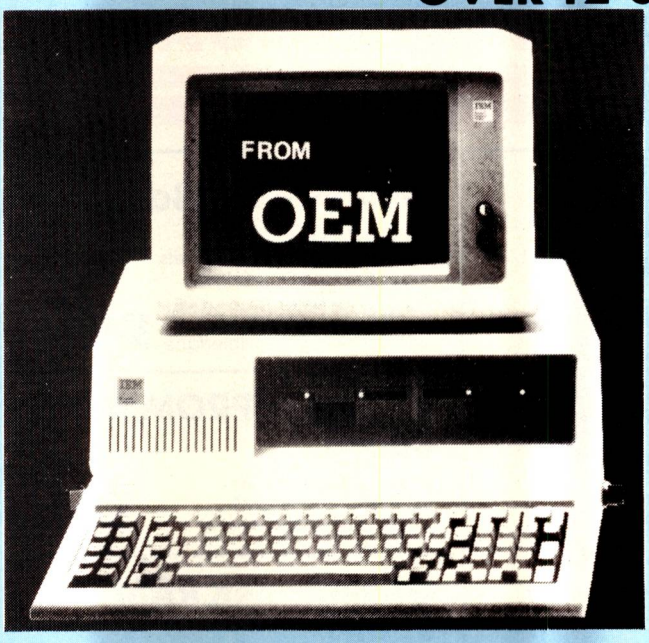

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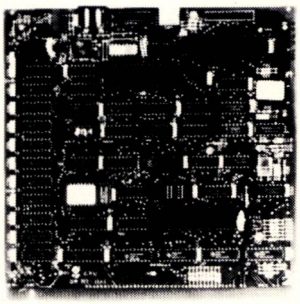

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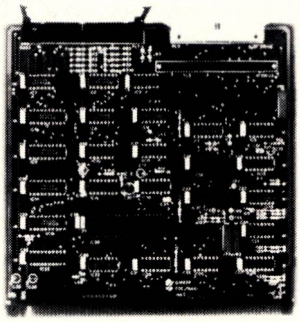

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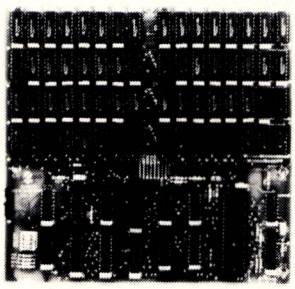

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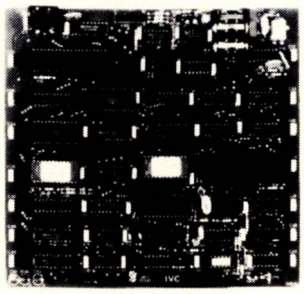

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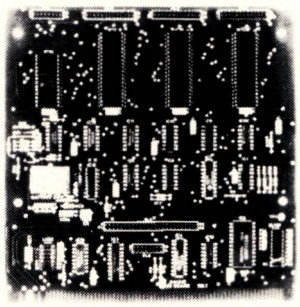

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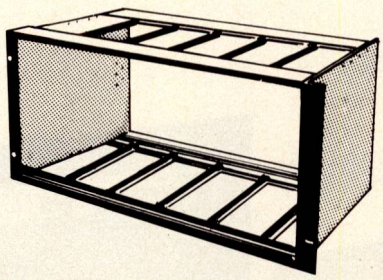

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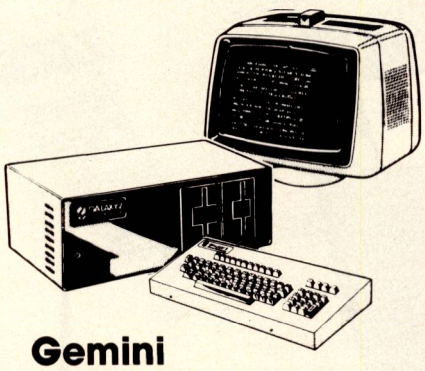

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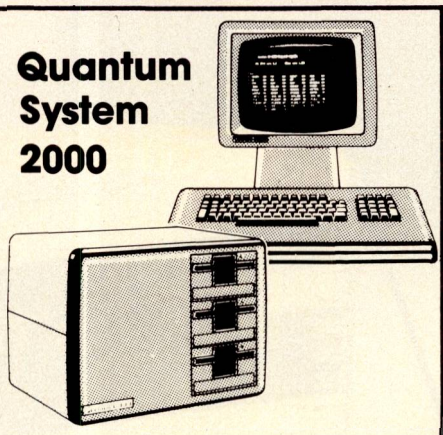

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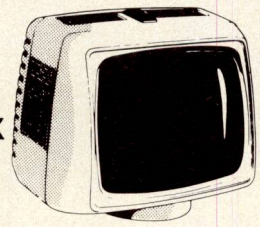

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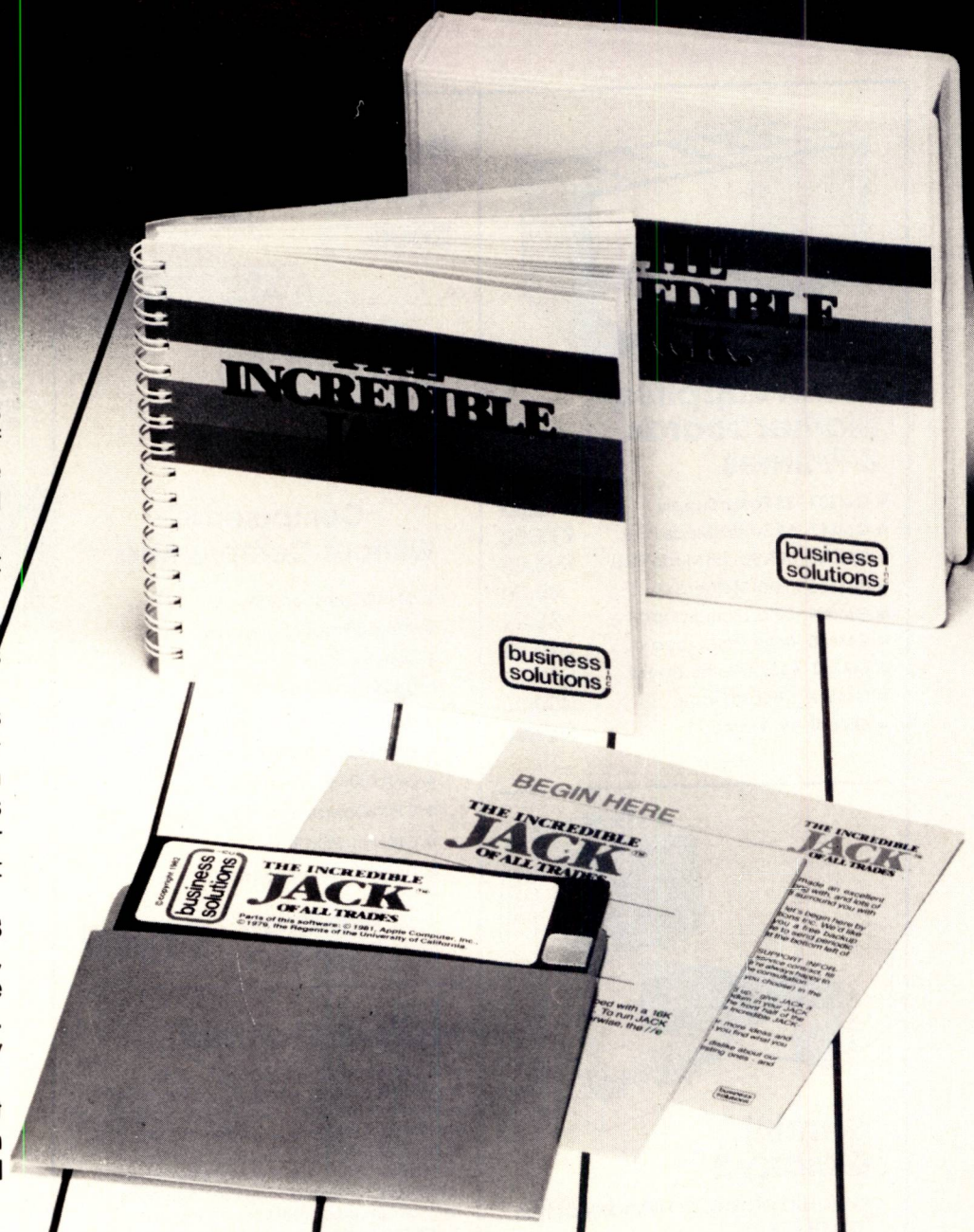

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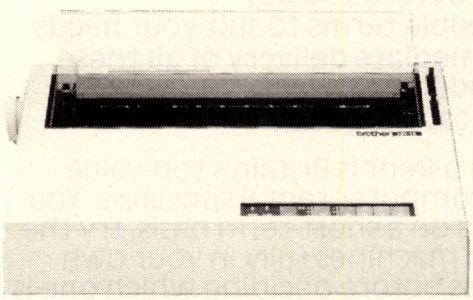

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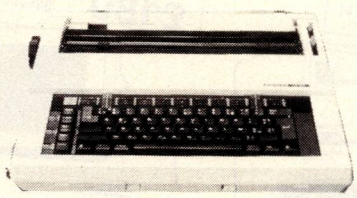

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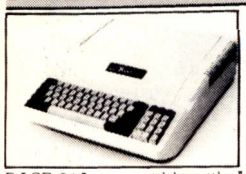

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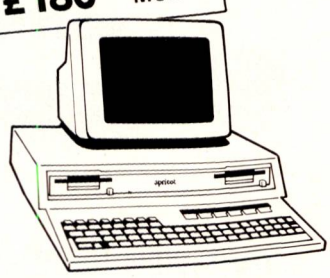

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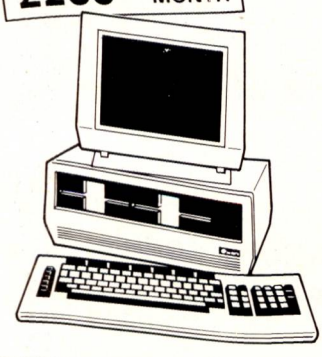

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1CAX-001	Cardbox (CP/M)	132.00	151.80
1COD-001	CDEX Training for Visicalc	37.52	43.14
1MPR-006	Datastar (CP/M)	128.00	147.20
1STO-001	DB Master Version 3.02	134.00	154.10
1STO-002	DB Master Version 4.0	199.00	228.85
1STO-003	DB Master Statistics	62.00	71.30
1STO-004	DB Master Utilities 1 (links with Visi Series)	62.00	71.30
1STO-005	DB Master Utilities 2	62.00	71.30
1FOX-002	D-Util (for dBase II)	61.00	70.15
1DJR-001	FMS-80 (CP/M)	196.00	225.40
1ASH-002	Friday (CP/M)	165.00	189.75
1ISM-002	Graphmagic (bar-pie charts etc)	57.00	65.55
1ART-004	Magicalc	99.00	113.85
1ISM-001	Mathmagic	57.00	65.55
1SOF-001	Mutliplan (DOS)	170.00	195.50
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1SWP-001	PFS File (also for IIe)	79.00	90.85
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1APL-004	Quickfile (IIe only)	57.00	65.55
1EXB-001	Savvy Professional	335.00	385.25
1VAR-001	Sidevise (Prints Visi sideways)	40.00	46.00
1MPR-015	Starindex (CP/M)	94.50	108.67
1MPR-005	Supersort (CP/M)	131.00	150.65
1BUS-001	The Incredible Jack	129.00	148.35
1DJA-001	The Last One	132.00	151.80
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1VER-004	Visi+ (Visicalc consolidation)	19.45	22.36
1LCC-003	Visicalc Utilities	32.30	37.14
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1VCP-005	Visifile	135.00	155.25
1VCP-002	Visiplot	135.00	155.25
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1APL-017	Applewriter II	84.55	97.23
1ELI-001	Format 80	123.00	141.45
1ONL-003	Homeword	34.00	39.10
1SVS-002	List Handler	33.20	38.18
1ART-003	Magic Words	46.50	53.47
1HAY-001	Pie Writer 2.2	99.75	114.71
1SEN-009	Sensible Speller (multi version)	79.00	90.85
1ONL-003	Screenwriter II (70 COLS without 80 col. card)	75.00	86.25
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1SVS-001	Word Handler	39.85	45.82
1MPR-001	Wordstar Version 3.31 (CP/M)	228.00	262.20

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OEPS-001	Epson FX-80 (160 cps & prop spacing)	399.00	458.85
OEPS-002	Epson FX-100 (wide carriage)	499.00	573.85
OWAT-001	Digiplot II (6 pen plotter)	755.00	868.25
1APL-011	Silentype printer (Inc I/F)	192.00	220.80
OMPL-001	Star Gemini 10X	219.00	251.85
OTEC-001	Tec Starwriter F10 (40cps)	1099.00	1263.85

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1SIM-001	Aristocard Parallel	65.00	74.75
1SIM-002	Aristocard Serial	71.20	81.88
1CCS-003	Asynchronous Serial I/F (7710A)	113.00	129.95
1ORN-004	Buffered Grappler	169.00	194.35
1DIG-006	Digitek Printmaster (Basic, CP/M, Pascal)	69.00	79.35
1ORN-001	Grappler + Epson,Anadex,Centronics,Nec)	98.00	112.70
1GRM-001	IPB 16K (serial/parallel & buffer)	122.00	140.50
1PRA-001	MPB-16K (Epson 16K buffer)	109.00	125.35

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1VIS-002	Applewriter II preboot disk (Vision 80)	18.00	20.70
1ELI-003	Ramview 80 IIe	52.55	60.43
1ELI-004	Ramview 80 64K IIe	125.00	143.75
1VID-002	Softswitch (for Videoterm)	20.00	23.00
1UMI-002	Uterm (inc shift mod & font editor)	127.00	146.05
1VID-019	Ultraterm	284.00	326.60
1VID-024	Ultraterm AW preboot disk	12.30	14.14
1VID-023	Ultraterm VC Preboot disk	29.40	33.81
1VID-003	Videx Enhancer II	83.00	95.45
1VID-010	Videx Inverse Eprom	18.45	21.21
1VID-001	Videx Videoterm	175.00	201.25
1VIS-003	Visicalc preboot disc (gives 80 cols with Vision 80)	39.00	44.85
1VIS-001	Vision-80 (inc softswitch & inverse)	185.00	212.75
1TYT-002	VC-Expand 80	47.00	54.05
1VER-001	Super Expander 80.2	76.00	87.40

MONITORS & COLOUR CARDS

1DIG-004	Digitek Colour card	79.00	90.85
1DMS-004	DMS RGB Colour card	75.00	86.25
0KAG-001	Kaga 12" Green Screen	105.00	120.75
1MIC-002	Microvitec Colour Monitor	265.00	304.75
1MIC-001	Microvitec Colour Card (for above)	35.00	40.25
1ZEN-001	Zenith 12" Green Screen	89.00	102.35

GRAPHICS UTILITIES & MUSIC

1PEN-005	Additional Fonts & Char Sets	13.25	15.23
1BRD-005	Arcade Machine II	40.80	46.92
1ROB-001	Bitstik	245.00	281.75
1PEN-001	Complete Graphics System	44.00	50.60
1SRS-015	EZ Draw 3.3 (II+ only)	26.50	30.47
1GIB-001	Gibson Light Pen	236.50	271.97
1INS-004	Grayforth (fast 3D plus music)	47.45	54.56
1PEN-002	Graphics Magician (new version)	37.95	43.64
1SUB-002	Graphics Package (Sublogic)	76.00	87.40
1SYN-004	Higher Text II (many different fonts)	21.80	25.07
1KDA-001	Koala Pads	87.00	100.05
1MTN-004	Mountain Music System (16 voice)	246.00	282.90
1APL-020	Pascal Animation	41.00	47.15
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1ONL-025	The Artist	51.30	58.99
1VSR-001	Versawriter (graphic digitizer)	179.00	205.85
1VSR-002	Versawriter Expansion Pack 1	24.70	28.40
1PHN-001	Zoom Graphix (similar to Bitstik zoom)	23.75	27.31
1INS-002	Electric Duet (creates 2 part music)	18.95	21.79
1TRO-001	S.A.M. (Software Automatic Mouth)	65.00	74.75

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1SWD-014	Amper Array (Routine Machine Lib)	32.75	37.66
1SWD-013	Amper Chart (Routine Machine Lib)	32.75	37.66
1SWD-015	Amper Sampler (Routine Machine Lib)	32.75	37.66
1SWD-012	Amper Screen (Routine Machine Lib)	32.75	37.66
1SEN-004	Aplus (Applesoft Structured Basic)	18.95	21.79
1BEA-005	Apple Mechanic (Beagle Bros)	18.95	21.79
1SOF-010	Assembly Lang Dev (6502, Z80, 8080)	79.00	90.95
1QUA-002	Bag of Tricks	24.70	28.40
1SEN-018	B.E.S.T. (Enhanced Software Tool)	24.70	28.40
1SEN-011	Build Using (gives "Print Using" commands)	19.00	21.85
1GDS-001	C.I.A. (disk utility)	33.25	38.23
1CEN-001	Copy II Plus 4.0	37.95	43.64
1SWD-011	Disk Library (inc CP/M & Pascal)	34.95	40.92
1BEA-001	DOS Boss (modifies DOS commands)	15.95	18.34
1SEN-014	Edit Soft (powerful macro line editor)	23.75	27.31
1WYT-001	Fast DOS	18.95	21.79
1SYN-013	Global Program Line Editor (supports 80 cols)	39.00	44.85
1SEN-010	Image Printer II	22.80	26.22
1VER-003	Locksmith 4.1	63.00	72.45
1SWD-006	Merlin Macro Assembler	42.00	48.30
1SWD-016	Munch-a-Bug	32.25	37.08
1HAY-010	Orca/M	66.45	76.41
1SWD-008	Printographer	33.00	37.95
1PCE-002	Rosetta (Pascal to DOS/DOS to Pascal)	35.00	40.25
1ELI-005	S.C. Macro Assembler	57.00	65.55
1DAR-001	Snapshot Copykit (II+ & IIe)	93.00	106.95
1SWD-009	Speedstar (assembles 12000 lines/min)	63.50	73.02
1UNI-003	Structured Basic (U-Micro)	85.50	98.32
1SEN-001	Super Disk Copy III	22.00	25.30
1SOF-007	TASC Compiler (handles very large programs)	113.00	129.55
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1SWD-010	The Routine Machine (machine language routines)	40.00	46.00
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1TYT-007	128K Ramcard (Titan/Saturn)	284.00	326.60
1VER-002	128K Ramex card	275.00	316.25
1TYT-005	Accelerator II+	285.00	327.75
1FMJ-001	Coolstack (holds 2 drives, monitor & fan)	65.00	74.75
1APL-006	DOS Upgrade kit (3.2 to 3.3)	36.00	41.40
1TYT-006	Ember (Titan auto RAM bank selector)	33.20	38.18
1VSA-004	E-Z Port (games socket extender)	15.90	18.28
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1HAL-002	Hard disk 10Mb (HAL, inc I/F)	1950.00	2242.50
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1HAK-002	Hawk IEEE-488 card	189.00	217.35
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1VIS-004	Vision 128 Ram Card	240.00	276.00
1ALS-002	Z-Card II (includes CP/M)	103.95	119.54
1UNI-001	Z80 Card U-Micro (card only)	73.00	83.95
1SOF-003	Z80 Card Microsoft (incl CP/M & MBasic)	215.00	247.25

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1APL-009	Apple Super Pilot	122.50	140.87
1SOF-005	COBOL 80 (CP/M)	420.00	483.00
1MSF-001	Forth Metacraft	65.00	74.75
1SFT-002	Forth II	42.00	48.30
1SOF-006	Fortran 80 (CP/M)	119.00	136.85
1TER-001	Terrapin Logo	95.00	109.25
1INS-003	Transforth (full floating point)	65.95	75.84

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OELE-001	Disc Head Cleaning Kit (20 discs and fluid)	14.50	16.67
OALB-004	Disk Tray (40 disks, lockable)	18.95	21.79
OALB-003	Disk Tray (90 disks, lockable)	23.00	26.45
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1SVS-004	E-Z Learner	20.00	23.00
ODRE-001	Finger Print (Epsons)	37.95	43.64
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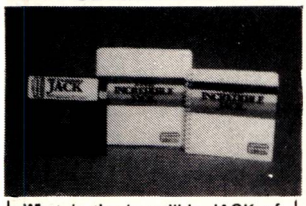

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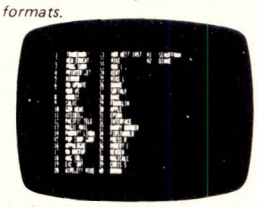

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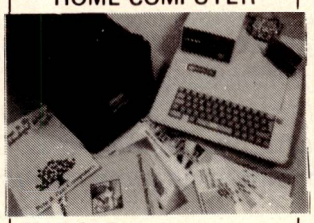

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I see Micronet 800 is now offering a £100 prize for the best program received each month. Strange, but that sounds somewhat familiar . . . except that the £100 paid by *PCW* for the Program of the Month is a bonus on top of the standard page rate. The rest of the Micronet authors, incidentally, sign away all their rights in return for a 'minimum' of £15. Anyway, on to more interesting matters.

This month's programs selection includes two 'artificial intelligence' programs for the Beeb — 'Fred' and 'Micromouse'. 'Fred' is a simple learning program, working along the lines of a relational data base, while 'Micromouse' is a maze-solver.

Three oft-neglected machines get an airing: Paul Lay wins the Program of the Month spot with an ingenious utility for the Atari; Nick Foale provides an adventure for the Atom; and a version of Frogger for the MZ-80A (this also runs on the 'K' running 'A' Basic). Two utilities for the NewBrain, a sound synthesiser for the TRS-80 with a sound box and a utility program for a disk-based BBC complete the set. Finally, the clues to last month's Oric 'Forest of Doom' are given as promised.


Games


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Program of the Month
Atari Split-screen
by Paul Lay

'Split-screen' is a clever utility for a 16k Atari 400/800.

The program allows you to divide the Atari's screen refresh routine between two different displays — one graphic, the other text. The net result is that you can (apparently) display text and graphics at the same time.

The program intercepts the deferred vertical blank interrupt signal, and instructs it to alternate between two totally independent displays. Thus each display is refreshed at 1/25th second intervals instead of 1/50th. Since the human eye has a perception rate of approximately 1/16th second, we are fooled into seeing the two alternating displays as one uninterrupted one.

The beauty of this method is that the text and graphics screens are genuinely independent, so you can have both text and graphics on the same line, scroll text without affecting the graphics, and so on.

The program has been set up with a GRAPHICS 0 text screen and a GRAPHICS 7 graphics screen, but these may be changed if desired.

To use the routine in your own programs, add your code to the listing below. To force graphics to the prepared screen, GOSUB GRAPH just before entering the graphics statements. Similarly with text, GOSUB TEXT and then print to the screen in the usual way. Note that the TEXT subroutine positions the text cursor at 0,0.

Split screen does have one major problem: screen flicker. Although the brain can't see the two displays as separate, it's being asked to cope with a continuously changing image and perceives this as a rapid flickering. In order to minimise the effects of this, the author recommends the following:-

(a) Use dark background colours and bright foreground ones.
(b) Don't change the background colour once set.
(c) Don't change graphics mode once set.

Page 6 locations 1536-1562 and 1636-1662 are used by the routine, so

these memory locations must not be used by your program. Similarly, free memory above RAMTOP-8192 should be avoided if possible.

Note that you cannot change the text background colour or the value of COLOUR 3.

The screen flicker is irritating. Our referee suggests that it may even cause epileptic and migraine attacks in sufferers of either illness. If anyone can think of some way of eliminating or reducing the flicker, let me know.

```
100 GRAPHICS 16
110 TL=PEEK(560):TH=PEEK(561)
120 GRAPHICS 55
130 GL=PEEK(560):GH=PEEK(561)
140 RT=PEEK(106)*256
150 DL=GL+256*GH
160 GM=RT-8192
170 MH=INT(GM/256):ML=GM-MH*256
180 POKE DL+4,ML:POKE DL+5,MH
190 COM INIT$(11)
200 FOR A=1 TO 11:READ B
210 INIT$(A)=CHR$(B):NEXT A
220 DATA 160,0,162,6,169,7,32,92,228
230 DATA 104,96
240 DATA 160,255,140,48,2,160,255
250 DATA 140,49,2,169,0,141,198
260 DATA 2,160,100,162,6,169,7
270 DATA 32,92,228,76,98,228
280 FOR A=1536 TO 1562:READ B
290 POKE A,B:NEXT A
300 DATA 160,255,140,48,2,160,255
310 DATA 140,49,2,169,148,141,198
320 DATA 2,160,0,162,6,169,7,32,92
330 DATA 228,76,98,228
340 FOR A=1636 TO 1662:READ B
350 POKE A,B:NEXT A
360 POKE 1537,TL:POKE 1542,TH
370 POKE 1637,GL:POKE 1642,GH
380 A=USR(ADR(INIT$))
390 DL=GL+256*GH
400 GL=PEEK(DL+4):GH=PEEK(DL+5)
410 GRAPH=420:TEXT=440:GOTO 450
420 POKE 87,7:POKE 88,GL
430 POKE 89,GH:RETURN
440 ? :POSITION 0,0:RETURN
450 GOSUB TEXT:? "INITIALIZING ";
460 GOSUB GRAPH:COLOR 0
470 FOR A=0 TO 95
480 PLOT 0,A:DRAWTO 159,A:NEXT A
490 GOSUB TEXT:? ")";
500 REM Demonstration Program
510 GOSUB GRAPH:DEG
520 FOR COL=3 TO 1 STEP -1
530 COLOR COL
540 RX=COL*7
550 FOR T=0 TO 175 STEP 2
560 PLOT 80+RX*COS(T),30+20*SIN(T)
570 DRAWTO 80+RX*COS(T),30+20*SIN(-T)
580 NEXT T:NEXT COL
590 COLOR 2:PLOT 75,50
600 DRAWTO 75,55:PLOT 85,50
610 DRAWTO 85,55
620 COLOR 1:FOR A=56 TO 63
630 PLOT 74,A:DRAWTO 86,A:NEXT A
640 COLOR 2
```


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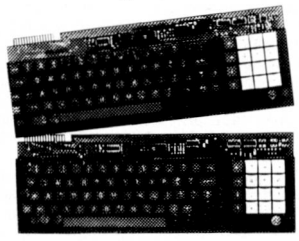

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PROGRAMS

```
650 FOR A=0 TO 50
660 X=INT(RND(1)*159)
670 Y=INT(RND(1)*95)
680 LOCATE X,Y,Z:IF Z<>0 THEN 660
690 PLOT X,Y:NEXT A
700 GOSUB TEXT
710 POSITION 2,7
720 ? "┌──────────────────────┐"
730 ? "|Balloons In Space !|"
740 ? "└──────────────────────┘"
750 FOR A=0 TO 1000:NEXT A:LIST
770 GOTO 770
```

BBC Disk Menu
by SD Turnbull

BBC 'Disk menu' is a utility program for a disk-based BBC Micro.

Once installed on a disk, 'Menu' will present a disk directory on pressing SHIFT and BREAK. The first program on the disk is highlighted. The up/down cursor keys are used to highlight the desired program, and the RETURN key loads and runs the program. Both Basic and machine code programs may be selected in this way.

To enter Basic, press 'B'; to Rerun the menu program after inserting a new disk, press 'R'. Use the left and right cursor keys to select machine code or ASCII files.

After typing in the listing, it should be saved under the filename 'OPEN'. Next enter '*BUILD !BOOT' and respond to the prompt with 'CHAIN "OPEN"'. Finally, press RETURN and escape, followed by '*OPT 4 3' (RETURN). The menu program is now called by pressing SHIFT and BREAK in the usual way.

```
)L.07
)L.
  100 T$=  "Open Disk"
  110 REM  Copyright (c) 1983
  120 REM  by S.D.Turnbull
  130 REM  9 Victoria Avenue, Didsbury
  140 REM  Manchester, M20 8GY
  150 REM-------------------------------
  160 MODE7:HIMEM=HIMEM-&1000
  170 ON ERROR PROCerror:END
  180 PROCtitle
  190 PROCinitialize
  200 REPEAT
  210   PROCprogram
  220   UNTIL INKEY-101
  230 PROCquit
  240 END
  250 -------------------------------
  260 DEF PROCerror:PROCquit:*FX15 0
  270 REPORT:PRINT" at line ":ERL
  280 ENDPROC
  290 -------------------------------
  300 DEF PROCquit:VDU26,12
  310 PROCcurson:*FX4 0
  320 PROCdouble("**"+T$+" Ended**",8)
  330 PRINT:ENDPROC
  340 -------------------------------
  350 DEF PROCcurson:VDU23;29194;0;0;0;:ENDPROC
  360 -------------------------------
  370 DEF PROCcursoff:VDU23;8202;0;0;0;:ENDPROC
  380 -------------------------------
  390 DEF PROCdouble(text$,Y%)
  400 PROCcentre(CHR$141+text$,Y%)
```

PROGRAMS

```
410 PROCcentre(CHR$141+text$,Y%+1)
420 ENDPROC
430 ------------------------------
440 DEF PROCcentre(text$,Y%)
450 LOCAL X%:X%=16-LENtext$DIV2
460 PRINTTAB(X%,Y%)text$:
470 ENDPROC
480 ------------------------------
490 DEF PROCtitle:CLS:PROCcursoff
500 LOCAL Y%:Y%=7
510 PROCdouble(""+T$+"",Y%)
520 PROCcentre("by S.D.Turnbull",Y%+7)
530 ENDPROC
540 ------------------------------
550 DEF PROCinitialize:*FX4 1
560 numer$="0123456789":cr$=CHR$13
570 del$=CHR$127
580 block%=&700:buffer%=HIMEM
590 files%=31:types%=4:start%=6
600 lock%=0:load%=1:exec%=2:leng%=3
610 DIM file$(files%),data%(files%,3),type$(types%)
620 osword%=&FFF1:osbyte%=&FFF4
630 read%=&53:write%=&4B
640 FOR type%=1 TO types%
650   READ type$(type%):NEXT
660 ZZ%=INKEY(1000):ENDPROC
670 ------------------------------
680 DATA BASIC Programs
690 DATA Machine Code Programs
700 DATA ASCII File
710 DATA EXEC-able File
720 ------------------------------
730 DEF FNin(keys$):PROCcurson:*FX21 0
740 LOCAL in%:REPEAT in%=INSTR(keys$,GET$)
750   VDU-7*(in%=0):UNTILin%()0
760 PROCcursoff:=in%
770 ------------------------------
780 DEF PROCheader(text$):VDU26 12
790 PROCdouble(""+text$+" ",0)
800 PRINT':ENDPROC
810 ------------------------------
820 DEF PROCwindow(W%):VDU28
830 ON W% GOTO 840,850,860
840 VDU0,24,39,5,12:ENDPROC
850 VDU0,24,39,7,12:ENDPROC
860 VDU0,24,39,24,12:ENDPROC
870 ------------------------------
880 DEF PROCprogram
890 LOCALentries%
900 PROCheader(T$)
910 PROCget_directory
920 PROCprepare_directory
930 PROCshow_it
940 ENDPROC
950 ------------------------------
960 DEF PROCget_directory:LOCAL S%
970 PROCsector(read%,buffer%,0,0,0)
980 PROCsector(read%,buffer%+256,0,0,1)
990 ENDPROC
1000 ------------------------------
1010 DEF PROCsector(RW%,B%,D%,T%,S%)
1020 LOCAL X%,Y%,A%
```


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PROGRAMS

```
1030 block%?0=D%:block%!1=B%
1040 block%?5=3:block%?6=RW%
1050 block%?7=T%:block%?8=S%
1060 block%?9=&21
1070 X%=block%:Y%=X%DIV256
1080 A%=&7F:CALL osword%
1090 ENDPROC
1100 ------------------------------
1110 DEF PROCprepare_directory
1120 LOCAL entry%
1130 PROCdisk_title
1140 entries%=FNget_entries
1150 FOR entry%=1 TO entries%
1160   PROCget_entry(entry%)
1170   NEXT:ENDPROC
1180 ------------------------------
1190 DEF PROCdisk_title
1200 LOCALtitle$,base%,point%
1210 base%=buffer%
1220 REPEAT title$=title$+CHR$(base%?point%)
1230   point%=point%+1
1240   IF point%=8 base%=buffer%+256:point%=0
1250   UNTIL(point%=4 AND base%)buffer%) OR base%?point%=0
1260 PROCheader(title$)
1270 ENDPROC
1280 ------------------------------
1290 DEF FNget_entries=buffer%?261 DIV8
1300 ------------------------------
1310 DEF PROCget_entry(entry%)
1320 LOCALfile$,point%
1330 FOR point%=entry%*8 TO entry%*8+6
1340   file$=file$+CHR$(buffer%?point%)
1350   NEXT
1360 file$=CHR$(buffer%?point%AND&7F)+"."+file$
1370 data%(entry%,lock%)=(buffer%?point%)&7F)
1380 data%(entry%,load%)=FNload_address(entry%)
1390 data%(entry%,exec%)=FNexec_address(entry%)
1400 data%(entry%,leng%)=FNlength(entry%)
1410 file$(entry%)=file$:ENDPROC
1420 ------------------------------
1430 DEF FNload_address(entry%):entry%=entry%*8+buffer%+256
1440 =entry%?0+entry%?1*256
1450 ------------------------------
1460 DEF FNexec_address(entry%):entry%=entry%*8+buffer%+256
1470 =entry%?2+entry%?3*256
1480 ------------------------------
1490 DEF FNlength(entry%):entry%=entry%*8+buffer%+256
1500 =entry%?4+entry%?5*256
1510 ------------------------------
1520 DEF PROCshow_it
1530 LOCAL key%,type%,Y%,files%
1540 type%=1
1550 PROCdisplay(type%)
1560 REPEAT key%=GET:*FX21 0
1570   IF INKEY-26  PROCscreen(-1)
1580   IF INKEY-122 PROCscreen(+1)
1590   IF INKEY-58  PROCselect(-1)
1600   IF INKEY-42  PROCselect(+1)
1610   IF INKEY-74  PROCrun(Y%,type%)
1620   UNTIL INKEY-101 OR INKEY-52
1630 ENDPROC
1640 ------------------------------
```

PROGRAMS

```
1650 DEF PROCdisplay(type%):LOCAL file%
1660 PROCwindow(1):files%=0
1670 PROCcentre(""+type$(type%)+"",0)
1680 PROCwindow(2)
1690 FOR file%=1 TO entries%
1700   IF FNtype(file%,type%) PROCline(file%):files%=files%+1
1710   NEXT
1720 IF files%=0 PROCcentre("No files",2)
1730 PROCselect(0):ENDPROC
1740 ------------------------------
1750 DEF FNtype(file%,type%)
1760 ON type% GOTO 1770,1780,1790,1800
1770 =data%(file%,load%))&1500 AND data%(file%,exec%))&8000
1780 =data%(file%,load%))&200 AND data%(file%,load%)
       (&8000 AND data%(file%,exec%)(&8000
1790 =data%(file%,load%)=0 AND data%(file%,exec%)=0
1800 =data%(file%,load%)=&FFFF AND data%(file%,exec%)=&FFFF
1810 ------------------------------
1820 DEF PROCline(file%):@%=6
1830 PRINTSPCstart%file$(file%);
1840 PRINT~data%(file%,load%)data%(file%,exec%)data%(file%,leng%)
1850 @%=10:ENDPROC
1860 ------------------------------
1870 DEF PROCscreen(S%)
1880 type%=(type%+S%)MOD types%
1890 IF type%=0 type%=4
1900 PROCdisplay(type%)
1910 ENDPROC
1920 ------------------------------
1930 DEF PROCselect(S%)
1940 IF files%=0 ENDPROC
1950 PRINTTAB(0,Y%)SPC3;
1960 Y%=(Y%+S%) MOD files%
1970 IF Y%(0 Y%=files%-1
1980 PRINTTAB(0,Y%)"";
1990 ENDPROC
2000 ------------------------------
2010 DEF PROCrun(Y%,type%):LOCAL file$
2020 IF files%=0 ENDPROC
2030 file$=FNget_name(Y%)
2040 ON type% GOTO 2050,2060,2070,2080
2050 PROCquit:CHAINfile$
2060 OSCLI("RUN "+file$):PROCquit
2070 PROCmessage("You cannot run an ASCII file"):ENDPROC
2080 OSCLI("EXEC "+file$):PROCquit
2090 ------------------------------
2100 DEF FNget_name(Y%):LOCAL X%,A%
2110 FOR X%=start% TO start%+9
2120   VDU31,X%,Y%:A%=135
2130   file$=file$+CHR$((USR(osbyte%)AND&FF00)DIV&100)
2140   NEXT:=file$
2150 ------------------------------
2160 DEF PROCmessage(M$)
2170 PROCcentre(""+M$+"",files%+1)
2180 Z%=FNin(cr$+" ")
2190 PROCcentre(STRING$(LENM$," "),files%+1)
2200 ENDPROC
2210 ------------------------------
)
L.00
)*FX3 4
---
```


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PROGRAMS

BBC Fred
by JL Gordon

'Fred' is an artificial intelligence program for a 32k BBC Micro.

Fred attempts to 'learn' from keyboard input in a similar fashion to a relational database. Facts are entered in the form <noun> <relationship> <noun>. For example, COMPUTERS ARE IRRITATING. From the facts supplied, Fred will attempt to make deductions. So, if you tell Fred that COMPUTERS ARE IRRITATING and FRED IS COMPUTER, Fred will deduce that Fred is irritating!

You can interrogate Fred by asking questions such as 'Who is Fred?' and 'What are computers?'. Fred will then respond by displaying all the things he 'knows' about the given subject: that is, facts as entered by the user, and inferences that Fred has made. The easiest way to see how this works is to take a look at the sample 'conversation' immediately before the listing.

When entering facts, it's best to stick to straightforward three-word constructs, and not pay to much attention to grammar! You can see in the sample conversation that Fred made a mistake in deducing that JOHN WRITE COMPUTER. This error was due to the vagaries of the English language, since all the relevant facts supplied to Fred were correct and the deduction was a perfectly logical one.

To correct an erroneous inference, enter 'NO' in response to the incorrect statement. Fred will then ask which statement was incorrect and will flag the statement so that it's not repeated. The statement will remain in memory, however, so that Fred doesn't make the same deduction again based on future data.

To save the database to tape, enter 'SAVE'. To load a database, enter 'LOAD'. 'PRINT' dumps the contents of the database to a printer.

The program works by establishing the two objects and the relationship between them. The relationship is stored as a link word, and pointers are set to indicate which links belong to which objects.

The detailed notes supplied by the author are too long to reproduce here, but photostats are available by sending an A4-sized sae to:- Fred Notes, ***PCW***, 62 Oxford Street, London W1A 2HG.

```
LISTO7
>LIST
   10 REM J.L.GORDON  LEARNING PROGRAM VIII
   20 @%=&20008
   30 MODE7
   40 DC=50: DIMT$(2),TN(2)
   50 Z%=1000:J%=500:ZN%=1000000
   60 A%=1:U%=A%: REM U% SLEEP LOOP COUNT
   70 LF%=0:NL%=6:NK%=NL%-A%
   80 DIM WO$(9)
   90 DIMA$(DC)
  100 ME%=440:DIMM$(%),L%(NL%,ME%)
  110 S%=0:REM SLEEP COUNTER
  120 M%=27
  130 DATAWHAT,WHO,WHY,WHERE,HOW,DO,ARE,AM,IS
  140 DATAIS A,IS AN,ARE A,ARE AN,IS TO,HAS,HAVE,CAN,WILL
  150 DATAMAY,THE,A,TO,SAVE,PRINT,LOAD,NO
  160 FORI=A%TOM%-A%:READM$(I):NEXT
  170 CLS
  175  PRINTTAB(5,3)"Please tell me something."
  180 PROCsleep
  190 PROCinput
  200 PROCword_sort
  210 PROCtype
  220 IFL$="IS"THENPRINT'"PLEASE DO NOT USE 'IS'":PRINT"TRY SOMETHING ELSE.":GOT
O180
  230 IFY%=0THEN GOTO250
  240 PRINT:PRINT"I DO NOT UNDERSTAND ":PRINTCY$:GOTO 180
  250 IF X%=3THEN PROCcommand :GOTO180
  260 IF X%=A%THEN PROCquestion :GOTO180
  270 PROCmemstore
  280 IF Y%=A%THEN GOTO180
  290 PROCanswer
  300 CM$=A$(C%-A%)
  310 PROCoutput
  320 GOTO180
  330
  340
  350 DEFPROCinput
  360 CLS:K%=0
  370 PRINT:PRINT
  380 CY$=""
  390 REPEAT
  400   PRINTTAB(K%+6,12)K$::K%=K%+A%
  410   CY$=CY$+K$
  420   K$=GET$
  430   IFK%<0THENK%=0
  440   IFK$=CHR$(127)THENCY$=LEFT$(CY$,K%-A%):K%=K%-A%:PRINTTAB(K%+6,12)" ";:GO
TO420
  450   UNTIL K$=CHR$(13)
  460 PRINT
  470 ENDPROC
  480
  490
  500 DEFPROCoutput
  510 CLS
  520 PRINTTAB(4,4)CM$
  530 ENDPROC
  540
  550
  560 DEFPROCword_sort
  570 L=LEN(CY$):B%=A%:C%=A%:D%=9
  580 FORQ%=C% TOD%:WO$(Q%)="":NEXT
  590 FORQ%=C% TO L
  600   IFMID$(CY$,Q%,C%)=" "THENB%=B%+A%:GOTO620
  610   WO$(B%)=WO$(B%)+MID$(CY$,Q%,C%)
  620   NEXT
```

PROGRAMS

```
630 WN%=B%
640 PROCfred
650 ENDPROC
660
670
680 DEFPROCfred
690 FOR0%=C% TO WN%
700   IFWO$(0%)<>"YOU"THEN GOTO 750
710   WO$(0%)="FRED"
720   IFWO$(0%+A%)="ARE"THENWO$(0%+A%)="IS"
730   IFWO$(0%-A%)="ARE"THENWO$(0%-A%)="IS"
740   IFWO$(0%+A%)="HAVE"THENWO$(0%+A%)="HAS"
750   IFWO$(0%)<>"I"THEN GOTO790
760   WO$(0%)="YOU"
770   IFWO$(0%+A%)="AM"THENWO$(0%+A%)="ARE"
780   IFWO$(0%-A%)="AM"THENWO$(0%-A%)="ARE"
790   NEXT
800 ENDPROC
810
820
830 DEF PROCtype
840 Y%=0:X%=0:TN(A%)=0:TN(2)=0:L$="":T$(A%)="":T$(2)=""
850 B%=19
860 FOR0%=A% TO B%
870   IF WO$(A%)=M$(0%)THEN X%=A%:LF%=A%:0%=B%
880   NEXT
890 IFLF%=A% THEN LF%=0:ENDPROC
900 FOR0%=23 TO 26
910   IFWO$(A%)=M$(0%) THEN X%=3:LF%=A%:0%=27
920   NEXT
930 IFLF%=A% THEN LF%=0:ENDPROC
940 X%=2
950 T$(A%)=WO$(A%):TN(A%)=A%
960 IFT$(A%)="THE" OR T$(A%)="A" OR T$(A%)="TO"THENT$(A%)=WO$(2):TN(A%)=2
970 T$(2)=WO$(WN%):TN(2)=WN%
980 FOR0%=TN(A%)+A% TO WN%-A%
990   L$=L$+WO$(0%)+" "
1000  NEXT
1010 IFLEN(L$)<2 THEN Y%=A%:ENDPROC
1020 IFWN%<3 THEN Y%=A%
1030 L$=LEFT$(L$,LEN(L$)-A%)
1040 ENDPROC
1050
1060
1070 DEF PROCmemstore
1080 IFM%>=ME% THENPRINT"MEMORY FULL":ENDPROC
1090 B%=0:C%=0:D%=0
1100 FOR0%=A% TO M%-A%
1110   IFL$=M$(0%) THEN D%=0%:0%=M%-A%
1120   NEXT
1130 IFD%=0 THEN M$(M%)=L$:D%=M%:M%=M%+A%
1140 FOR0%=A% TO M%-A%
1150   IFM$(0%)="" THEN GOTO1170
1160   IFT$(A%)=M$(0%) THEN B%=0%
1170   NEXT
1180 FOR0%=A% TO M%-A%
1190   IFM$(0%)=""THEN GOTO1210
1200   IFT$(2)=M$(0%) THEN C%=0%
1210   NEXT
1220 IFB%=0 THEN M$(M%)=T$(A%):B%=M%:M%=M%+A%
1230 IFC%=0 THEN M$(M%)=T$(2):C%=M%:M%=M%+A%
1240 FORR%=A%TOM%-A%
1250   IFM$(R%)<>M$(B%) THEN1290
1260   FOR0%=A% TO NL%:IFL%(0%,R%)=0 THEN T%=0%:0%=NL%:NEXT:0%=T%:R%=M%-A%:NEXT
:GOTO1310
1270 PROCsort_a:IFE0=A%THEN :0%=NL%:NEXT:R%=M%-A%:NEXT:ENDPROC
1280 NEXT
1290 NEXT
1300 0%=L%(NL%,B%):P%=0%DIVZ%:B%=0%MODZ%
1310 IF0%<NL%THEN GOTO 1340
1320 L%(NL%,B%)=9*Z%+M%:M$(M%)=T$(A%):M%=M%+A%
1330 L%(A%,M%-A%)=9*Z%+B%:0%=2:B%=M%-A%
1340 L%(0%,B%)=D%*Z%+C%
1350 FOR0%=A% TO NL%:IFL%(0%,C%)=0 THEN T%=0%:0%=NL%:NEXT:0%=T%:GOTO1390
1360 NEXT
1370 P%=0%DIVZ%:C%=0%MODZ%:GOTO 1350
1380 0%=L%(NL%,C%):IF0%>ZN%THEN0%=0%-ZN%
1390 IF0%<NL% THEN GOTO1420
1400 L%(NL%,C%)=9*Z%+M%:M$(M%)=T$(2):M%=M%+A%
1410 L%(A%,M%-A%)=9*Z%+C%:0%=2:C%=M%-A%
1420 L%(0%,C%)=D%*Z%+B%+J%
1430 ENDPROC
1440
1450
1460 DEFPROCsort_a
1470 X6%=L%(0%,R%):IFX6%>ZN%THENX6%=X6%-ZN%
1480 X7%=X6%DIVZ%:X8%=X6%MODZ%
1490 IFX8%>J% THEN X8%=X8%-J%
1500 X$=M$(B%)+M$(X8%)
1510 Z$=T$(2)+T$(A%)
1520 Y$=T$(A%)+T$(2)
1530 E0=0
1540 IF(X$=Y$ ORX$=Z$)ANDL$=M$(X7%)THENE0=A%
1550 ENDPROC
1560
1570
1580 DEF PROCanswer
1590 REM D%=LINK B%=TOPIC
1600 S1%=B%:F%=0
1610 FOR0%=A%TO 0C:A$(0%)="":NEXT
1620 C%=A%
1630 F1%=0
1640 FOR0%=7TO 14:IF D%=0% THEN F1%=A%
1650   NEXT
1660 FOR 0%=A% TO NL%
1670   G%=L%(0%,S1%):E%=G%DIVZ%:H%=G%MODZ%
1680   IFG%>ZN%THEN1750
1690   IFG%=0 THEN T%=0%:0%=NL%:NEXT:0%=T%:ENDPROC
1700 IF H%>J% THEN F%=A%:H%=H%-J%
1710 IF0%=NL% THEN GOTO1740
1720 IF F1%=0 AND E%=D% THEN PROCanswer_a:GOTO1740
1730 IF F1%=A% THEN PROCanswer_a
1740 F%=0
1750 NEXT
1760 S1%=H%:GOTO1660
1770
1780
1790 DEF PROCanswer_a
1800 IF F%=A% THENA$(C%)=M$(H%)+" "+M$(E%)+" "+M$(S1%):C%=C%+A%:GOTO1820
1810 A$(C%)=M$(S1%)+" "+M$(E%)+" "+M$(H%):C%=C%+A%
1820 IFC%<3 THEN ENDPROC
1830 FOR02=A% TO C%-2:IFA$(C%-A%)=A$(02) THENA$(C%-A%)="":C%=C%-A%:02=C%-A%
1840   IFM$(S1%)=M$(H%) THEN A$(C%-A%)="":C%=C%-A%:02=C%-A%
1850   NEXT
1860 ENDPROC
1870
1880
```


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PROGRAMS

```
1890 DEFPROCcommand
1900 IFCY$="LOAD"THEN PROCload:ENDPROC
1910 IFCY$="SAVE"THEN PROCsave:ENDPROC
1920 IFCY$<>"PRINT"THENGOTO2040
1930 VDU2
1940 PRINT
1950 FORQ%=A%TOM%-A%
1960   PRINT;Q%" "M$(Q%);
1970   PRINTTAB(16);
1980   FORW%=A%TONL%:PRINT;L%(W%,Q%),;
1990     NEXT
2000   PRINT
2010   NEXT
2020 VDU3
2030 ENDPROC
2040 IFCY$="NO"THENPROCno:ENDPROC
2050 PRINT"I CANNOT DO THAT."
2060 ENDPROC
2070
2080
2090 DEF PROCquestion
2100 L$="":T$(A%)=WO$(WN%):TN(A%)=WN%
2110 FORQ%=2 TOWN%-A%:L$=L$+WO$(Q%)+" ":NEXT
2120 L$=LEFT$(L$,(LEN(L$)-A%))
2130 FORQ%=A%TO M%-A%
2140   IF L$=M$(Q%)THEND%=Q%:Q%=M%-A%
2150   NEXT
2160 IFD%=0THEND%=9
2170 FORQ%=A%TOM%-A%
2180   IFT$(A%)=M$(Q%) THENB%=Q%:Q%=M%-A%
2190   NEXT
2200 PROCanswer
2210 IFC%>A%THEN GOTO2240
2220 PRINT" I HAVE NO ANSWER FOR YOU."
2230 ENDPROC
2240 PRINT
2250 FORQ%=A%TOC%
2260   PRINTA$(Q%)
2270   NEXT
2280 ENDPROC
2290
2300
2310 DEF PROCsleep
2320 REPEAT
2330   FORV%=A% TO NK%
2340     IFL%(V%,U%)=0THEN GOTO2390
2350     G%=L%(V%,U%):IFG%>ZN%THEN2390
2360     E%=G%DIVZ%:H%=G%MODZ%
2370     IFH%>J% THENF%=A%:H%=H%-J%
2380     IFE%<15 AND E%>9 AND M$(H%)<>M$(U%)THEN PROCsleep_sort ELSE PROClink_s
ort
2390     K$=INKEY$(0)
2400     IFK$<>""THENV%=NK%
2410     F%=0:NEXT
2420   U%=U%+A%:IFU%=M%THENU%=A%
2430   UNTIL K$<>""
2440 ENDPROC
2450
2460
2470 DEF PROCsleep_sort
2480 S1%=H%
2490 FORI%=A%TONL%
2500   F%=0
2510   G%=L%(I%,S1%):IFG%>ZN%THEN2560
2520   E%=G%DIVZ%:H%=G%MODZ%
2530   IFH%>J% THEN H%=H%-J%:F%=A%
2540   IF I%=NL% THEN2560
2550   IFE%>9 AND M$(H%)<>M$(U%) THEN PROCsleep_new
2560   NEXT
2570 IF E%=9 THEN S1%=H% :GOTO2490
2580 ENDPROC
2590
2600
2610 DEF PROCsleep_new
2620 IF F%=A%THEN T$(A%)=M$(H%):T$(2)=M$(U%):L$=M$(E%):GOTO2640
2630 T$(A%)=M$(U%):T$(2)=M$(H%):L$=M$(E%)
2640 PROCmemstore
2650 ENDPROC
2660
2670
2680 DEF PROCsave
2690 S=OPENOUT("L_DATA")
2700 FORQ%=A%TOM%-A%
2710   PRINT£S,M$(Q%)
2720   FORP%=A%TONL%:PRINT£S,L%(P%,Q%):NEXT
2730   NEXT
2740 CLOSE£S
2750 ENDPROC
2760
2770
2780 DEF PROCload
2790 Q%=A%
2800 S=OPENIN("L_DATA")
2810 REPEAT
2820   INPUT£S,M$(Q%)
2830   FORP%=A%TONL%:INPUT£S,L%(P%,Q%):NEXT
2840   Q%=Q%+A%
2850   UNTIL EOF£S
2860 CLOSE£S
2870 M%=Q%
2880 ENDPROC
2890
2900
2910 DEF PROClink_sort
2920 S1%=H%:S2%=E%
2930 FORI%=A%TONL%
2940   G%=L%(I%,S2%):IFG%>ZN%THEN2990
2950   E%=G%DIVZ%:H%=G%MODZ%
2960   IFH%>J%THENH%=H%-J%
2970   IFI%=NL%THEN2990
2980   IFE%<15 AND E%>9THENE%=H%:H%=S1%:PROCsleep_new
2990   NEXT
3000 IF E%=9 THENS2%=E%:GOTO2930
3010 ENDPROC
3020
3030
3040 DEF PROCno
3050 CLS
3060 PRINTTAB(4,10)"WHICH STATEMENT IS INCORRECT ?"
3070 PRINT
3080 INPUTCY$
3090 PROCword_sort
3100 PROCtype
3110 Q%=0
3120 F%=0
3130 REPEAT
```

```
3140   Q%=Q%+A%
3150   IFT$(A%)=M$(Q%)THENF%=A%
3160   UNTIL F%=A% OR Q%>M%
3170 IFQ%>=M%THENPRINT''"I NEVER SAID THAT.":ENDPROC
3180 F%=0:F1%=0:D%=0
3190 FORC%=A%TONL%
3200   F%=0
3210   B%=L%(C%,Q%)
3220   IFB%=0THENC%=NL%:NEXT:GOTO3290
3230 IFB%>ZN%THENF%=A%:B%=B%-ZN%
3240 O%=B%DIVZ%:P%=B%MODZ%
3250 IFP%>J%THENP%=P%-J%
3260 IFM$(P%)=T$(2)ANDM$(O%)=L$THENF1%=A%:D%=C%:C%=NL%:NEXT:GOTO3300
3270 NEXT
3280 IFQ%=9THENQ%=P%:GOTO3190
3290 PRINT'" I NEVER SAID THAT !":ENDPROC
3300 IFF%=A%THENPRINT'" I ALREADY KNOW THAT.":ENDPROC
3310 F%=0:F1%=0
3320 B%=L%(D%,Q%)
3330 L%(D%,Q%)=L%(D%,Q%)+ZN%
3340 O%=B%DIVZ%:P%=B%MODZ%
3350 IFP%>J%THENP%=P%-J%:F%=A%
3360 IFP%=0THEN3440
3370 FORC%=A%TONL%
3380   X6%=L%(C%,P%):IFX6%>ZN%THEN3420
3390   X7%=X6%DIVZ%:X8%=X6%MODZ%
3400   IFX8%>J%THENX8%=X8%-J%
3410   IFM$(X7%)=L$ AND M$(X8%)=T$(A%) THENL%(C%,P%)=L%(C%,P%)+ZN%:F1%=A%
3420   NEXT
3430 IFF1%=0THENP%=L%(NL%,P%)MODZ%:GOTO3360
3440 IFF1%=0THENPRINT" I ONLY FOUND HALF OF THAT."
3450 PRINT'" GOT THAT."
3460 ENDPROC
```



Atom Quest

by Nick Foale

In our enthusiasm for all those shiny new micros, *PCW* doesn't forget the older machines — and here's an Atom program to prove it. 'Quest' is an adventure program for the 8k machine.

You start out in a dungeon. Within this dungeon, you'll find all the usual dungeon-type things — bats, trapdoors, treasure (adventure game dungeons *always* contain treasure), a Wampus or two, pits, Belor — master of the dungeon, magic crystals and the Neidus. It's the Neidus you're after.

There are five horizontal and five vertical walls (I always thought that horizontal walls were called floors, but no matter). Run into one of these and you'll gain a headache and lose five points.

Bats have a nasty habit of picking you up bodily and hauling you off to another part of the dungeon. During this unwanted journey, you'll probably drop some or all of your treasure. One magic crystal will kill the bat and gain you 30 points.

The trapdoor is the only means of escape from the dungeon; find it, and you have the option of continuing in your quest or getting the hell out.

There are 20 diamonds worth 50 points each if you manage to leave the dungeon alive with them.

Wampi (plural of Wampus) are . . . no, you don't want to know about Wampi. Try to imagine a deranged Oric-owning traffic warden, and you're getting warm. Wampi eat you. Killing one requires between one and six magic crystals and will gain you lots of points.

Pits are (a) bottomless and (b) to be avoided. Like an unreliable lift, once you step into one, motion is suspended. A magic crystal will save you.

Belor is like a Wampus, only more so. However, she won't actually harm you — but will just follow you around and think a lot about harming you. If you hold the full Neidus, you can transport her and gain 2500 points.

The Neidus is in three parts. Each part is worth 1000 points, and a 2000-point bonus is awarded if you escape with all three parts.

You have ten commands available: N, NE, E, SE, S, SW and NW for the eight points of the compass, plus H for H)elp and T to T)ransport you to a random section of the dungeon.

There are five skill levels, and three warning levels. The skill level determines the number of nasty things in the dungeon (A is the hardest). Warning level C warns you about all nearby dangers except pits, B warns you of Neidus and Belor and A gives you no warnings whatsoever. The author plays on skill A, warning C and reckons over 5000 points is good.

The dungeon is randomly created each time the program is run.

```
LST  IST
  3DIMDD9;@=0;T=0;M=6;P=0;E=#8203;F=#2800;O=0;H=#2840;Q=#2880
 21F.Z=0TO440;E?Z=0;N.
 23P.$12
 24?#E1=0
 25F.Z=1TO15;F.X=0TOZ;P." ";N.
 30P."THE QUEST"';N.Z;F.Z=1TO250;WAIT;N.
 31P.$30;?#E1=0
 32P.''''''''"      a nick foale creation"';F.Z=0TO220;WAIT;N.
 35P.$12"GOOD MORROW OH BRAVE ONE,I BE"'"THE INN-KEEPER."
 45P."INSIDE THE"'"DUNGEON IT BE AS DARK AS PITCH."'
 60P."YOU ENTER HAVING ONLY 6 MAGIC"'"CRYSTALS AND A COMPASS."
 61IN.''"WHAT IS YOUR NAME OH BRAVE ONE"'$H
 62IN."LEVEL (A-E) "$F;G.4000
```


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These listings provide the source for an implementation of FORTH up to 79 standard.

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A complete 'how to do it' guide to the implementation of FORTH from the above listings. This manual contains the FORTH source written in FORTH, an editor, an extensive glossary and lots more.

ALL ABOUT FORTH by Haydon **£7.95**
An excellent reference book with cross references to fig-FORTH, the FORTH-79 standard and Starting FORTH. This book should be next to every FORTH Programmer's computer.

6809 & 6502 MACROASSEMBLERS ..... **£5 each**
Written in fig-FORTH, these listings require the minimum of alteration for any fig implementation. Copies on tape can be supplied for Dragon and Microtan users at £1 extra.

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PROGRAMS

```
 70IN."WARNINGS (A-C) "$F;IF?F(65OR?F)67G.70
 80P."PREPARE TO MEET THY DOOM !!"'
200F.Z=0TO20;E?Z=1;N.
210F.Z=420TO440;E?Z=1;N.
220F.Z=0TO420STEP21;E?Z=1;N.
230F.Z=20TO440STEP21;E?Z=1;N.
235F.K=2TO14S.6;L=A.R.%18+2;F.N=K TOK+4
236?(E+N*21+L)=1;N.;N.
237F.K=1TO5;G=A.R.%18+2;DOL=A.R.%9+2;N=A.R.%9+10
238C=A.(L-N);U.C)5A.C(15
239F.U=L TON;?(E+U+G*21)=1;N.;N.
260F.Z=1TO20
270DOY=A.R.%441;U.E?Y=0
280E?Y=3;N.
290F.Z=1TOR
300DOY=A.R.%441;U.E?Y=0
310E?Y=4;N.
312F.Z=1TO(I/3)
313DOY=A.R.%441;U.E?Y=0
314E?Y=7;N.
315F.Z=1TOI
320DOY=A.R.%441;U.E?Y=0
325E?Y=5
330DOY=A.R.%441;U.E?Y=0
335E?Y=6;N.
360F.Z=1TO50
370DOY=A.R.%441;U.E?Y=0
380E?Y=8;N.
415F.Z=1TO3
420DOY=A.R.%441;U.E?Y=0
425E?Y=2;N.
430DOV=A.R.%441;U.E?V=0
440E?V=9
487DOA=A.R.%441;U.E?A=0
490G.6000
491F.Z=1TO100;WAIT;N.;P.$12;GOS.5000
492DD1=A+22;DD2=A+21;DD3=A+20;DD4=A-1;DD5=A+1;DD6=A-22
493DD7=A-21;DD8=A-20;IF?F=CH"A"G.600
494IF?F=CH"B"G.520
495S=0;F.Z=1TO8;IF E?DD(Z)=1 S=1
496N.;IF S=1P."YOU FEEL A SLIMY WALL"'
497S=0;F.Z=1TO8;IF E?DD(Z)=3 S=1
498N.;IF S=1P."TREASURE!TREASURE!"'
499S=0;F.Z=1TO8;IFE?DDZ=4S=1
500N.;IFS=1P."TRAPDOOR !! TRAPDOOR !!"'
511S=0;F.Z=1TO8;IF E?DD(Z)=5S=1
512N.;IF S=1P."YOU SMELL THE FOUL STENCH OF A"'"WAMPUS."'
513S=0;F.Z=1TO8;IF E?DD(Z)=6S=1
514N.;IF S=1P."YOU HEAR WINGFLAPS OF BATS"'
517S=0;F.Z=1TO8;IF E?DD(Z)=8S=1
518N.;IF S=1P."YOU FEEL A MAGICAL FORCE"'
520S=0;F.Z=1TO8;IFE?DDZ=2S=1
522N.;IFS=1P."NEIDUS IS NEAR."'
525S=0;F.Z=1TO8;IFE?DDZ=9S=1
528N.;IFS=1P."BELOR!BELOR!"'
600P.'"WHAT DO YOU WISH TO DO OH "'$H';IN.$Q
610IF?Q=84G.900
612IF?Q=72G.800
615B=A
620IF$Q="NW"OR$Q="NE"OR$Q="N"B=B+21
630IF$Q="SW"OR$Q="SE"OR$Q="S"B=B-21
640IF$Q="NW"OR$Q="SW"OR$Q="W"B=B-1
650IF$Q="NE"OR$Q="SE"OR$Q="E"B=B+1
700IF E?B=1  P."CLONK,YOU HIT A WALL"';P=P-5 ;G.490
710IF E?B  =3P."YOU FOUND SOME TREASURE"';T=T+1;E?B=0
720IF E?B=4G.950
725IFE?B=2G.1300
730IF E?B=5G.1000
735IFE?B=9G.1400
740IF E?B=6G.1100
750IF E?B=7G.1200
760IFE?B=8P."YOU FOUND A MAGIC CRYSTAL"';M=M+1;E?B=0
770A=B;G.490
800IFM(1G.930
805P.$12;K=A/21;L=A%21;F.Z=0TO20;F.Y=0TO20
810IF?(E+Y+Z*21)=2P."NEIDUS";G.850
815IF?(E+Y+Z*21)=4P."TRAPDOOR";G.850
816IF?(E+Y+Z*21)=9P."BELOR";G.850
820N.;N.;P.'"any key";LINK#FE94;P.';M=M-1;G.490
850IFK(Z P." NORTH "
855IFK)Z P." SOUTH "
860IFL(Y P." EAST "
865IFL)Y P." WEST "
870P.';G.820
900IFM=0G.930
905P."YOUR HEAD SPINS AS YOU ARE"'"TRANSPORTED TO ..."
910DOA=A.R.%441;U.E?A=0
920M=M-1;G.490
930P."BUT YOU HAVE NO MAGIC CRYSTALS"';G.490
950IN."DO YOU WISH TO ESCAPE "$Q";IF?Q=CH"Y"G.2000
960IF?Q=CH"N"P."BRAVE KNIGHT !!";A=B;G.490
970P."YES OR NO?"';G.950
1000IFM)0G.1025
1010P."THE WAMPUS HAS EATEN YOU"'
1020P."BUT YOU GAINED "P" POINTS FOR"'"BRAVERY"';E.
1025P."YOU DISTURBED THE WAMPUS"'
1030X=A.R.%6+1;IFX)M G.1060
1040P."BUT YOU DESTROYED IT WITH "X'"MAGIC CRYSTALS"';E?B=0
1050A=B;P=P+X*50;M=M-X;G.490
1060P."BUT YOUR MAGIC WAS TOO WEAK.YOU NEEDED "X" MAGIC"
1065P." CRYSTALS AND"'"HAD ONLY "M'
1070P."BUT YOU GAINED "P" POINTS FOR"'"BRAVERY"';E.
```

PROGRAMS

```
1100P."SUPERBATS!"'
1110IFM)0G.1150
1115DOA=A.R.%441;U.E?A=0
1130N=A.R.%(T+1) ;P."YOU LOST "N" DIAMONDS IN"'"THE PANIC."'
1132T=T-N
1135F.Z=1TON
1136DOX=A.R.%441;U.E?X=0
1137E?X=3;N.
1140G.490
1150IN."MAGIC(YES OR NO)"$Q;IF?Q=CH"Y"G.1155
1151IF?Q=CH"N"G.1115
1153P."YES OR NO ?"';G.1150
1155P."YOU KILLED THE BATS!!"';A=B;M=M-1;E?A=0;P=P+30;G.490
1200IF M)0G.1255
1210P."AAAAAAHHHHHHH"'
1220P."YOU FELL DOWN A PIT BUT WON"'P" POINTS FOR BRAVERY"';E.
1255P."YOU STUMBLED ON A BOTTOMLESS PITBUT A MAGIC CRYSTAL"'
1260P."SAVED YOU !"';M=M-1;P=P-10;G.490
1300O=O+1;IFO=3G.1350
1310P."YOU HAVE FOUND PART "O" OF THE"'"NEIDUS."';G.1430
1350P."YOU HAVE FOUND THE FINAL PART OFTHE NEIDUS."';G.1430
1400IFO=3G.1450
1410P."THE EVIL BELOR HAS KILLED YOU !!"'"YOU EARNED "P
1420P." POINTS FOR BRAVERY."';E.
1430A=B;E?A=0;G.490
1450P."BELOR ATTACKS BUT YOU TRANSPORT HER WITH THE NEIDUS."'
1460P."NOW IT IS LOST AGAIN."';E?B=0;F.Z=1TO3
1470DOY=A.R.%441;U.E?Y=0
1480E?Y=2;N.
1482DOV=A.R.%441;U.E?V=0
1484E?V=9;O=0;A=B;P=P+2500;G.490
2000IFO=3P."YOU ESCAPED WITH THE FULL NEIDUS,WINNING ";G.2020
2005P."YOU ESCAPED ALIVE & WON "P+T*50+O*1000'"POINTS"';E.
2020P.5000+P+T*50" POINTS."';E.
4000IF?F=CH"A"R=1;I=20
4010IF?F=CH"B"R=1;I=15
4020IF?F=CH"C"R=1;I=10
4030IF?F=CH"D"R=2;I=10
4040IF?F=CH"E"R=3;I=7
4050IF?F(65OR?F)69G.62
4060G.70
5000P."DIAMONDS:"T"       POINTS:"P'"MAGIC:"M
5010P."          NEIDUS:"O;IFO=3P."*"
5020P.'';R.
6000IFV-A)21W=V-21+R.%2;G.6020
6005IFA-V)21W=V+21+R.%2;G.6020
6010IFV-A(0W=V+1;G.6020
6015W=V-1
6020IFW=A G.491
6025IFE?W=0;E?V=0;V=W;E?V=9
6030G.491
```

MZ-80 Frogitt

by R Wells and A Francis

'Frogitt' runs under 'A' Basic on either an MZ-80K or MZ-80A. Basic SA-5510 should be used on the MZ-80K. The program will also run on the MZ-700 under Basic SA-5510.

The title is not meant to refer to the sort of thing someone might mutter after losing a program, but rather to the arcade game 'Frogger'. The game is a standard version, and all necessary instructions are contained within the program.

```
1 REM ┌──────────────────────┐
2 REM │ /──────────────────\ │
3 REM ‖ [ FROGITT ]  by R.WELLS and ‖
4 REM │ \        A.FRANCIS   / │
5 REM │  \──────────────────/  │
6 REM │                       │
7 REM │                       │
8 REM │                       │
9 REM └──────────────────────┘
10 REM
11 REM
12 REM
13 REM
14 REM
15 NB=2000:S=0:D=0:FR=3:SC=100:TI=5:O=112:PRINT"■■■■";:MAN=175:WA=126:DIMF$(3)
20 GOSUB6000:RESTORE3000:GOSUB3000:IFFE=0THENGOSUB32000
21 PRINT"■■Push I for instructions or S to start"
22 GETA$:IFA$=""THEN22
23 IFA$="I"THENGOSUB6300:PRINT:GOTO21
24 IFA$<>"S"THEN22
25 PRINT"■"
29 FE=255
30 GOSUB2000
40 M=53248+18+16*40:POKEM,MA:GOSUB16000
50 PIP$="+B0":TEMP07:P2$="-C0"
100 FORL=1TOTI*1.4
105 GETA$
110 IFA$="Z"THEN500
120 IFA$="X"THEN600
130 IFA$="."THEN800
135 NEXTL
137 FORX=1TOTI*2:NEXTX
140 POKEM,O:M=M+D
150 USR(#C500):POKEM,MA
160 GOSUB16000:IF(LC<1)+(LC>37)THEN1000
200 REM
215 IFRND(1)<.3THENIFS>1000THENPOKEM,O:USR(#CA00):M=M+D:POKEM,MAN
```


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PROGRAMS

```
216 GOSUB16000
220 GOTO100
500 IFPEEK(M-1)=0THEN1000
510 POKEM,0:M=M-1:O=PEEK(M):POKEM,MA
530 GOTO135
600 IFPEEK(M+1)=0THEN1000
610 POKEM,0:M=M+1:O=PEEK(M):POKEM,MA
630 GOTO135
800 IFPEEK(M-80)=107THEN1500
801 IFPEEK(M-80)=0THEN1000
803 IFM<53447THEN1000
805 IFD=0THEND=1
810 D=-D:POKEM,0:M=M-80:O=PEEK(M):POKEM,MA
820 MUSICP2#:S=S+SC:GOSUB2075:GOTO137
999 END
1000 FORX=5TO100:POKE#11A2,X:USR(68):NEXTX
1001 F=0
1010 USR(71)
1011 POKEM,0:IFA#="Z"THENF=M-1
1012 IFA#="X"THENF=M+1
1013 IFA#="."THENF=M-80
1014 IFF=0THENF=M
1015 FORX=0TO15:POKEF,107:FORV=0TO30:NEXTV:POKEF,0:FORV=0TO30:NEXTV:NEXTX
1020 POKEM,0:MUSIC"R0"
1030 CURSOR16,22:PRINT"SPLAT!!!"
1040 FORV=0TO500:NEXTV
1050 CURSOR16,22:PRINT"          "
1060 FR=FR-1:IFFR<0THEN1100
1065 IFFR>2THENS=S+100:USR(62):USR(62)
1070 CURSOR0,18:PRINT"■■■FROGS remaining:";FR
1080 GOSUB2000:M=53248+18+16*40:POKEM,MA:D=0:O=112
1090 LC=19:GOTO100
1100 PRINT"■";
1110 PRINT"■■■■■■■■■■■■You have been laid to rest."
1112 PRINT"■■■ Depress any key to halt the funeral!■■■
1115 GOSUB32100
1116 IFS>HSTHENHS=S:PRINT"■But don't worry!you broke the high score"
1117 PRINT"■The high score is at ";HS
1120 PRINT"■■■■■■■■■■■■■■■Try again";
1130 INPUTL$
1140 IFLEFT$(L$,1)="Y"THENRUN1
1150 IFLEFT$(L$,1)="N"THENEND
1160 TEMPO7:PRINT"■■■":MUSIC"+C0+D+E+F+C+D+E2R0"
1170 GOTO1120
1500 MUSIC"C2R1+C2R1C2+C6R0"
1505 POKEM,0:POKEM-80,MAN
1510 CURSOR16,21:PRINT"WELL DONE !"
1520 SC=SC+10
1530 CURSOR10,23:PRINT"Jumps now worth ";SC:TI=TI-.5:IFTI<0THENTI=0
1540 FORV=0TO1500:NEXTV
1550 CURSOR16,21:PRINT"          "
1560 CURSOR10,23:PRINT"                    "
1565 IFS>NBTHENNB=NB+2000:GOSUB1800:S=S+100:FR=FR+1
1566 IFS>4000THENIFSB=1THENPRINT"■SPECIAL BONUS!!!!":SB=0:S=S+100:FR=FR+2
1570 GOTO1080
1800 PRINT"■":TEMPO4:FORX=1TO5
1810 CURSOR16,12:PRINT"! BONUS !"
1820 USR(62)
1830 CURSOR16,12:PRINT"          "
1840 USR(62):NEXTX
1850 PRINT"■■■You now recieve 100 points and an extra ■frog to play with."
1852 PRINT"■■+PLUS you also get 100 points for each"
1853 PRINT"■FROG you already have: 100X";STR$(FR);"=";STR$(100*FR)
1854 S=S+(100*FR)
1855 IFFR=2THENPRINT"■That's amazing! You lost no FROGS in"
1856 IFFR=2THENPRINT"■that session! Have one free!":FR=FR+1
1860 FORV=0TO3000:NEXTV
1870 PRINT"■":TI=1:TEMPO7:    RETURN
1999 END
2000 DATA 204,112,200,145,149,246
2001 RESTORE2000
2010 FORX=1TO6:READ CHAR
2020 CURSOR 0,2+(2*X):PRINTSTRING$(CHR$(CH),39)
2030 CURSOR0, 2+(2*X)
2035 CURSOR0,18:PRINT"■■■FROGS remaining:";FR
2040 FORV=1TOINT(RND(1)*20)+10:CURSORINT(RND(1)*39),2+(2*X):PRINT" ":NEXTV
2050 NEXTX
2055 CURSOR1,0:PRINT"Frogitt (C) 1983 by THANET SOFTWARE"
2060 CURSOR0,3:PRINTSTRING$("",40)
2070 CURSOR0,16:PRINTSTRING$("",40)
2071 CURSOR12,2:PRINT"■■ ■■■■__■■■■  "
2072 CURSOR25,2:PRINT"■■ ■■■■__■■■■  "
2075 CURSOR3,19:PRINT"SCORE:    ";S:IFS>HSTHENHS=S
2076 PRINT"■■■HI SCORE:";HS
2080 RETURN
2999 END
3000 POKE#C000,00
3010 POKE#C001,00
3020 POKE#C002,00
3030 POKE#C003,#3A:REM LD A(nn)
3040 POKE#C004,#00
3050 POKE#C005,#00
3060 POKE#C006,#21:REM LD HL(ST)
3070 POKE#C007,#00
3080 POKE#C008,#00
3090 POKE#C009,#11:REM LD DE(FI)
3100 POKE#C00A,#00
3110 POKE#C00B,#00
3120 POKE#C00C,#01
3130 POKE#C00D,39
3140 POKE#C00E,#00
3150 POKE#C00F,#ED:REM LDDR
3160 POKE#C010,#B0
3170 POKE#C011,#32:REM LD(nn),A
3180 POKE#C012,#00
3190 POKE#C013,#00
3200 POKE#C014,#C9
3500 POKE#C100,00
3510 POKE#C101,00
3520 POKE#C102,00
3530 POKE#C103,#3A:REM LD A(nn)
3540 POKE#C104,#00
3550 POKE#C105,#00
3560 POKE#C106,#21:REM LD HL(ST)
3570 POKE#C107,#00
3580 POKE#C108,#00
3590 POKE#C109,#11:REM LD DE(FI)
3600 POKE#C10A,#00
3610 POKE#C10B,#00
3620 POKE#C10C,#01
3630 POKE#C10D,39
```

PROGRAMS

```
3640 POKE#C10E,#00
3650 POKE#C10F,#ED:REM LDDR
3660 POKE#C110,#B8
3670 POKE#C111,#32:REM LD(nn),A
3680 POKE#C112,#00
3690 POKE#C113,#00
3700 POKE#C114,#C9
4000 REM CREATE M/C ROUTINE
4010 DATA 62,199,50,4,193,62,208,50,5,193
4020 DATA 62,198,50,7,193,62,208,50,8,193
4030 DATA 62,199,50,10,193,62,208,50,11,193
4040 DATA 62,160,50,18,193,62,208,50,19,193
4050 DATA 205,00,193
4060 DATA 62,103,50,4,193,62,209,50,5,193
4070 DATA 62,102,50,7,193,62,209,50,8,193
4080 DATA 62,103,50,10,193,62,209,50,11,193
4090 DATA 62,64,50,18,193,62,209,50,19,193
4100 DATA 205,00,193
4110 DATA 62,07,50,4,193,62,210,50,5,193
4120 DATA 62,06,50,7,193,62,210,50,8,193
4130 DATA 62,07,50,10,193,62,210,50,11,193
4140 DATA 62,224,50,18,193,62,209,50,19,193
4150 DATA 205,00,193
4155 L=50432
4160 FORX=1TO3
4170 FORY=1TO40
4190 READA:POKEL,A:L=L+1:NEXTY
4200 READ A,B,C:POKEL,A:L=L+1:POKEL,B:L=L+1:POKEL,C:L=L+1
4220 NEXTX
4230 POKEL,0:L=L+1
4240 DATA 62,240,50,04,192,62,208,50,05,192
4250 DATA62,241,50,7,192,62,208,50,8,192
4260 DATA 62,240,50,10,192,62,208,50,11,192
4270 DATA 62,23,50,18,192,62,209,50,19,192
4280 DATA 205,00,192
4290 DATA 62,144,50,04,192,62,209,50,5,192
4300 DATA 62,145,50,7,192,62,209,50,8,192
4310 DATA 62,144,50,10,192,62,209,50,11,192
4320 DATA 62,183,50,18,192,62,209,50,19,192
4330 DATA 205,00,192
4340 DATA 62,48,50,04,192,62,210,50,5,192
4350 DATA 62,49,50,07,192,62,210,50,8,192
4360 DATA 62,48,50,10,192,62,210,50,11,192
4370 DATA 62,87,50,18,192,62,210,50,19,192
4380 DATA 205,00,192
4390 L=51712
4400 FORX=1TO3
4410 FORY=1TO40:READA:POKEL,A:L=L+1:NEXTY
4420 READ A,B,C:POKEL,A:L=L+1:POKEL,B:L=L+1:POKEL,C:L=L+1
4430 NEXTX
4440 POKEL,#C9
4450 RETURN
6000 REM TITLE PAGE AND INSTRUCTIONS
6020 PRINT"
6030 PRINT"
6040 PRINT"
6050 PRINT"
6060 PRINT"
6070 PRINT"
6080 PRINT"
6090 PRINT"
6100 PRINT"
6110 PRINT"
6120 PRINT"
6130 PRINT"
6140 PRINT" [ Frogitt ] by R. Wells & A. Francis"
6150 PRINT"
6170 RETURN
6300 PRINT"■":
6310 PRINT"   This is the rather bizzarre game of"
6320 PRINT
6330 PRINT"*** FROGITT ***, where the poor frog"
6340 PRINT
6350 PRINT"is made to cross a fast flowing river."
6360 PRINT
6370 PRINT"   One problem he has to overcome is"
6380 PRINT
6390 PRINT"is that he is unable to swim. Another"
6400 PRINT
6410 PRINT"is that the only way across the river"
6420 PRINT
6430 PRINT"is the log method, which consists of "
6440 PRINT
6450 PRINT"jumping from log to log until the muck"
6460 PRINT
6470 PRINT"longed for opposite bank is reached."
6480 GETA$:IFA$=""GOTO6480
6490 PRINT"■■   When the 'lucky' frog achieves this,"
6500 PRINT
6510 PRINT"he can sit on his Lilly Pad and croak":PRINT
6520 PRINT"'till his heart's content- well, almost-"
6530 PRINT"in actual fact, he then is put back at"
6540 PRINT
6550 PRINT"the wrong side of a faster flowing river"
6560 PRINT"and he must cross it in the same way!"
6570 GETA$:IFA$=""THEN6570
6580 PRINT"■":
6590 PRINT"   The frog will have three lives."
6600 PRINT
6610 PRINT"   The reward in points for jumping "
6620 PRINT
6630 PRINT"successfully from one log to another"
6640 PRINT
6650 PRINT"increases every time the river is
6660 PRINT
6670 PRINT"crossed. A bonus occurs every 2000 pts."
6671 PRINT:PRINT"A high score is held, and if you get to"
6672 PRINT:PRINT"4000 pts, a special bonus occurs."
6673 PRINT:PRINT"If you get to a 2000 pts bonus without"
6674 PRINT:PRINT"loss of any FROGS, a further bonus is   awarded!"
6675 GETA$:IFA$=""THEN6675
6680 PRINT"■ Use the following keys to move
6685 PRINT"■■■              ./ Leaps Frog
6690 PRINT"
6700 PRINT"
6710 PRINT"
6720 PRINT"        'Z'moves      'X'moves
6730 PRINT"          Left          Right
6740 PRINT"
6750 PRINT"
6760 PRINT"
```


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PROGRAMS

```
6770 PRINT"
6780 RETURN
16000 LC=(((M-53248)/40)-INT(((M-53248)/40)))*40:RETURN
32000 REM
32001 L1$="ˆD4ˆD0RˆD2R0ˆD5A3ˆ#F4ˆ#F0RˆF2R0ˆ#F5ˆD3ˆA5ˆ#F3ˆA"#F"D"
32002 L2$="A4A0RA2R0A6":L3$="ˆA4ˆA0R0ˆA2R0ˆA6"
32003 L4$="A5ˆD3A5ˆ#F3A5ˆD3A5ˆ#F3A5ˆ#F3ˆD"#F"AA4A0RA2R0A6"
32004 L5$="A4A0RA2R0A5#F3G4G0RG2R0G5E3#F4#F0R#F3AG#F"
32005 L6$="E6R":L7$="A4A0RA3ˆD6"
32010 TEMPO 6:MUSIC L1$,L2$,L1$,L3$,L4$,L5$,L6$:RETURN
32100 REM
32101 F$(1)="G0AB4A3G2R0G3#FEDB5A3GˆCBA5D0GB4A3G2R0G3#FED"
32102 F$(2)="G5#F3DE#FG5B0ˆCˆD4ˆC3BˆC1ˆD0BˆD1ˆEˆD3B"
32103 F$(3)="ˆE5ˆD3BˆE1ˆDˆCBA5D0GˆD4ˆC3BˆC1ˆD0BˆD1ˆEˆD3BˆC5B3AG#FG5"
32110 TEMPO 5:FORX=1TO3:GETA#:IFA#<>""THENRETURN
32220 MUSIC F$(X):NEXTX:TEMPO 6:RETURN
```

NewBrain Disassembler

by C T Forshaw

What can you say about a disassembler? The program converts parts of the NewBrain ROM (or EPROM, as it appears to be on most machines) into assembler mnemonics. Output can be directed to screen or printer.

The program is both annotated and error-trapped.

```
100  REM ** CALL SUBROUTINES  FOR INITIALISATION AND JUMP TO MAIN LOOP
110
120 GOSUB 810:GOSUB 1260:GOSUB 160:ONERRORGOTO 1170:ONBREAKGOTO 1190:GOTO 680
130
140 REM ** INTRODUCTION AND PRINTER SET-UP
150
160 ?
170 ?TAB(20);"**********************************************"
180 ?TAB(20);"**                                          **"
190 ?TAB(20);"** Z80 DISASSEMBLER c C.T.FORSHAW 1983 **"
200 ?TAB(20);"**                                          **"
210 ?TAB(20);"**                V4.0                      **"
220 ?TAB(20);"**                                          **"
230 ?TAB(20);"**********************************************"
240 ?
250 ?"LISTING CONTROLS":?"":?"During the disassembly press 'ESCA
PE' to enter a new address,turn the printer":?"ON/OFF or page in a memory block
to be disassembled":?:?"Press any other key except 'STOP' to pause or continue t
he disassembly listing":?
260 ?"Have you a printer connected to the printer socket and do you require a"
270 ?"printed output of the disassembly listing (press 'Y' for YES 'N' for NO)?"
280 GET#1,A:IFA=0GOTO 280
290 IFA<>89ANDA<>78GOTO 280
300 LP=FALSE
310 IFA=78THEN RET
320 PUT13,0:INPUT("Enter the baudrate of the printer (75 TO 19200):")BD$
330 ONERRORGOTO 370
340 CLOSE#2:OPEN#2,8,BD$
350 LP=TRUE
360 RET
370 PUT13,0:?"Not a valid baud rate":PUT11,11,11,11:RESUME 320
380
390 REM ** MOST CODES ARE DECODED HERE USING THE ARRAYS H$(),M$(),R$(),L$()
400
410 IFP>191THEN I$=H$(P-191):GOTO 450
420 IFP>127THEN P=P-128:I=INT(P/8):I$=M$(I+1)+R$(P-8*I):RET
430 IFP>63THEN P=P-64:R=INT(P/8):I$="LD "+R$(R)+","+R$(P-R*8):RET
440 I$=L$(P+1)
450 IFLRET
460 F=INSTR(I$,"V"):IFFGOTO 490
470 F=INSTR(I$,"W"):IFFTHEN P=PEEK(S+1)+PEEK(S+2)*256:S=S+2:N$="0000":CALL32640,
P,N$:I$=LEFT$(I$,F-1)+N$+MID$(I$,F+1):RET
480 RET
490 IFLEFT$(I$,2)="JR"ORLEFT$(I$,4)="DJNZ"THEN S=S+1:P=PEEK(S)+S-(256ANDPEEK(S)>
127)+1:N$="0000":CALL32640,P,N$:I$=LEFT$(I$,F-1)+N$+MID$(I$,F+1):RET
500 S=S+1:P=PEEK(S):N$="0000":CALL32640,P,N$:I$=LEFT$(I$,F-1)+RIGHT$(N$,2)+MID$(
I$,F+1):RET
510 P=PEEK(S):Q=S:D=0
520 F=INSTR(CK$,CHR$(P)):IFFGOTO 900
530 GOSUB 410
540
550 REM ** PRINT DECODED LINE AND TEST KEYBOARD
560
570 N$="0000":CALL32640,Q,N$
580 IFLP=TRUETHEN PT$="      "+N$+"            "+I$+LEFT$("
      ",30-LEN(I$));FORF=QTOS:P=PEEK(F):CALL32640,P,N$:PT$=PT$+RIGHT$(N$,2)+"
":NEXTF:?#2,PT$:GOTO 600
590 ?:?TAB(5);N$;TAB(15);I$;TAB(40);:PT$="";FORF=QTOS:P=PEEK(F):PT$=PT$+CHR$(27)
+CHR$(P):CALL32640,P,N$:?RIGHT$(N$,2);"  ";:NEXTF:?TAB(65);PT$;
600 S=S+1
610 GET#1,A:IFA=0GOTO 510
620 IFA=27GOTO 680
630 GET#1,A:IFA=0GOTO 630
640 IFA<>27GOTO 510
650
660 REM ** ENTER NEW START ADD./PRINTER COMMAND/PAGE COMMAND:START OF MAIN LOOP
670
680 ?:?:PUT10:?"[Enter 'ON' to turn ON printer,'OFF' to turn OFF printer,'PAGE'
to page memory]";:PUT11,28:?"Enter hex address of first location for disassemble
r :";:INPUT("")N$:PUT10
690 IFN$="OFF"THEN CLOSE#2:LP=FALSE:?:?"Printer OFF":GOTO 680
700 IFN$="ON"GOSUB 320:ONERRORGOTO 1170:GOTO 680
710 IFN$="PAGE"GOSUB 1370:ONERRORGOTO 1170:GOTO 680
720 S=0:FORF=1TOLEN(N$):A=INSTR("0123456789ABCDEF ",MID$(N$,F,1),1)-1
```

PROGRAMS

```
730 IFA=-1GOTO 770
740 IFA=16GOTO 760
750 S=S*16+A
760 NEXTF:IFS<65536GOTO 510
770 PUT13,0:?"Not a valid hex address":PUT11,11,11,11,11,11:GOTO 680
780
790 REM ** INITIALISE ARRAYS FROM DATA STATEMENT,OPEN STREAMS ETC
800
810 FORI=1TO255:CLOSE#I:NEXTI:OPEN#0,0,"L":POKE 43,1:OPEN#1,6:PUT#1,1:DIMC$(11),
E$(60),F$(4),H$(64),L$(64),M$(8),R$(7):CK$="ÜÜ°v" (CHR$ 203,221,237,253,118)
820 FORI=1TO11:READC$(I):NEXTI:FORI=1TO60:READ E$(I):NEXTI:FORI=1TO4:READF$(I):N
EXTI:FORI=1TO64:READH$(I):NEXTI:FORI=1TO64:READL$(I):NEXTI:FORI=1TO8:READM$(I):
NEXTI:FORI=0TO7:READR$(I):NEXTI:RET
830
840 REM ** DATA FOR COMPLETE Z80 CODES AND REGISTERS
850
860 DATA "RLC ","RRC ","RL ","RR ","SLA ","SRA ",---,"SRL ","BIT","RES","SET","I
N B,(C)","OUT (C),B","SBC HL,BC","LD (W),BC",NEG,RETN,"IM 0","LD I,A","IN C,(C)"
,"OUT (C),C","ADC HL,BC","LD BC,(W)",---,RETI,---,"LD R,A","IN D,(C)","OUT (C),D
","SBC HL,DE","LD (W),DE",---,---,"IM 1","LD A,I","IN E,(C)","OUT (C),E","ADC HL
,DE","LD DE,(W)",---,---,"IM 2","LD A,B","IN H,(C)","OUT (C),H","SBC HL,HL",---,
---,---,---,RRD,"IN L,(C)","OUT (C),L","ADC HL,HL",---,---,---,---,RLD,---,---,"
SBC HL,SP","LD (W),SP",---,---,---,---,"IN A,(C)","OUT (C),A","ADC HL,SP","LD SP
,(W)",LD,CP,IN,OUT,"RET NZ","POP BC","JP NZ,W","JP W","CALL NZ,W","PUSH BC","ADD
 A,V","RST 00H","RET Z",RET,"JP,Z,W",---,"CALL Z,W","CALL W","ADC A,V","RST 08H"
,"RET NC","POP DE","JP NC,W","OUT (V),A","CALL NC,W","PUSH DE","SUB V","RST 10H"
,"RET C",EXX,"JP C,W","IN A,(V)","CALL C,W",---,"SBC A,V","RST 18H","RET PO","PO
P HL","JP,PO,W","EX (SP),HL","CALL PO,W","PUSH HL","AND V","RST 20H","RET PE","J
P (HL)","JP PE,W","EX DE,HL","CALL PE,W",---,"XOR V","RST 28H","RET P","POP AF",
"JP P,W",DI,"CALL P,W","PUSH AF","OR V","RST 30H","RET M","LD SP,HL","JP M,W",EI
,"CALL M,W",---,"CP V","RST38H",NOP,"LD BC,W","LD (BC),A","INC BC","INC B","DEC
B","LD B,V",RLCA,"EX AF,AF'","ADD HL,BC","LD A,(BC)","DEC BC","INC C","DEC C","L
D C,V",RRCA,"DJNZ V","LD DE,W","LD (DE),A","INC DE","INC D","DEC D","LD D,V",RLA
,"JR V","ADD HL,DE","LD A,(DE)","DEC DE","INC E","DEC E","LD E,V",RRA,"JR NZ,V",
"LD HL,W","LD (W),HL","INC HL","INC H","DEC H","LD H,V",DAA,"JR Z,V","ADD HL,HL"
,"LD HL,(W)","DEC HL","INC L","DEC L","LD L,V",CPL,"JR NC,V","LD SP,W","LD (W),A
","INC SP","INC (HL)","DEC (HL)","LD (HL),V",SCF,"JR C,V","ADD HL,SP","LD A,(W)"
,"DEC SP","INC A","DEC A","LD A,V",CCF,"ADD ","ADC ","SUB ","SBC ","AND ","XOR "
,"OR ","CP ",B,C,D,E,H,L,(HL),A
870
880 REM ** PROCESS CODES NOT DELT WITH ABOVE EG. BIT,SET + UNIQUE OPERATIONS
890
900 ONFGOTO 910,1020,960,1020,920
910 GOSUB 930:GOTO 570
920 I$="HALT":GOTO 570
930 S=S+1:P=PEEK(S):IFP>=64THEN P=P-64:I=INT(P/64):J=P-I*64:I$=C$(9+I)+STR$(INT(
J/8))+","+R$(J-INT(J/8)*8):RET
940 I=INT(P/8):IFI=6GOTO 530
950 I$=C$(I+1)+R$(P-8*I):RET
960 S=S+1:P=PEEK(S):IFP<64GOTO 530
970 IFP<=123THEN I$=E$(P-63):GOSUB 460:GOTO 570
980 IFP>187ORP<160GOTO 530
990 P=P-160:I=INT(P/8):J=P-I*8:IFJ>=4ANDI>=4THEN P=P+160:GOTO 530
1000 I$=F$(J+1)+MID$("IDID",I+1,1):IFI>1THEN I$=I$+"R"
1010 GOTO 570
1020 S=S+1:P=PEEK(S):IFP<>203GOTO 1040
1030 S=S+1:P=PEEK(S):D=P:GOSUB 930:P=D:F=INSTR(I$,"H"):GOTO 1090
1040 L=1:GOSUB 410:L=0
1050 F=INSTR(I$,"HL"):IFFGOTO 1070
1060 GOSUB 460:GOTO 570
1070 IFMID$(I$,F-1,1)<>"("ORLEFT$(I$,1)="J"GOTO 1100
1080 S=S+1:P=PEEK(S):D=P
1090 N$="0000":CALL32640,P,N$:N$=RIGHT$(N$,2)
1100 ZZ$=I$:I$=LEFT$(I$,F-1)+"I":IFPEEK(Q)=221THEN I$=I$+"X":GOTO 1120
1110 IFPEEK(Q)=253THEN I$=I$+"Y"
1120 IFD<>0THEN I$=I$+"+"+N$
1130 I$=I$+MID$(ZZ$,F+2):GOSUB 460:GOTO 570
1140
1150 REM ** ERROR AND BREAK KEY TRAPS
1160
1170 IFERRNO=2THEN S=0:RESUME
1180 ?:?:?"BASIC error number";ERRNO;"at line number";ERRLIN:GOTO 680
1190 ?:?:?"Stop key pressed":?"Press 'STOP' to leave the disassembler":ONBREAKGO
TO 1220
1200 GET#1,A:IFA<>0ONBREAKGOTO 1190:GOTO 680
1210 GOTO 1200
1220 ONBREAKGOTO 0:END
1230
1240 REM ** LOAD M/C DECIMAL TO HEX CONVERSION ROUTINE
1250
1260 IFTOP<32640GOTO 1280
1270 RESERVETOP-32635
1280 A=32640
1290 READB:IFB=999RET
1300 POKE A,B:A=A+1:GOTO 1290
1310 DATA 70,43,78,237,67,125,127,43,70,43,78,10,253,434,26,50,122,127,3,10,253,
142,27,50,123,127,42,125,127,231,39,42,122,127,66,205,173,127,67,205,173,127,55,
63,201,120,31,31,31,31,230,15,205,194,127,119,35,120,230,15,205,194,127,119,35,2
01,198,48,254,58,216,198,7,201,999
1320
1330 REM ** NEWBRAIN BASIC PAGING SUBROUTINE
1340
1350 REM ** WHEN USING A NEWBRAIN WITHOUT EXPANSION INTERFACE THIS SUBROUTINE
          MUST BE REMOVED BY ENTERING A LINE :        "1370 RET"
         TO RE-INSERT THE SUBROUTINE ENTER THE LINE :"1370 A=A"
1360
1370 A=A
1380 ONERRORGOTO 1440
1390 PUT13,0:INPUT("Enter 8K memory block identifier:")BK
1400 IFBK>255ORBK<0GOTO 1450
1410 POKE150,168-(BK AND 128)/16:POKE149,256+NOT(
BK OR 128)
1420 ?:?"Memory block number";BK;"paged into reserved RAM A000-BFFF"
1430 RET
1440 RESUME 1450
1450 PUT13,0:?"Not a valid block identifier":PUT11,11,11,11:GOTO 1390
1460 END
```


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PROGRAMS

TRS-80 Sound Synthesiser

by Andrew Wallis

'Sound synthesiser' is a program for TRS-80 owners with a sound box. It enables music to be composed in a similar fashion to the SOUND statement supported by some machines. If your cassette player has a monitor switch, directing output to the speaker while recording, you can use the program without a soundbox as follows:-

(a) Insert a scratch cassette into the player
(b) Plug in the cassette leads as for saving a program
(c) Switch on monitor
(d) Press RECORD

The program is menu driven. The only points to be made are that the pitch of a note is inversely proportional to the value entered, and that duration = value entered * pitch. Otherwise, the program is self-explanatory.

```
0 CLEAR 1000
1 REM ::: V.I.P (VERY IMPORTANT POINT)
2 REM *** ANSWER 'MEM SIZE' WITH '32700' ***
5 REM ***** MEMORY USED = 3221 *****
10 CLS
20 REM ****************
30 REM * SYNTHESIZER *
40 REM *      BY      *
50 REM *  A.WALLIS    *
60 REM ****************
70 REM : DATA FOR M/L ROUTINE
80 DATA 62,2,211,255,221,33,188,127,221,78
90 DATA 0,22,10,121,183,202,58,127,221,126
100 DATA 1,183,194,22,127,221,54,1,30,30,2
110 DATA 195,24,127,30,1,221,70,1,123,211,255
120 DATA 16,254,221,70,1,62,2,211,255,16
130 DATA 254,21,194,24,127,22,10,13,194,24,127
140 DATA 221,35,221,35,195,252,126,62,2,211,255,201
150 REM : READ M/L INTO MEMORY
160 FOR X=32500 TO 32500+74
170 REM : START TO FINISH OF TABLE
180 READ D
190 POKE X,D
200 NEXT X
210 POKE 16527,126
220 POKE 16526,244
230 REM : TELL TRS-80 WHERE M/L ROUTINE IS STORED
240 CLS
250 A$="S Y N T H E S I Z E R"
260 PRINT@540-LEN(A$)/2,A$
270 GOSUB 1000
280 GOSUB 1000
290 CLS
300 PRINT@0,"C H O I C E S :"
310 PRINT@64*2,"<1>.....ENTER DATA FOR MUSIC"
320 PRINT@64*4,"<2>.....PLAY MUSIC"
330 PRINT@64*6,"<3>.....TERMINATE PROGRAM"
340 PRINT
350 REM   DISPLAY OPTIONS
360 PRINT@64*10,"ENTER # ( 1 - 3 )":INPUT CHOICE
370 IF CHOICE<1ORCHOICE>3THEN PRINT@64*10,STRING$(64,192):GOTO 360
380 ON CHOICE GOTO 10000,20000,999
999 CLS:END
1000 FOR DELAY=500 TO 0 STEP -1
1010 NEXT DELAY
1020 RETURN
10000 CLS
10010 PRINT@0,"MUSIC GENERATION MODE"
10020 GOSUB 1000
10030 PRINT@64*2,"THIS PROGRAM USES TWO VARIABLES TO GENERATE"
10035 GOSUB 1000
10040 PRINT@64*4,"MUSIC.TONE ( PITCH) AND DURATION (LENGTH)"
10050 GOSUB 1000
10060 PRINT@64*6,"THESE VARIABLES HAVE VALUES BETWEEN 1 & 255 INC."
10065 GOSUB 1000
10067 PRINT@64*8,"DURATION IS ENTERED FIRST,FOLLOWED BY PITCH.
10068 PRINT@64*9,"ENTERING 999 FOR ** DURATION ** ";
10069 PRINT"INDICATES THE END OF INPUT DATA"
10070 GOSUB 1000:GOSUB 1000:GOSUB 1000
10080 CLS
10090 X=32700
10100 PRINT@64*8,"DURATION ( 1-255 INC.)":INPUT L
10110 IF L=999 THEN POKE X,0 :GOTO 10180
10120 IF L<1ORL>255 THEN PRINT@64*8,STRING$(64,192) ELSE GOTO 10130
10125 GOTO 10100
10130 POKE X,L:X=X+1
10135 CLS
10150 PRINT@64*8,"TONE ( 1-255 INC.)":INPUT T
10160 IF T<1 OR T>255 THEN PRINT@64*8,STRING$(64,192)ELSE 10170
10165 GOTO 10150
10170 POKE X,T:X=X+1
10175 CLS
10177 GOTO 10100
10180 CLS
10190 PRINT@64*8,"A L L   D O N E ! !"
10200 PRINT@64*10,"PRESS 'P' TO HEAR MUSIC SO FAR ,";
10205 PRINT" 'R' TO RETURN TO MAIN MENU"
10210 I$=INKEY$:IF I$=""THEN 10210
10215 IF I$="R" THEN GOTO 290
10220 IF I$<>"P"THEN 10200
10230 GOTO 20000
10235 END
20000 Q=USR(0)
20010 CLS
```

```
20020 PRINT@128,"PRESS 'M' TO HEAR TUNE AGAIN ,";
20025 PRINT" 'R' TO RETURN TO MAIN MENU"
20030 PRINT@64*3,"AND 'A' TO ADD MORE DATA TO CURRENT TUNE"
20040 I$=INKEY$
20050 IF I$=""THEN 20040
20060 IF I$="M"THEN GOTO 20000
20070 IF I$="R" THEN GOTO 290
20080 IF I$="A" THEN GOTO 10100
20090 GOTO 20040
```

NewBrain Big Characters

by Jeff Kearey

'Big characters' is a utility for an unexpanded NewBrain.

As listed below, the program takes a string from the keyboard and turns it into large characters. It would, however, be a simple matter to incorporate the routine into other programs where strings are passed from another part of the program.

When run, the program will prompt you for the string to be printed. This string may include graphics and punctuation as required. It will then print the string in large characters.

Note that line 30 opens the console device stream. The size will have to be adjusted to suit the length of your string.

```
1  REM            "LARGECHR1"
5  REM LARGE CHARACTER PRINTING PROGRAM
10 REM *********************************
15 REM By J R Kearey   November 1983
20 REM Initializations
25 REM ***************
30 OPEN#0,0,"L50":PUT 6:j=0:i=0:DIM d(1),p(7)
40 REM cursor controls
45 REM ***************
50 m$=CHR$(9):FOR i=1TO10:m$=m$+CHR$(11):NEXTi:m1$=m$
60 m$=CHR$(28):FOR i=1TO9:m$=m$+CHR$(10):NEXTi:m2$=m$
65 REM
70 REM setup powers of 2 array
75 REM*********************************
80 p=1:FORi=0TO7:p(i)=p:p=p*2:NEXTi
90 REM find start of character table
95 REM*********************************
100 ad=PEEK(119)+256*PEEK(120)
110 REM overall string handling loop
115 REM*****************************
120 nc=10:PRINT"You have";nc;"characters per line."
130 LINPUT("Please enter your text: ")t$
140 lt=LEN(t$):ns=INT(lt/nc):rs=INT((lt/nc-ns)*nc+.01)
150 PRINT"Text will have";ns;"complete line(s) plus";rs;"character(s)."
160 FOR l=1TOns:GOSUB 200:NEXT l:IF rs THEN nc=rs:GOSUB 200
165 END
170 REM  SUBROUTINES
175 REM  ***********
180 REM
185 REM Main chr extraction S/R
190 REM ************************
200 FOR k=1TOnc:nn=nn+1:c1=ASC(MID$(t$,nn)):c=c1+ad
210 IF c1 AND 96 THEN 290:REM test for graphic chr
220 REM
230 REM Graphic chr decode
235 REM ******************
240 FOR j=0TO6:GOSUB 500:NEXT j
250 pk=PEEK(c)
260 FOR j=0TO2:GOSUB 510:NEXT j:GOTO390
270 REM
280 REM Non-graphic chr decode
285 REM ************************
290 FOR j=0TO1
300 pk=PEEK(c):c=c+256
310 IF pk AND 1 THEN d(j)=pk-1:PUT10:GOTO 330:REM descender found
320 GOSUB 510
330 NEXT j
340 FOR j=0TO5:GOSUB 500:NEXT j
350 FOR j=0TO1
360 pk=d(j):d(j)=0:GOSUB 510:REM print descenders if necessary
370 NEXT j
380 REM Position cursor for next chr
385 REM *****************************
390 PRINT m1$;
400 NEXT k
410 REM Position cursor for next line
415 REM *****************************
420 PRINT m2$;
430 RETURN
440 REM
450 REM Print Bit Pattern  S/R
460 REM ***********************
500 pk=PEEK(c):c=c+256
510 IF pk=0 PUT10:RETURN
520 FOR i=7TO0 STEP -1
530 IF pk AND p(i) PUT147:GOTO 550
540 PUT26
550 NEXT i:PUT10:FOR m=1TO8:PUT8:NEXTm
560 RETURN
```

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PROGRAMS

BBC Micromouse
by Michael Ashwin

'Micromouse' is a simple but entertaining exercise in computerised problem solving; it requires 32k.

The program allows you to create a maze of your own design, from which the 'mouse' attempts to escape. The maze can be as complex as you like, but must begin at the top left and end at the bottom right of the screen.

When you run the program, pressing 2 selects demonstration mode in which a randomly constructed maze is drawn. Pressing 1 allows you to design your own maze. The maze is drawn using the cursor keys; unshifted keys move the cursor, shifted keys leave a trail.

The mouse's algorithm is simple but effective. It moves downwards whenever possible. If it cannot move down, it attempts to move right. If this is not possible, it tries to move up. And if this fails, it moves left. It 'remembers' passages which it has explored and doesn't try the same route twice. With this knowledge, it should be easy to design a maze which traps the mouse, right? Well, try it . . .

```
>L.
   10 GOTO30
   20 ONERRORRUN
   30 MODE7
   40 PROCINIT
   50 PROCSETVAR
   60 MODE1
   70 PROCDIS:IF A$="2" THEN PROCDEMO:GOTO90
   80 PROCMAZE
   90 PROCPROMPT
  100 IF A=32 THEN PROCCOMPUTER
  110 PROCDISMAZE
  120 PROCMOVE
  130 IF INKEY$(400)="" THEN RUN
  140 RUN
  150 END
  160 DEFPROCMOVE
  170 C1%=C1%+1:X%=2:Y%=2:X1%=X%:Y1%=Y%:count=0:A%=1:IF C1%=5 THEN ENDPROC
  180 IF A%=3 THEN Z%(Y%,X%)=2:T%=0 ELSE T%=10
  190 IF X1%=31 AND Y1%=26 THEN ENDPROC
  200 TIME=0:REPEATUNTILTIME>T%
  210 PRINTTAB(X1%+4,Y1%+1);"."
  220 GOES=GOES+1:PRINTTAB(10,29);"Number of goes  ";GOES
  230 X1%=X%:Y1%=Y%:PRINTTAB(X%+4,Y%+1);CHR$C%
  240 IF Z%(Y%,X%+1)=1 OR Z%(Y%+1,X%)=1 OR Z%(Y%-1,X%)=1 OR Z%(Y%,X%-1)=1 THEN A
%=1
  250 IF Z%(Y%+1,X%)=A% THEN Y%=Y%+1:Z%(Y%,X%)=3:A%=1:count=0:C%=241:GOTO180
  260 IF Z%(Y%,X%+1)=A% THEN X%=X%+1:Z%(Y%,X%)=3:A%=1:count=0:C%=242:GOTO180
  270 IF Z%(Y%-1,X%)=A% THEN Y%=Y%-1:Z%(Y%,X%)=3:A%=1:count=0:C%=243:GOTO180
  280 IF Z%(Y%,X%-1)=A% THEN X%=X%-1:Z%(Y%,X%)=3:A%=1:count=0:C%=244:GOTO180
  290 IF X%=X1% AND Y%=Y1% THEN count=count+1:A%=3:Z%(Y%,X%)=2:IF count>10 THEN
PRINTTAB(X%+4,Y%+1);" ":GOTO170 ELSE 180
  300 X%=X1%:Y%=Y1%:GOTO180
  310 DEFPROCDIS:CLS
  320 VDU23;8202;0;0;0;
  330 COLOUR1
  340 PRINT'SPC(15);"Micro-Mouse"
  350 PRINTSPC(5);STRING$(32,CHR$240)
  360 FOR A=1 TO 25:PRINTSPC(5);CHR$240;SPC(30);CHR$240:NEXTA
  370 PRINTSPC(5);STRING$(32,CHR$240)
  380 VDU19,2,4,0,0,0:COLOUR2
  390 FOR A=1 TO 25:PRINTTAB(6,(A+2));STRING$(30,CHR$240):NEXTA
  400 ENDPROC
  410 DEFPROCSETVAR
  420 DIM Z%(27,32):C1%=0
  430 VDU23,240,255,255,255,255,255,255,255,255
  440 VDU23,241,60,60,60,60,255,126,62,24
  450 VDU23,242,24,28,254,255,255,254,28,24
  460 VDU23,243,24,62,126,255,60,60,60,60
  470 VDU23,244,24,56,127,255,255,127,56,24
  480 FOR A=1 TO 32:Z%(1,A)=0:Z%(27,A)=0:NEXTA
  490 FOR A=1 TO 27:Z%(A,1)=0:Z%(A,32)=0:NEXTA
  500 ENDPROC
  510 DEFPROCMAZE
  520 X=2:Y=2:Z=0
  530 X1=X:Y1=Y
  540 IF INKEY(-58) AND Y>2 THEN Y=Y-1
  550 IF INKEY(-42) AND Y<26 THEN Y=Y+1
  560 IF INKEY(-122) AND X<31 THEN X=X+1
  570 IF INKEY(-26) AND X>2 THEN X=X-1
  580 IF Z=1 THEN Z%(Y,X)=1:PRINTTAB(X+4,Y+1);"X";TAB(X1+4,Y1+1);" " ELSE COLOUR
3:PRINTTAB(X+4,Y+1);"X":COLOUR2:PRINTTAB(X1+4,Y1+1);CHR$240:Z%(Y,X)=0
  590 IF INKEY(-1) THEN Z=1 ELSE Z=0
  600 IF INKEY(-74) THEN ENDPROC
  610 GOTO 530
  620 DEFPROCPROMPT
  630 COLOUR130:COLOUR4
  640 PRINTTAB(8,7);"Press space to see how the"
  650 PRINTTAB(9,8);"computer sees the maze"
  660 COLOUR3:PRINTTAB(20,10);"OR"
  670 COLOUR1:PRINTTAB(10,12);"Press any key to begin"
  680 IF INKEY$(0)="" THEN A=GET ELSE 680
  690 COLOUR128:COLOUR3
  700 ENDPROC
  710 DEFPROCCOMPUTER
  720 PRINTTAB(15,29);"0 = Wall"
  730 PRINTTAB(15,30);"1 = Passage"
  740 COLOUR2
  750 FOR A%=1 TO 32:FOR B%=1 TO 27
  760 PRINTTAB(A%+4,B%+1);Z%(B%,A%)
  770 NEXTB%,A%
  780 PRINTTAB(0,29);STRING$(75," ")
  790 PRINTTAB(11,29);"Press space to begin"
  800 REPEATUNTILGET=32
  810 PRINTTAB(11,29);SPC(20)
  820 ENDPROC
  830 DEFPROCDISMAZE
  840 FOR A%=1 TO 32:FOR B%=1 TO 27
  850 IF A%=1 OR A%=32 OR B%=1 OR B%=27 THEN COLOUR1 ELSE IF Z%(B%,A%)=1 THEN CO
LOUR3 ELSE COLOUR2
  860 PRINTTAB(A%+4,B%+1);CHR$240
  870 NEXTB%,A%
  880 COLOUR131:COLOUR4
```

PROGRAMS

```
  890 ENDPROC
  900 DEFPROCINIT
  910 FORA=1 TO 2:PRINTCHR$134;CHR$157;CHR$132;CHR$141;SPC(10);"Micro-Mouse":NEX
TA
  920 PRINT'" This program illustrates the wanderingsof a mouse around a maze th
at you have  created."
  930 PRINT'" The size and shape of maze is up to youhowever the more difficult
the maze the longer it takes the 'mouse' to escape."
  940 PRINT'" You enter the maze by the use of the   cursor control keys.With th
ese you      control a flashing cursor that will     leave a path if the SHIFT k
ey is pressedat the same time."
  950
  960 PRINT''"  Press the space bar to continue"
  970 REPEATUNTILGET=32
  980 CLS:FORA=1 TO 2:PRINTCHR$134;CHR$157;CHR$132;CHR$141;SPC(10);"Micro-Mouse"
:NEXTA
  990 PRINT'" You may make a trail were ever you wishhowever it must begin at th
e top left   and end at the bottom right of the      screen."
 1000 PRINT'" When you have finished entering the    maze you press return then
the computer takes over."
 1010 PRINT'" Try and devise a maze that you think   will fool the 'mouse'."
 1020 PRINT''"PRESS 1) to start                          2) for demonstration
 maze"
 1030 A$=GET$:IF A$="1" OR A$="2" THEN ENDPROC ELSE GOTO1030
 1040 DEFPROCDEMO:PRINTTAB(9,5);"PLEASE WAIT A FEW SECONDS":FORA=2 TO 31:Z%(2,A)
=1:Z%(26,A)=1:NEXTA:B=RND(29+2):FORA=2 TO 26:Z%(A,B)=1:NEXTA:FORA=1 TO 20
 1050 X=RND(29)+2:Y=RND(24)+2:D=RND(2):L=RND(20)
 1060 REPEAT:L=L-1
 1070 Z%(Y,X)=1
 1080 IF D=1 AND Y<25 THEN Y=Y+1:IF Y=26 THEN L=0
 1090 IF D=2 AND X<30 THEN X=X+1:IF X=31 THEN L=0
 1100
 1110 UNTIL L=0
 1120 NEXTA
 1130 ENDPROC
```

Atari Disk directory

by H M Hoffman

'Disk directory' is a simple program to make life easier for owners of Atari 400/800 disk systems. We were unable to test the program on the new XL machines, though I see no reason why it shouldn't work on these.

When run, the program presents a directory of files on drive 1, assigning to each one a unique index number. The user may then run or delete any Basic program by entering RUN or DElete followed by the index number. Entering D returns you to the Atari DOS.

To use the program type it in and save it onto each of your disks under the filename 'D:MENU'. 'RUN "D:MENU" ' then calls the directory program. The program is error-trapped to prevent the user from trying to run data files, and so forth.

When deleting files, the program double-checks with an 'OK to delete (y/n)?' message, but anything other than an upper-case N will be taken as consent. I suggest replacing line 172 with:- 172 IF NOT(N$="Y") THEN RUN.

```
  2 REM (C)H.M.HOFFMAN
  3 REM PROGRAM ATARI DISK DIRECTORY UTILITY
  4 REM FOR ATARI 400/800 32K AND ABOVE
  5 REM PROGRAM TO RUN OR DELETE BASIC PROGRAMS
  6 REM BY MENU SELECTION
  7 REM SAVE A COPY ON EACH BASIC DISK
  9 REM THEN RUN D:MENU
 10 GRAPHICS 0
 20 DIM A$(13),F$(8),E$(3),T$(40*18),B$(15),N$(2)
 25 T$=" ":T$(40*18)=" ":T$(2)=T$:PNT=1
 30 OPEN #1,6,0,"D:*.*":N=1
 35 ? :? ,"FILES FOR THIS DISK":?
 40 TRAP 100:INPUT #1,A$:IF A$(5,13)="FREE SECT" THEN 80
 50 F$=A$(3,10):E$=A$(11,13):IF E$="SYS" OR F$="MEM    " AND E$="SAV" THEN 40
 60 T$(PNT)=STR$(N):T$(PNT+4)=F$:T$(PNT+4+LEN(F$))=".":T$(PNT+4+LEN(F$)+1)=E$:PNT
=PNT+19:N=N+1
 70 IF N<40 THEN GOTO 40
 80 CLOSE #1:? T$:TRAP 105
105 POSITION 2,22:? "RUN OR DELETE A FILE? (RU OR DE)";:POSITION 34,22:INPUT N$:
IF N$="DE" THEN 150
106 POSITION 2,23:? "FILE NUMBER TO RUN OR D FOR DOS";:POSITION 34,23:INPUT N$:I
F N$="D" THEN DOS
109 N=VAL(N$):M=(N-1)*19+5:STATUS #1,ST:TRAP 130
110 A$=T$(M):B$="D:                ":J=3:FOR I=1 TO 12:IF A$(I,I)<>" " THEN B$(J,J)
=A$(I,I):J=J+1
111 NEXT I
112 IF FLAG=1 THEN 170
114 GRAPHICS 2
115 ? #6;"     loading ":? #6;" ":? #6;"   ";B$
120 IF FLAG<>1 THEN RUN B$
130 GRAPHICS 2:? #6;"    ERROR"
140 ? #6;" ":? #6;"      ";ST
150 FLAG=1
155 POSITION 2,23:? "FILENUMBER TO DELETE";:POSITION 34,23:INPUT N$
160 GOTO 109
170 POSITION 2,23:? "O.K. TO DELETE ";B$;"Y OR N?":POSITION 34,23:INPUT N$
172 IF N$="N" THEN RUN
175 GRAPHICS 2:? #6;"     deleting":? #6;" ":? #6;"   ";B$
180 XIO 33,#1,0,0,B$
200 RUN
```

Ace Sine Wave Generator

by M Stewart

'Sine Wave Generator' is a utility for the Jupiter Ace. The word SIN calculates successive values of sine and cosine in order to generate a sine wave. This

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PROGRAMS

should run on any Forth system, while the demonstration program (defined as DEMO) is specific to the Ace.

The idea for the definitions came from the article 'Accurate Sine-wave oscillator' published in *Wireless World*, June 1981. The author's definitions use a more general form of the equations published in the article, namely:
$\sin(n+1) = \sin(n) + (1/m)\cos(n)$ and
$\cos(n+1) = \cos(n) - (1/m)\sin(n+1)$
where m is the value supplied by the user.

The word SIN uses the top three numbers on the stack to calculate the next members of the series, replacing the top of the stack with the next sine and the second to top with the next cosine. This gives the equation SIN(m-,cos(n), sin(n) −m, cos(n+1), sin(n+1)).

If m is a large value, the starting value should be correspondingly high; and the higher the starting value, the more accurate the sine-wave.

```
: SIN
  (m,cos(n),sin(n) - m,cos(n+1),sin(n+1))
   3 PICK 3 PICK SWAP / +
   SWAP 3 PICK 3 PICK
   SWAP / - SWAP
;

 : DEMO
   (plot a sine-wave on screen using SIN)
    INVIS CLS 4 20 0
    (set m=4,cos(0)=20,sin(0)=0)
    63 0
    DO
     DUP 20 +
     (set zero 20 pixels up)
     I SWAP 1 PLOT
     (PLOT point at I,sin(I))
     SIN
     (calculate next point)
    LOOP
;
The choice of cos(0)=20 and sin(0)=0 ensures that the maximum and
minimum values taken by the sine series are +20 and -20 respectively
The choice of m=4 gives approximately 2½ waves which fit on the
screen well.
 These definitions were tried and tested on an unexpanded Jupiter Ace
```

MZ-80K Draughts
by W Thomas

'Draughts' is exactly as you'd imagine — a draughts program: you versus your MZ-80K.

Our referee reports that the game is extremely difficult to beat, even on level one. The program's 'thinking' time is reasonable, and you'll need your wits about you.

```
  1 REM         ************
  2 REM         * DRAUGHTS *
  3 REM         *          *
  4 REM         *    BY    *
  5 REM         *          *
  6 REM         * W.THOMAS *
  7 REM         ************
  8 GOTO193
  9 REM - POSITION CURSOR
 10 PRINT"■":LEFT$(A$,X):LEFT$(D$,Y)::RETURN
 11 REM - COMPUTER MOVE
 12 X=31:Y=7:GOSUB10:PRINT"FROM:  "
 13 Y=9:GOSUB10:PRINT" TO :  "
 14 MUSIC"T1O1L1C1"
 15 Y=14:GOSUB10:PRINT"THINKING"
 16 BM=-9E+9:M1=0:M2=0:M3=0:T1=0:T=0
 17 IFW=1THENM=L2:GOTO19
 18 FORM=78TO10STEP-2
 19 A=B(M):F=A
 20 IFA=1THEN24
 21 IFA<>3THEN27
 22 D=-8:GOSUB39
 23 D=-10:GOSUB39
 24 D=8:GOSUB39
 25 D=10:GOSUB39
 26 T1=T1+1:IF(T1=T2)+(W=1)THEN28
 27 NEXTM
 28 X=31:Y=14:GOSUB10:PRINTSPC(8)
 29 IFBM=-9E+9THEN162
 30 GOSUB147
 31 A=B(M1):B(M1)=0:B(M2)=A:IFTTHENU=(M1+M2)/2:B(U)=0
 32 C=0:IF(M2>71)*(A=1)THENB(M2)=3:C=1
 33 M=M1:GOSUB144:L1=M
 34 M=M2:GOSUB144:L2=M
 35 IFB(M2)=3THENV(M2)=V(M2)+1
 36 W=0:IFTTHENM=U:GOSUB144:GOSUB93:IF(C=0)*(T=1)THENW=1:GOTO12
 37 GOTO113
 38 REM - CALCULATE MOVE VALUE
 39 A=B(M+D)
```

PROGRAMS

```
40 IF(A=1)+(A=3)+(A=5)THENRETURN
41 JJ=0:B=0:X=M:GOSUB76:C=E2
42 IF(A=2)+(A=4)THEN56
43 IFTTHENRETURN
44 IF(F=1)*(M+D)71)THENB=2
45 B(M)=0:Z=M+D:B(Z)=F+B
46 GOSUB70
47 IF(M=L2)*(Z=L1)THENE=E-20
48 IFE=3THENE=E-Y(Z)
49 E=E+B*50:B(M)=F:B(Z)=0
50 IFE<BMTHENRETURN
51 IF(E=BM)*(C)M3)THENRETURN
52 IF(E=BM)*(C=M3)*(RND(1)).5)THENRETURN
53 BM=E:M1=M:M2=Z:M3=C
54 RETURN
55 REM - POSSIBLE CAPTURE ?
56 IFB(M+D+D)>0THENRETURN
57 IFT=0THENT=1:BM=-9E+9
58 IF(F=1)*(M+D+D)71)THENB=2
59 B(M)=0:B(M+D)=0:Z=M+D+D:B(Z)=F+B
60 GOSUB62:GOSUB70:E=E+JJ+A*5:B(M+D)=A:GOTO49
61 REM - MULTIJUMP EVALUATION
62 JJ=0:FORI=8TO10STEP2
63 IF(B(Z)=1)*(SGN(I)=-1)THEN67
64 AA=B(Z+I):IF(AA<>2)*(AA<>4)THEN67
65 IFB(Z+I+I)=0THENJJ=JJ+5000:GOTO67
66 JJ=JJ-4000
67 IFSGN(I)=1THENI=-I:GOTO63
68 I=-I:NEXTI:RETURN
69 REM - BOARD EVALUATION
70 T0=0:E=0:FORX=10TO78STEP2:E2=0:IF(B(X)=1)+(B(X)=3)THENGOSUB76:T0=T0+1
71 IFE2<0THENGOSUB80:E2=E2-JJ
72 E=E+E2:IFT0=T2THENRETURN
73 NEXTX
74 RETURN
75 REM - SQUARE EVALUATION
76 E1=-36*(B(X)=3):E2=P(B(X+8)+B(X-8)*6+E1)
77 E2=E2+P(B(X+10)+B(X-10)*6+E1)
78 RETURN
79 REM - PIECE LOSS MINIMISATION !
80 F1=B(X):B(X)=0:JJ=0
81 FORI=8TO10STEP2
82 AA=B(X+I)+B(X-I)*6:IF(AA=2)+(AA=4)+(AA=24)THENGOSUB84
83 NEXTI:B(X)=F1:RETURN
84 Z1=B(X+I):Z2=X-I:IFAA=24THENZ1=4:Z2=X+I
85 FORI1=-10TO-8STEP2
86 IF(Z1=2)*(SGN(I1)=1)THEN90
87 AA=B(Z2+I1):IF(AA<>1)*(AA<>3)THEN90
88 AA=Z2+I1*2:IFB(AA)>0THEN90
89 JJ=JJ+5000+Z1*500:IF(Z1=2)*(AA<17)THENJJ=J+2500
90 IFSGN(I1)=-1THENI1=-I1:GOTO86
91 I1=-I1:NEXTI1:RETURN
92 REM - ANOTHER CAPTURE ?
93 M=M2:A=B(M):GOSUB100:RETURN
94 REM - CAN HUMAN GO ?
95 FORM=78TO10STEP-2
96 A=B(M):IF(A=2)+(A=4)THENGOSUB100:IFTTHENRETURN
97 NEXTM
98 RETURN
99 REM - POSSIBLE MOVE FIND
100 T=0:G1=1:G2=3:IF(A=1)+(A=3)THENG1=2:G2=4
101 IFA<3THEN104
102 D=-8:GOSUB108:IFTTHENRETURN
103 D=-10:GOSUB108:IFTTHENRETURN
104 D=8+16*(A=2):GOSUB108:IFTTHENRETURN
105 D=10+20*(A=2):GOSUB108
106 RETURN
107 REM - POSSIBLE CAPTURE ?
108 IFB(M+D)=0THENG=1:RETURN
109 IF(B(M+D)<>G1)*(B(M+D)<>G2)THENRETURN
110 IFB(M+D+D)=0THENT=1:G=1
111 RETURN
112 REM - HUMAN MOVE
113 G=0:GOSUB95:IFG=0THEN166
114 GOSUB153
115 X=1:Y=7:GOSUB10:PRINT"FROM:  "
116 PRINT"■  TO :  "
117 MUSIC"_C1C1"C1"
118 X=6:Y=7:GOSUB136
119 A=B(M):IF(A<>2)*(A<>4)THEN115
120 M1=M:X=6:Y=9:GOSUB136
121 IFB(M)>0THEN155
122 M2=M:V=ABS(M1-M2):IF(V<>8)*(V<>10)*(T=0)THEN155
123 IF(V<>16)*(V<>20)*(T=1)THEN159
124 IF(SGN(M1-M2)=-1)*(A=2)THEN155
125 V=(M1+M2)/2:IF(T=1)*(B(V)<>1)*(B(V)<>3)THEN155
126 GOSUB153
127 B(M1)=0:B(M2)=A:IFTTHENB(V)=0
128 C=0:IF(M2<18)*(A=2)THENB(M2)=4:C=1
129 M=M1:GOSUB144
130 M=M2:GOSUB144
131 IFTTHENM=V:GOSUB144:T2=T2-1:IFT2=0THEN162
132 IFC=1THENT=0:GOTO12
133 IFTTHENGOSUB93:IFTTHEN115
134 GOTO12
135 REM - INPUT HUMAN MOVE
136 GOSUB10
137 GOSUB221:IFZ$="*"THEN169
138 K=ASC(Z$)-65:IF(K<0)+(K)7)THEN137
139 PRINTZ$;:M=K
140 GOSUB221:IFZ$="*"THEN169
141 K=ASC(Z$)-48:IF(K<1)+(K>8)THEN140
142 PRINTZ$:M=M+K*9:RETURN
143 REM - PRINT PIECE
144 Y=INT(M/9):X=M-Y*9:X=X*2+12:Y=Y*2+1
145 GOSUB10:PRINTA$(B(M)):RETURN
146 REM - PRINT COMPUTER MOVE
147 X=36:Y=7:GOSUB10
148 A1=INT(M1/9):A2=M1-A1*9:PRINTCHR$(A2+65):CHR$(A1+48)
149 Y=9:GOSUB10
150 A1=INT(M2/9):A2=M2-A1*9:PRINTCHR$(A2+65):CHR$(A1+48)
151 RETURN
152 REM - DELETE MESSAGES
153 X=1:Y=13:GOSUB10:PRINTSPC(8):PRINTSPC(9):RETURN
154 REM - ILLEGAL MOVE MESSAGE
155 GOSUB153
156 X=1:Y=13:GOSUB10:PRINT"ILLEGAL":PRINT"  MOVE!"
```


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PROGRAMS

```
157 MUSIC"A0R0C0R0A0R0C0":GOTO115
158 REM - POSSIBLE CAPTURE MESSAGE
159 X=1:V=13:GOSUB10:PRINT"POSSIBLE":PRINT" CAPTURE!"
160 MUSIC"D0R0D0R0D0R0D0":GOTO115
161 REM - HUMAN VICTORY
162 X=30:V=14:GOSUB10:PRINT"I CAN'T GO"
163 V=16:GOSUB10:PRINT" YOU WIN!"
164 GOTO169
165 REM - COMPUTER VICTORY
166 X=1:V=13:GOSUB10:PRINT"BAD LUCK"
167 V=16:GOSUB10:PRINT" I WIN!"
168 REM - PLAY AGAIN ?
169 C=0:X=12:V=22:GOSUB10:PRINT" ANOTHER GAME ? "
170 GETZ$:IFZ$="Y"THENRUN
171 IFZ$="N"THENEND
172 C=1-C:IFC=0THEN169
173 X=13:V=22:GOSUB10:PRINTSPC(14):GOTO170
174 REM - DISPLAY BOARD etc.
175 GOSUB189
176 PRINT"■    ":A$(2):"■":TAB(33):A$(1)
177 PRINTTAB(11)::FORI=1TO18:PRINT"■":NEXT:PRINT
178 FORI=1TO16:PRINTTAB(11)::"■";SPC(16);"■":NEXT
179 PRINTTAB(11)::FORI=1TO18:PRINT"■":NEXT
180 PRINT"■■■■   YOUR":TAB(30)"COMPUTER"
181 PRINT"    MOVE":TAB(32)"MOVE"
182 M=8:FORI=1TO8:FORJ=1TO8:M=M+1:GOSUB144:NEXTJ:M=M+1:NEXTI
183 X=0:FORI=0TO7:V=3+2*I:GOSUB10:PRINTTAB(9)I+1:NEXT
184 V=20:FORI=0TO7:X=2*I+12:GOSUB10:PRINTCHR$(65+I):NEXT
185 X=12:V=22:GOSUB10:PRINT"SKILL LEVEL :";5-SK
186 IFZ$="B"THEN113
187 GOTO12
188 REM - DISPLAY TITLE
189 PRINT"■":TAB(16):"DRAUGHTS":PRINTTAB(15):"▔▔▔▔▔▔▔▔":RETURN
190 X=8:V=24:GOSUB10:PRINT"PRESS ANY KEY TO CONTINUE";
191 GOSUB221:GOSUB189:RETURN
192 REM - INITIALISATION
193 GOSUB189
194 DIMB(89),P(71),A$(5),V(89)
195 DEF FNA(X)=SGN(.3-RND(1))
196 DEF FNB(X)=INT(RND(1)*SK*5)*FNA(1)+R
197 A$="":FORI=1TO36:A$=A$+"■":NEXT
198 D$="":FORI=1TO24:D$=D$+"■":NEXT
199 FORI=0TO89:READB(I):NEXT
200 FORI=0TO5:READA$(I):NEXT:GOSUB224
201 FORI=0TO6STEP2:V(I+10)=99:V(I+72)=99:V(16+I*9)=99:V(18+I*9)=99:NEXT
202 REM - INPUT SKILL LEVEL
203 PRINT"■■SKILL LEVEL ?"
204 PRINT"■1 (EASY) - 5 (NOT SO EASY)":PRINT"■YOUR CHOICE:";
205 GOSUB221
206 A=ASC(Z$):IF(A<49)+(A>53)THEN205
207 PRINTZ$:SK=53-A:T2=12
208 FORI=0TO71:READR:P(I)=FNB(1):NEXT
209 REM - CHOOSE COLOUR
210 PRINT"■■WHAT COLOUR DO YOU WANT TO PLAY ?"
211 PRINT"  (W)hite   OR   (B)lack"
212 PRINT"■REMEMBER BLACK PLAYS FIRST."
213 GOSUB221
214 IFZ$="W"THEN175
215 IFZ$="B"THEN217
216 GOTO213
217 ZZ$=A$(1):A$(1)=A$(2):A$(2)=ZZ$
218 ZZ$=A$(3):A$(3)=A$(4):A$(4)=ZZ$
219 GOTO175
220 REM - CHARACTER INPUT
221 I=RND(1):GETZ$:IFZ$=""THEN221
222 RETURN
223 REM - INSTRUCTIONS
224 PRINT"■DO YOU REQUIRE THE INSTRUCTIONS ?"
225 GOSUB221
226 IFZ$="Y"THEN229
227 IFZ$="N"THENRETURN
228 GOTO225
229 GOSUB189
230 PRINT"RULES:"
231 PRINT"■BLACK ALWAYS MOVES FIRST,AND"
232 PRINT"THEREAFTER PLAYERS MOVE ALTERNATELY."
233 PRINT"■YOU LOSE IF YOU CANNOT MOVE IN TURN,"
234 PRINT"EITHER DUE TO LOSS OR IMMOBILISATION OF"
235 PRINT"ALL YOUR PIECES."
236 PRINT"■A DRAUGHT MAY MOVE ONE SQUARE DIAGONALLY";
237 PRINT"FORWARD INTO A VACANT SQUARE."
238 PRINT"■YOU CAPTURE AN OPPOSING PIECE BY JUMPING";
239 PRINT"OVER IT INTO A VACANT SQUARE."
240 PRINT"■IF A PIECE CAPTURES AND IS THEN ABLE TO"
241 PRINT"CAPTURE AGAIN IT MUST DO SO."
242 PRINT"■■N.B. - YOU MUST ALWAYS CAPTURE IF ABLE.'
243 GOSUB190
244 PRINT"■SHOULD A DRAUGHT REACH THE OPPOSITE END"
245 PRINT"OF THE BOARD HE BECOMES A KING,AND IS"
246 PRINT"ABLE TO MOVE AND CAPTURE ALONG ALL FOUR"
247 PRINT"DIAGONALS."
248 PRINT"■HOWEVER,IF A DRAUGHT REACHES THE BACK"
249 PRINT"ROW BY CAPTURE HE CANNOT CAPTURE AGAIN"
250 PRINT"ON THAT TURN."
251 PRINT"■ONLY LEGAL MOVES WILL BE ACCEPTED."
252 PRINT"■MOVES ARE INPUT AS CO-ORDINATES"
253 PRINT"■ E.G.  FROM:B5"
254 PRINT"      TO :A6"
255 PRINT"■TO BREAK OUT OF THE GAME PRESS '*' WHEN"
256 PRINT"PROMPTED FOR YOUR MOVE."
257 GOSUB190
258 PRINT"■■PIECES:    DRAUGHT    KING"
259 PRINT"■■BLACK■";TAB(13):A$(1):TAB(26):"■":A$(3)
260 PRINT"■■WHITE■";TAB(13):A$(2):TAB(26):"■":A$(4)
261 RETURN
262 REM - BOARD DATA
263 DATA5,5,5,5,5,5,5,5,5,5
264 DATA5,1,5,1,5,1,5,1,5,5
265 DATA1,5,1,5,1,5,1,5,5,5
266 DATA5,1,5,1,5,1,5,1,5,5
267 DATA0,5,0,5,0,5,0,5,5,5
268 DATA5,0,5,0,5,0,5,0,5,5
269 DATA2,5,2,5,2,5,2,5,5,5
270 DATA5,2,5,2,5,2,5,2,5,5
271 DATA2,5,2,5,2,5,2,5,5,5
272 DATA5,5,5,5,5,5,5,5,5,5
```

```
273 REM - PIECE STRING DATA
274 DATA"   ",""
275 DATA"",""
276 DATA"",""
277 REM - MOVE DATA (DRAUGHT)
278 DATA5,50,-400,65,-400,61
279 DATA50,70,100,80,120,56
280 DATA21,85,25,75,30,20
281 DATA65,80,105,85,125,62
282 DATA-600,10,2,15,7,1
283 DATA61,55,150,60,140,20
284 REM - MOVE DATA (KING)
285 DATA20,15,-500,17,-500,2
286 DATA3,10,99,9,104,4
287 DATA105,99,150,119,160,100
288 DATA17,18,119,19,124,7
289 DATA-1000,104,160,124,170,8
290 DATA2,5,100,7,8,1
```

BBC Omniopoly

by Richard Smith

As promised in Bludners (*PCW*, February, page 408), here is the missing section from the BBC Omniopoly program (PCW, January).

```
 10 REM OMNIOPOLY loader Version 1.30
 20 REM Runs on any 32K BBC
 30 REM
 40 REM (c) Copyright Richard Smith
 50 REM Aug 23 1983
 60 REM
 70 MODE7
 80 VDU23,224,7,5,5,7,5,5,5,0
 90 VDU23,225,7,5,5,6,5,5,7,0
100 VDU23,226,7,4,4,4,4,4,7,0
110 VDU23,227,6,5,5,5,5,5,6,0
120 VDU23,228,7,4,4,6,4,4,7,0
130 VDU23,229,7,4,4,6,4,4,4,0
140 VDU23,230,7,4,4,4,5,5,7,0
150 VDU23,231,5,5,5,7,5,5,5,0
160 VDU23,232,2,2,2,2,2,2,2,0
170 VDU23,233,1,1,1,1,5,5,7,0
180 VDU23,234,5,5,6,6,6,5,5,0
190 VDU23,235,4,4,4,4,4,4,7,0
200 VDU23,236,5,7,7,7,5,5,5,0
210 VDU23,237,7,5,5,5,5,5,5,0
220 VDU23,238,7,5,5,5,5,5,7,0
230 VDU23,239,7,5,5,7,4,4,4,0
240 VDU23,240,7,5,5,6,5,5,5,0
250 VDU23,241,7,4,4,7,1,1,7,0
260 VDU23,242,7,2,2,2,2,2,2,0
270 VDU23,243,5,5,5,5,5,5,7,0
280 VDU23,245,5,5,5,7,7,7,5,0
290 VDU23,246,5,5,5,2,5,5,5,0
300 VDU23,247,5,5,5,7,2,2,2,0
310 VDU23,248,7,1,1,7,4,4,7,0
320 VDU23,249,3,2,2,7,2,2,7,0
330 VDU23,250,7,1,1,7,1,1,7,0
340 VDU23,251,5,5,5,7,1,1,1,0
350 VDU23,252,7,4,4,7,5,5,7,0
360 VDU23,253,7,1,1,1,1,1,1,0
370 VDU23,254,7,5,5,7,5,5,7,0
380 VDU23,255,7,5,5,7,1,1,1,0
390 FORI%=0TO1:VDU129,157,131,141:PRINTSPC(12)"OMNIOPOLY":NEXT
400 PRINT'"     (c) COPYRIGHT RICHARD SMITH 1983"
410 VDU28,10,17,29,15
420 CHAIN"OMN"
```

Oric Forest of Doom: Clues

by S W Lucas

Last month I promised to give some more clues to Oric 'Forest of Doom' (see February Programs), and here they are. I decided that the author's clues were a little too explicit (you wouldn't want it to be too easy, would you?), so I've rewritten them slightly. Here goes . . .

Appeasing the flower-pot men and pawnbroker is straightforward, but don't waste time caring for dead fish. When dealing with vampires, beware of cheap imitations. Appeals for help must be made from the appropriate place, and decisive action may sometimes be necessary. Never try to reason with a Balrog.

Orc Warriors have a taste for a traditional British breakfast. Brandy is pretty expensive. Plants, like children, need food. Head for Ireland once you've recovered the Tiara. There's something fishy about that horse. Once you've found the ruby, amazing experiences are to be avoided. A fairy tale ending is necessary to release the prince, while Arthur is in need of more scientific treatment. Take everyone shopping to finish the adventure.

Over to you!

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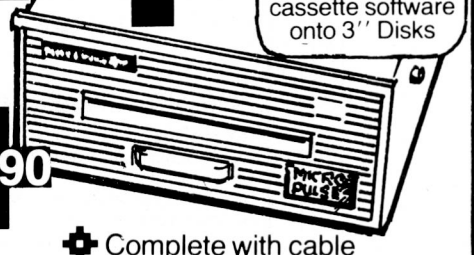

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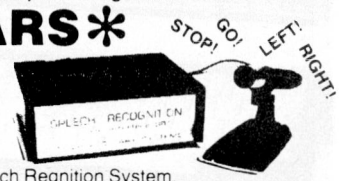

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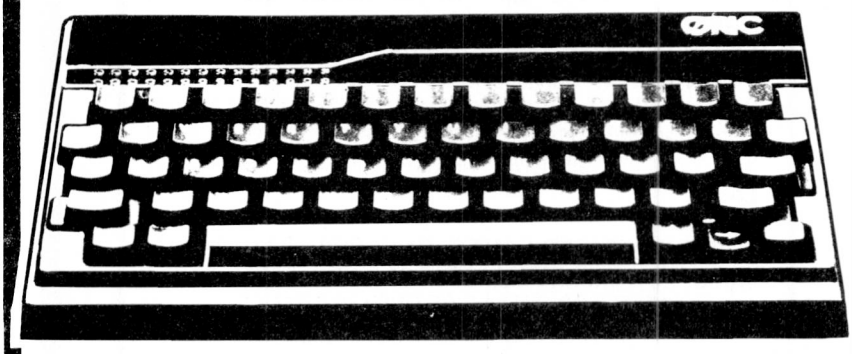

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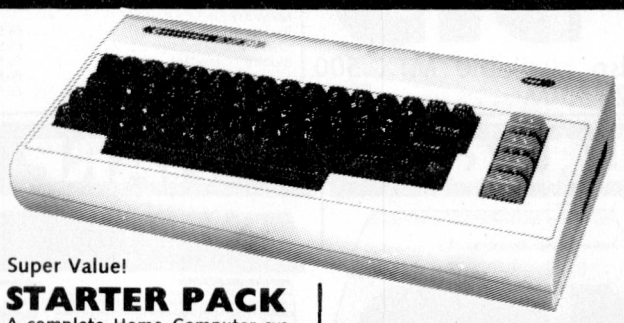

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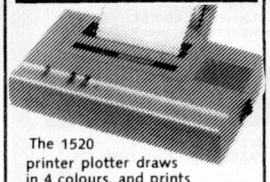

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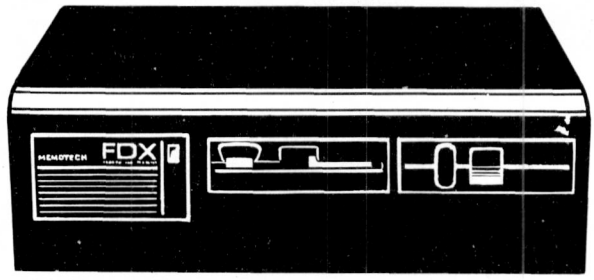

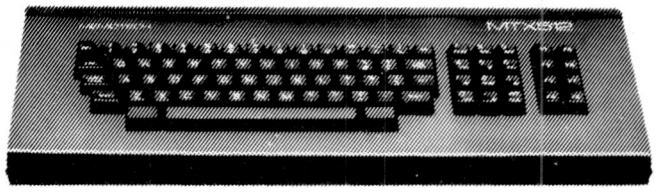

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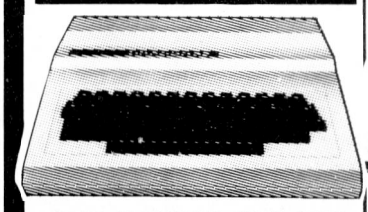

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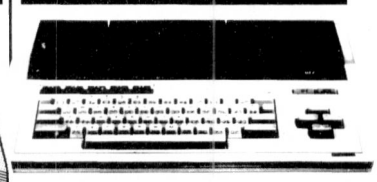

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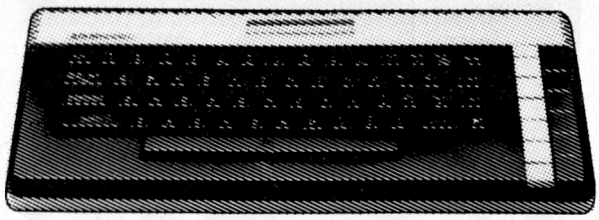

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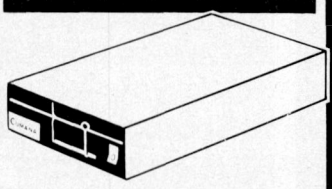

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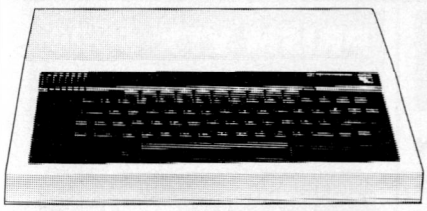

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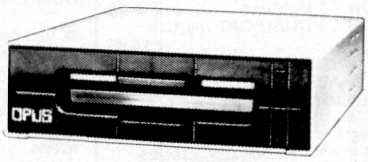

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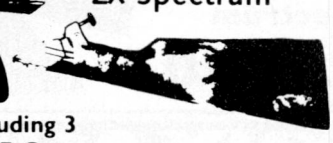

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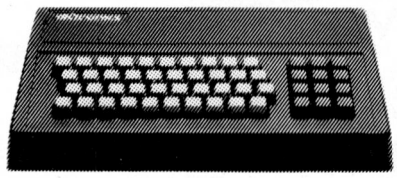

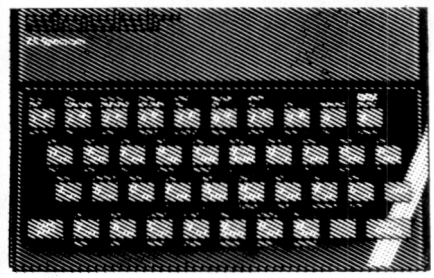

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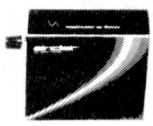

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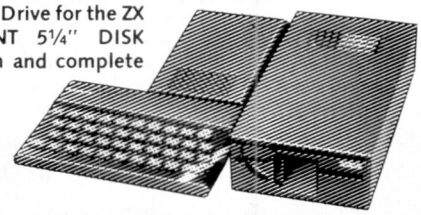

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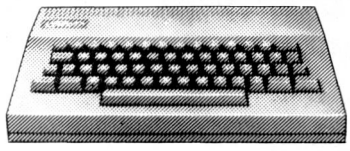

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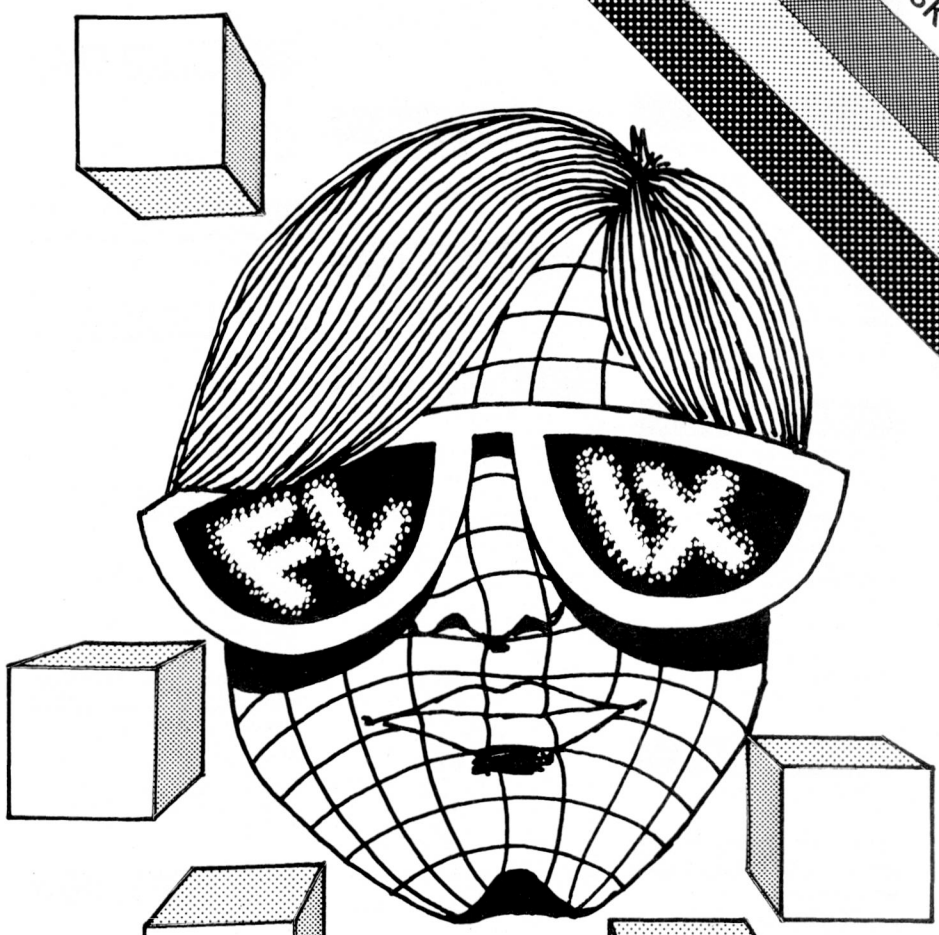

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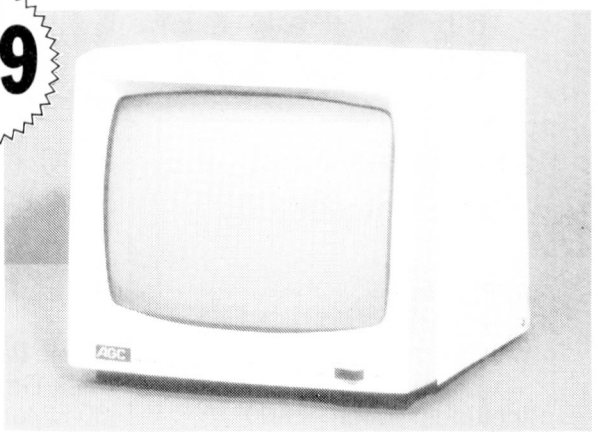

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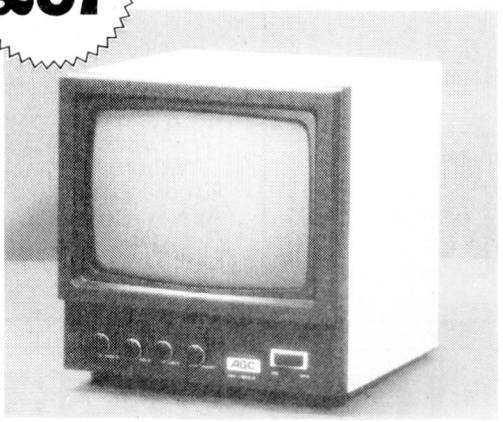

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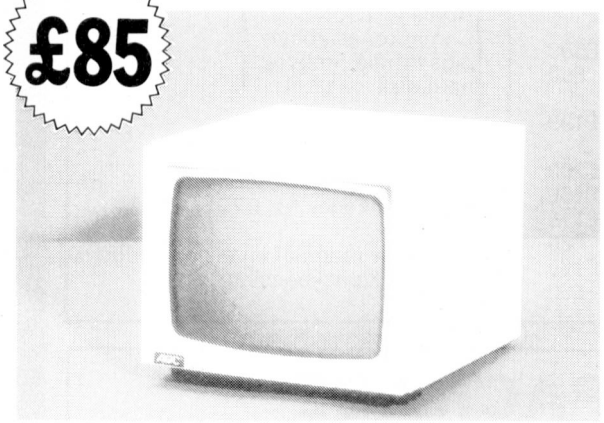

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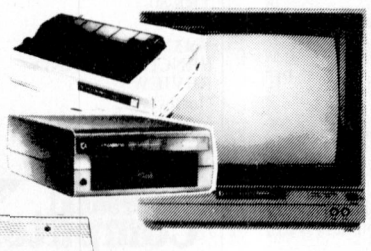

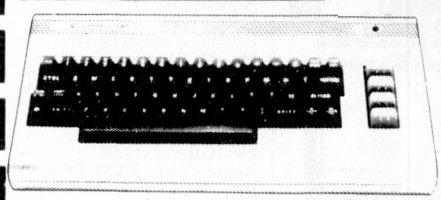

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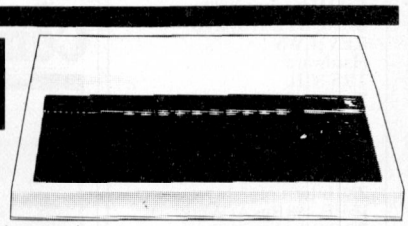

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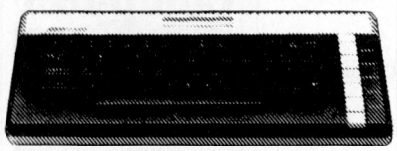

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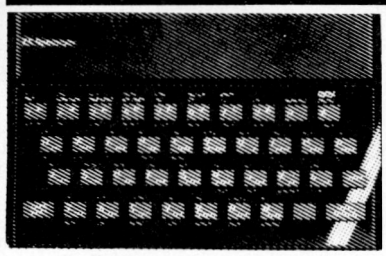

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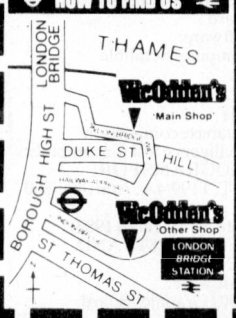

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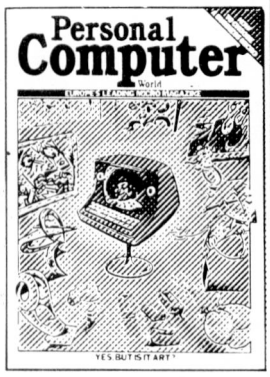

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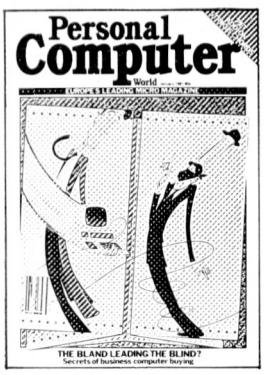

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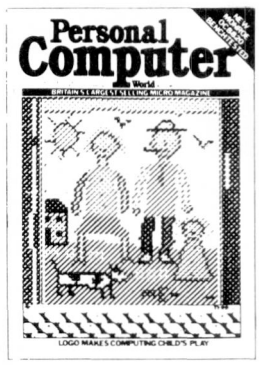

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But that's not all, not by a long way. This program automatically raises a corresponding debit or credit for every entry, and will even open a new account if an entry features an unrecorded account name.

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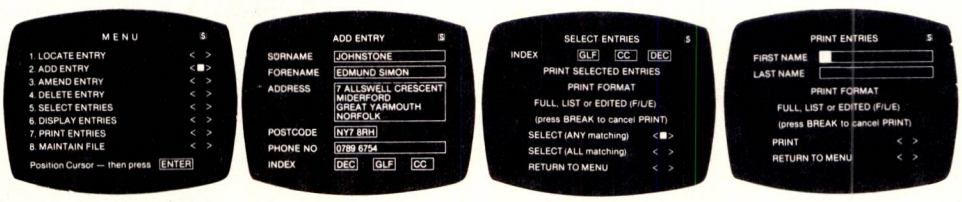
★ ★ ★ ADDRESS MANAGER ★ ★ ★

ADDRESS MANAGER utilises the same "on the page" presentation as FINANCE MANAGER and offers Spectrum owners a professional standard address filing, indexing and retrieval system. Below are examples of the screen presentations.



ADDRESS MANAGER has been carefully constructed to provide the user with a tool that is extremely friendly and easy to use, the speed and presentation of this program are second to none.

ADDRESS MANAGER features **MULTIPLE INDEXING** via our 3 way 3 character index, an ability to store over 400 full names and addresses or 1500 individual names/titles.

USES include storing and updating names, addresses and phone numbers, printing out Xmas card lists, etc, mail order work, customer classification by type size (doctors have used this program to catalogue patients by treatment).

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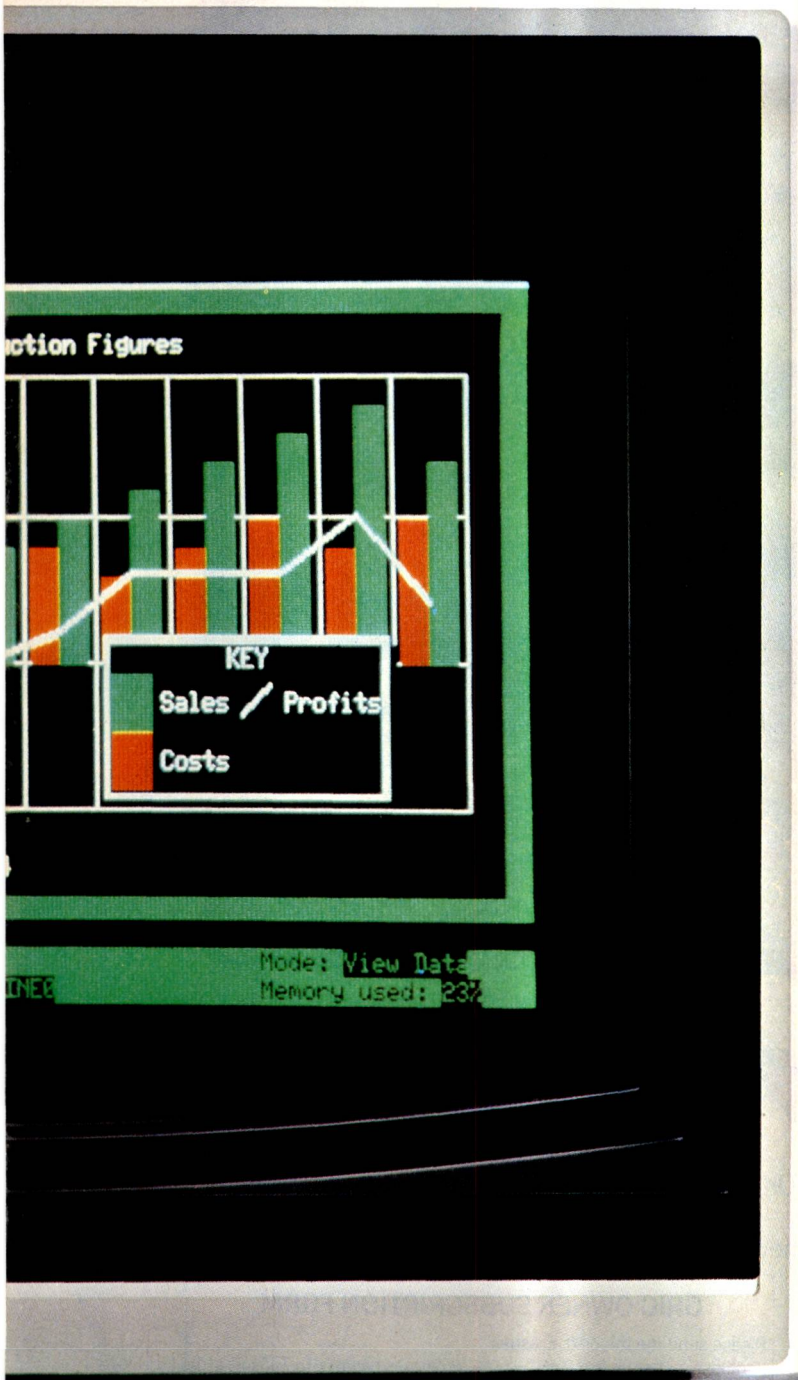
New-Sinclair QL

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.

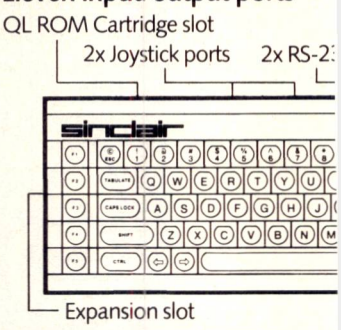
Exclusive: new QDOS operating system

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

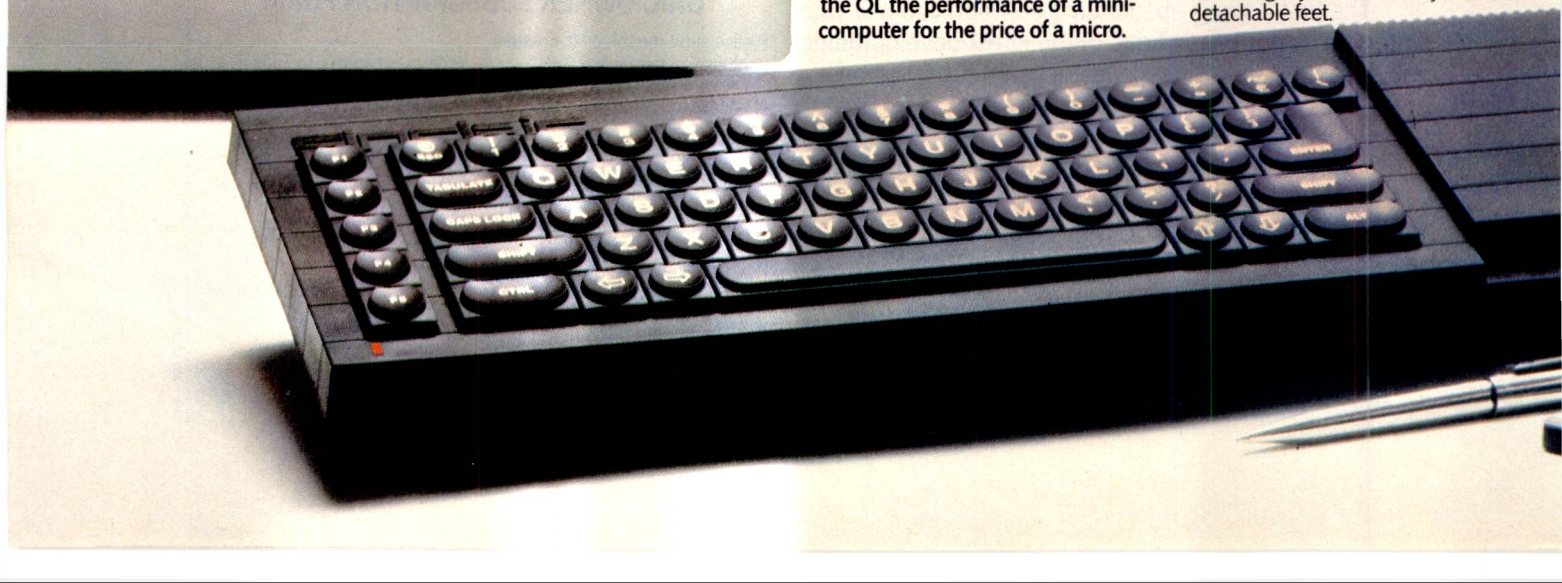


New professional keyboard

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.



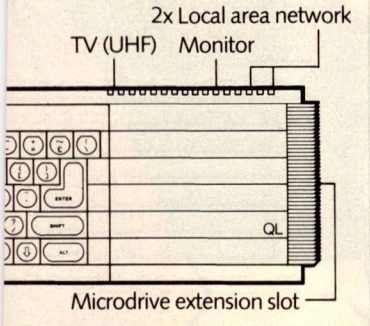
£399

ecause there's no comparison!

Advanced new friendly language – Sinclair SuperBASIC

The new Sinclair SuperBASIC combines the familiarity of BASIC with a number of major developments which allow the QL's full power to be exploited.

Unlike conventional BASIC, its procedure facility allows code to be written in clearly-defined blocks; extendability allows new procedures to be added which will work in exactly the same way as the command procedures built into the ROM; and its constant execution speed means that SuperBASIC does not get slower as programs 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

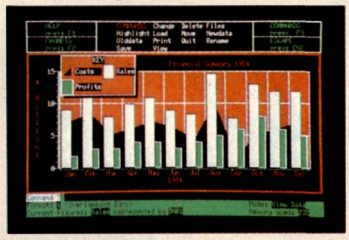


Certain to set a new standard of excellence, QL Quill uses the power of the QL to show on the screen exactly what you key in, and to print out exactly what you see on the screen.

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

If you're seriously considering any other computer, post the coupon for a blow-by-blow comparison. We'll take a *published* comparison chart for the machine you're considering (not one we've created ourselves) and give you the Sinclair QL figures, detail by detail.

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Phone Camberley (0276) 686100, or use the coupon to get a QL brochure.

Please allow 28 days from receipt of order. Remember that Sinclair offers a 14-day money-back undertaking.

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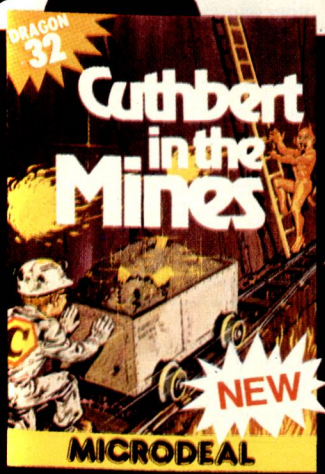



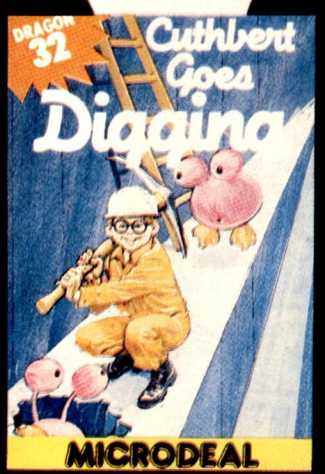

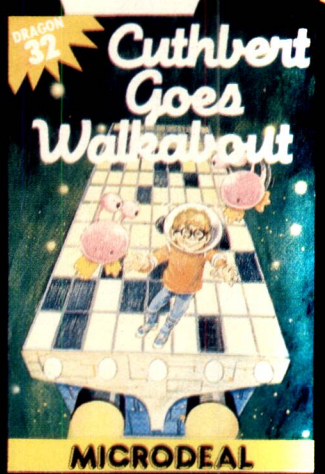







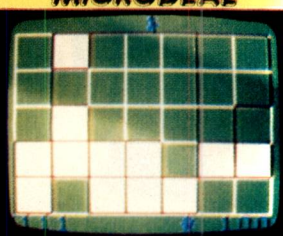

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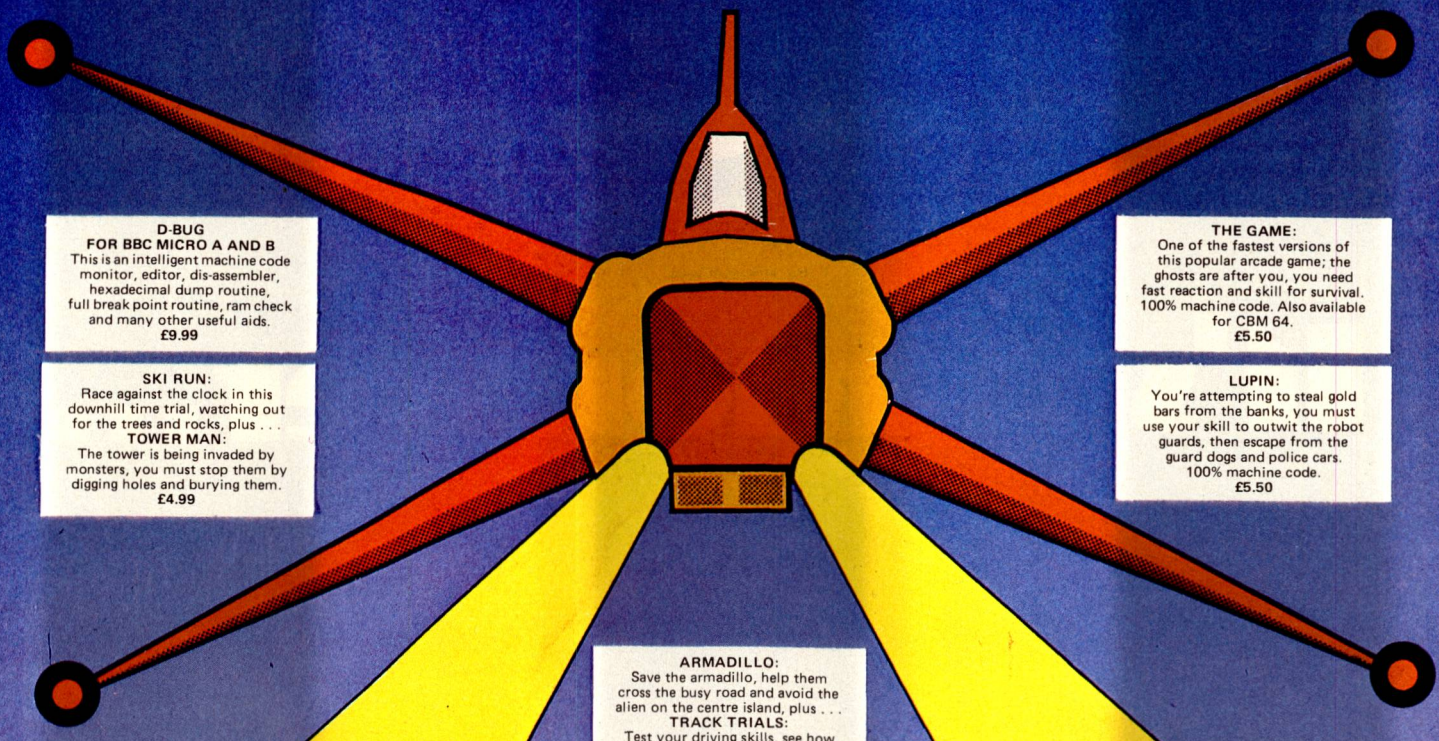

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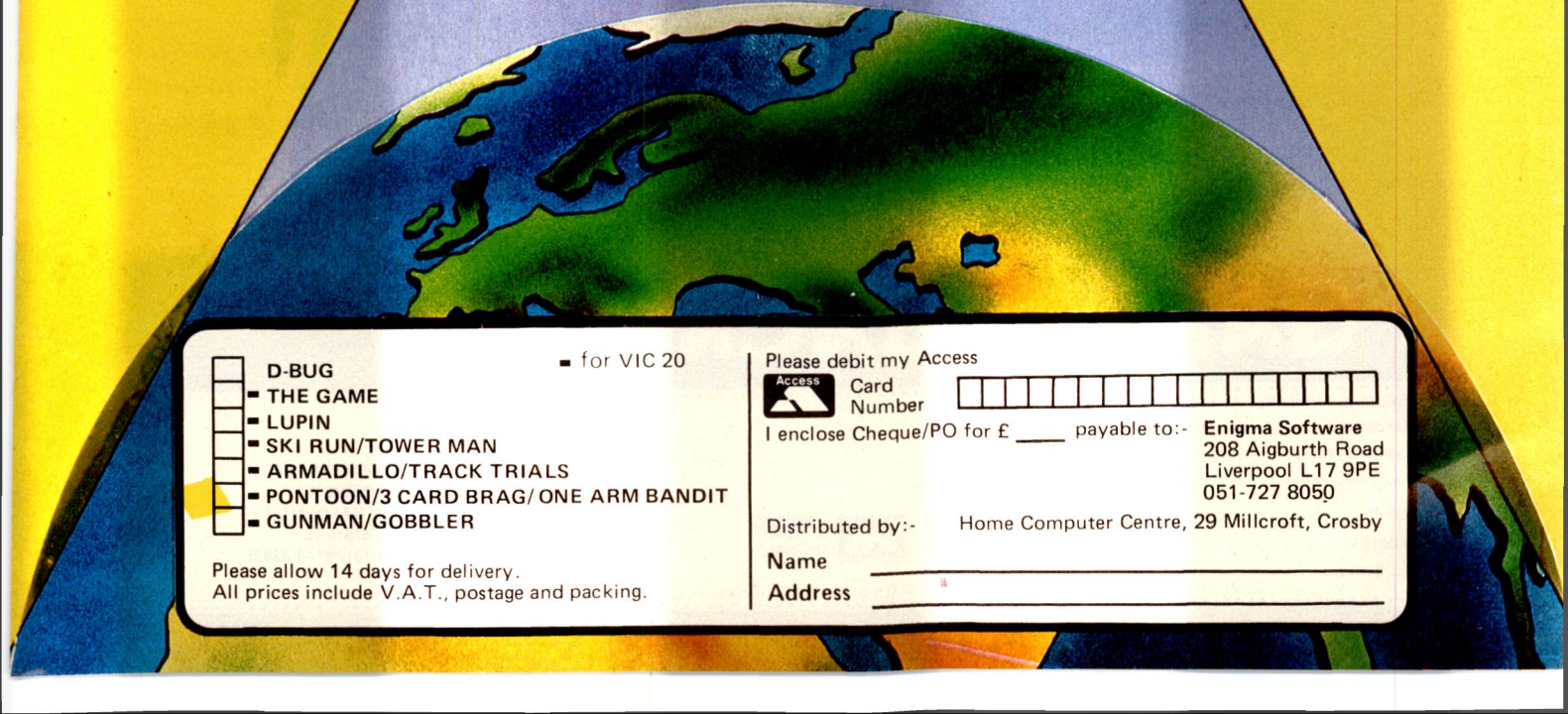

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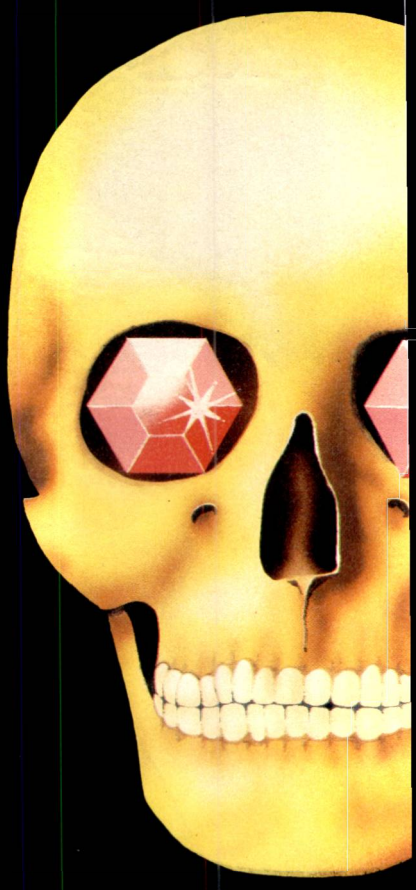

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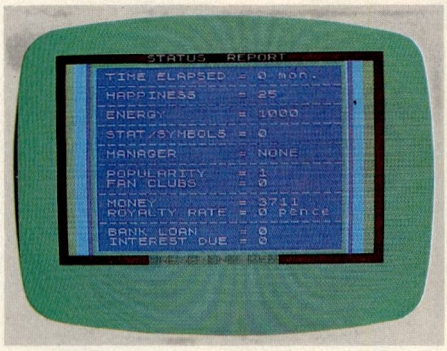
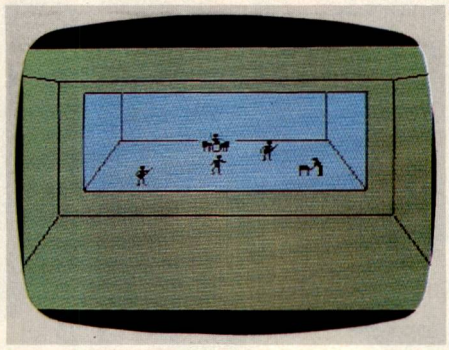
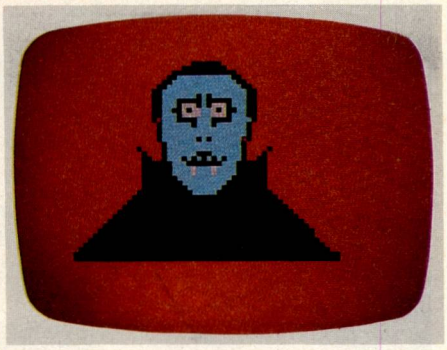
Ravenous sharks, aspiring pop stars and hangmen provide part of this month's entertainment for the Spectrum, Oric and Commodore machines.







It's Only Rock 'n' Roll/Tomb of Dracula

Computer: 48k Spectrum
Supplier: K-Tel
Price: £6.95

K-Tel, hitherto noted for its repackaging of old pop singles and saturation TV advertising of the resultant LPs, has now moved into the home computer software market with material for the Spectrum and VIC 20. K-Tel's gimmick is that each cassette contains two games and sells for the normal price. Known as 'Doublesiders' — 'Twice the fun with two on one' — these are bound to sell in large quantities, given the company's experience in mass marketing.

The first Doublesider for the 48k Spectrum features Tomb of Dracula, in which, armed only with silver stakes, your task is to get your hands on Dracula's treasure while avoiding the unwelcome attention of various ghouls, zombies and vampires. Arriving at Dracula's tomb with half an hour before the sun goes down you are initially given seven stakes and a quick look at a plan view of level 1 of the tomb. This shows the position of the various hazards and tells you the whereabouts of various caches of stakes, as well as indicating the location of either a staircase to the next level or, if you're very lucky, the treasure itself. The plan soon disappears, leaving you to plot your path from memory. The best bet is to amass as many silver stakes as possible — I found myself carrying 129 of them, although the program doesn't explain how it's possible to hold so many — as these are used up in fighting off the tomb denizens.

There are many levels — I have so far failed to proceed beyond level four — and it's all too easy to get killed in the early stages before sufficient stakes have been accumulated. And, of course, things get tougher after 30 minutes when the Count awakes and starts prowling about looking for blood . . . There's certainly nothing too complex here, but it's an enjoyable enough game. I suspect, however, that this is the equivalent of a single's 'B-side' and it's the game on the other side of the cassette that will attract the punters.

The 'A-side' is It's Only Rock 'n' Roll, a simulation in which you take the role of an aspiring pop star and must go on to fame and fortune, amassing status symbols such as limousines on the way.

You start out with a lot of energy and no popularity — after all, no one's even heard of you yet — and begin your career by selecting a name for your band and setting the difficulty level (this merely selects the time in months you're given in which to become rich and famous). You then have to reach your public — initially by busking, then, as you become better known, by playing in pubs, night clubs, and so on. Theoretically your popularity will continue to rise, although there are setbacks along the way, such as turning up for a gig in a pub on the night of a darts match, that will make you lose fans. But eventually you will have made enough money to go on tour — in Britain, Europe, the USA and Japan. At some stage you will be offered a recording contract by Spectral Records. If this happens, you must have suitable material: select the appropriate option and the Spectrum will inform you 'Wait — I need inspiration' before coming up with a few lines of doggerel, usually concentrating on spitting, puking and rabid dogs, that will guarantee you a place in the Top Twenty. (The charts, incidentally, are the least realistic feature of this game — on one occasion I found that the Top Twenty contained three numbers by Val Doonican, two by Perry Como and two by Eric Clapton.)

You have the option of going your own way or selecting a manager, and you may buy a status symbol at any time, assuming you have collected sufficient cash. Amass a million pounds and three status symbols and you have achieved your objective — this, however, is far from easy and you will need a lot of successful tours and hit records to get this far. It becomes easier if you cheat — normally you would be losing energy all the time, particularly when on a long tour, and the only way to recoup this is to rest for a few months, during which time you will earn no money. At the start of each gig you are asked how much energy you would like to use up, and by feeding in a negative value your reserves of strength will increase instead of being drained. A properly error-checked program would spot this, but It's Only Rock 'n' Roll will quite happily accept negative values, as long as they do not drop below −200.

There are other annoying aspects of this program — you too often find yourself sitting waiting for the game to proceed: this is especially noticeable after playing a concert, when you are told how much you have earned; the information stays on screen for a fixed amount of time, when it would have been better to allow the user to press a key to go on to the next stage. You also have the option of seeing highlights of your performance, but the Spectrum's weedy sound makes this a complete joke — it would have been a nice feature had this been a game for, say, the Commodore 64 but is completely wasted here. Various 'newsflashes' concerning the music industry appear from time to time, but these seem to have no effect on the game itself. I think there's a great game to be made out of the machinations of the pop world but, while this is certainly fun to play a couple of times, K-Tel has missed the chance to come up with something really spectacular.

Presentation	**80%**
Use of graphics	**65%**
Addictive quality	**50%**
Value for money	**70%**



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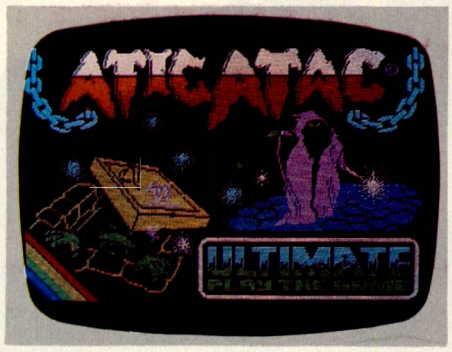
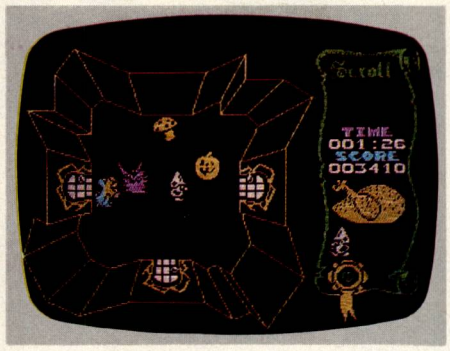






Atic Atac

Computer: 48k Spectrum
Supplier: Ultimate Play The Game
Price: £5.50

The reputation of Ultimate is now so high that every game produced by the company proceeds inexorably to the top of the bestseller charts. And there's no denying that the acclaim is well justified — Ultimate software just gets better and better. It now sets the standards against which all other Spectrum games are judged: Ultimate graphics, in particular, are a revelation, showing just what can be achieved on the Spectrum — just when you think you've seen the 'state of the art' in Spectrum games, Ultimate comes along with something even better.

As you can see from the above, I'm a fan — and I've certainly got nothing to complain about with Atic Atac, the latest and best (so far) offering from Ultimate.

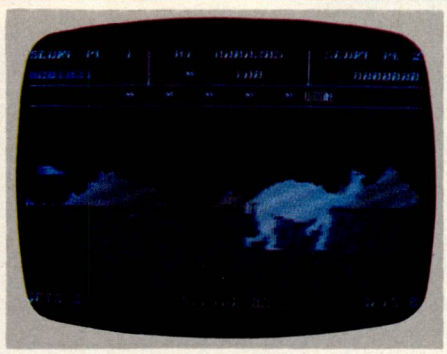
The one thing above all others that sets Ultimate games apart is their addictive quality. There's so much happening that you are unlikely to get bored for a very long time. Atic Atac is no exception. A bald description of the game would, I suppose, be 'a graphic adventure' — the object of the exercise is to find a hidden golden key and use this to escape from the castle in which you are trapped, all the while fighting or avoiding an amazing collection of ghouls and monsters that roam the castle rooms. But, you may treat it as a very sophisticated 'shoot-'em-up' game, surviving for as long as you can and going for a high points score. This is the way I approached it, familiarising myself with the surroundings before even attempting to find the key and make my escape.

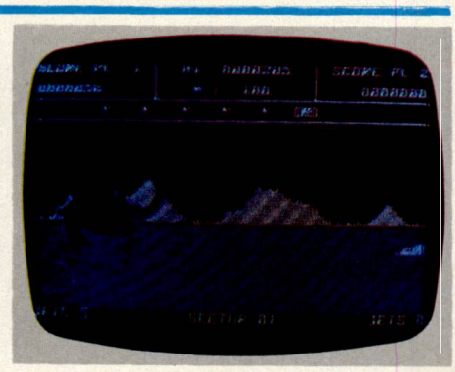
At the beginning of the game you're invited to select from a comprehensive menu — there are options for two types of joystick or keyboard control and you may elect to be a knight, a wizard or a serf (each of which has its own behaviour pattern and each may use a different set of secret passages). Pressing the zero key starts the game, whereupon you find yourself in the first of many rooms. Doors open and close, as do trap doors, furniture blocks your path, food is scattered about (this must be conserved: eat only when your reserves are low — the indication of this is an on screen turkey symbol being stripped to the carcase — or you will die of hunger later in the game), and a truly amazing series of monsters, mummies and ghouls appears to hamper your progress, all of which have different characteristics. Various objects may be picked up for later utilisation, but beware — three objects only can be carried at one time, so you may find it a good idea to leave a store of those you think may be useful in an easily accessible place. A map of some sort will also come in handy, although this is difficult to draw as there are so many rooms and many different levels. The Golden Key itself is in three parts — but I can tell you nothing about what happens when you have collected it as I am a long way from finishing the game. As usual with Ultimate instructions, the cassette insert gives you the bare minimum of information and leaves you to work out your game plan for yourself. The instructions do consistently refer to the Serf character as 'Surf' — obviously a somewhat wet individual . . .

Really, there's much too much happening in this game for a bare description to give you any more than a rough idea. All I can suggest is that you try it for yourself — I guarantee you won't be disappointed . . .

Presentation	**95%**
Use of graphics	**99%**
Addictive quality	**99%**
Value for money	**100%**







Attack of the Mutant Camels

Computer: Commodore 64 + joystick
Supplier: LLamasoft
Price: £7.50

Those nasty aliens are at it again — Earth is under attack. This time, however, the nasties use a more devious method. They have abducted herds of camels and mutated them from their normal harmless, if unpleasant, selves into 90 feet high death camels that can spit lasers. Your job, as ever, is to save the world single-handedly.

It's a shame in games like this that there aren't versions available for two players to play simultaneously — then at least the game might be 'winnable'. Unfortunately this isn't the case and I'm

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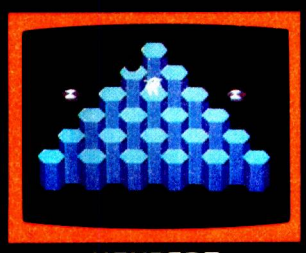

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S·C·R·E·E·N·P·L·A·Y

afraid you're on your own.

All you have to stop the advancing horde is one small light spaceship armed with an antimat cannon. Your ship is highly manoeuvrable but easily damaged. The range at which you fire is crucial — the general rule is the closer the better, so the tactics of this game are simple: get in close and blast them, and keep on blasting until they drop.

The camels are coated in neutronium (the strongest substance known to science) so they're difficult to kill. To destroy a camel you must gradually wear away its armour by repeated fire until the target flares up and the camel bites the dust. As the neutronium is worn away its colour changes so you can see just how well you're progressing.

The camels aren't going to be fired at without at least token resistance, so they spit laser bolts at you. These are of two types — normal and nasty. The normal bolts are easily avoided, and you can take four hits by these bolts before you're destroyed. Nasty bolts are a little trickier, since they home in and destroy you if you're caught.

The screen display is somewhat reminiscent of Defender and has a defender-style landscape. Above the display is a radar which plots the camels' progress as they plod across the screen.

The game is lost if a camel reaches the right edge of the radar, when you're immediately destroyed by your superiors who are annoyed by your incompetence. Should you manage to destroy all six camels in one level you can progress to the next. However, between levels is a tricky phase known as the trans-sector hyperwarp, where rocket dodging is necessary until your trans-spatial warp field engages and then it's back to camel blasting.

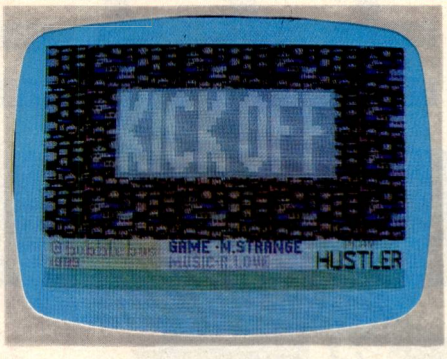
The whole point of the game is to amass points scored for hitting and destroying camels, with a large bonus obtainable for successive camels destroyed with one ship. It progresses to more difficult levels which increase the camels' speed and accuracy or the number of nasty bolts released by each animal.

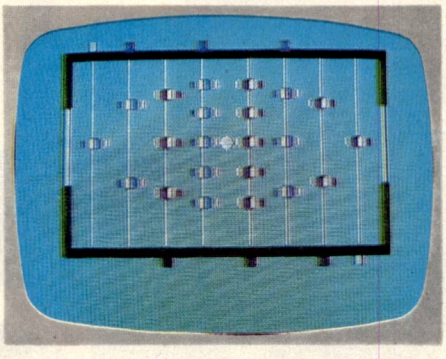
The game can be played by two players since there's time to retrieve the joystick after it's been thrown across the room in disgust.

Presentation	**60%**
Use of graphics	**65%**
Addictive quality	**80%**
Value for money	**75%**

Kick-Off

Computer: Commodore 64 + 1/2 joysticks
Supplier: Bubble Bus
Price: £5.95





Kick-Off is a computer version of the age old table football machines that used to fill our arcades but are now more commonly found in the cafés of the Costa Brava.

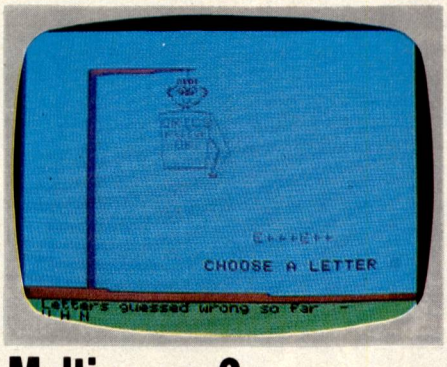
The game is for one or two players but only the two player game is worth playing. In the two player version both players should ideally use a joystick but it's possible for one to use the keyboard instead.

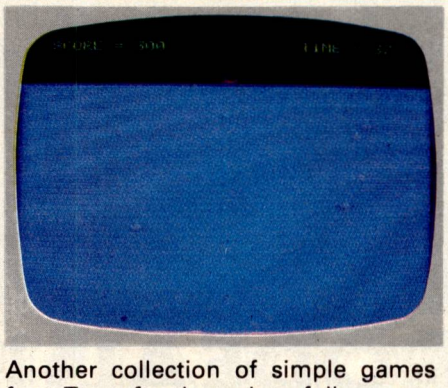
After a musical title page the display changes to the table itself. The table has the usual format with each player controlling four rods of footballers. For those unfamiliar with the original the formation is one goalkeeper, two defenders, five in midfield and three forwards. The players control the game by pushing the joystick to the left or right to change the rod currently being controlled. To show which rod is being used the handle of the rod in question changes colour. To kick the ball you must hold the fire button down as you push your joystick in the required direction.

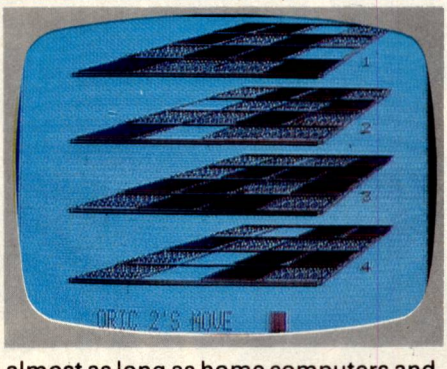
Controlling the players and the ball requires some skill which can be gradually acquired as games are played. Don't be dissuaded by early disasters as games between two competent players can be as enjoyable as the original.

The game is played over the best of eight goals with half time occurring after four goals: you change sides at half time (or rather joysticks) and the game continues, played at seven different speeds.

Presentation	**60%**
Use of graphics	**75%**
Addictive quality	**70%**
Value for money	**75%**



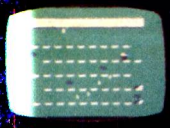




Multigames 2

Computer: 48k Oric
Supplier: Tansoft
Price: £6.90

Another collection of simple games from Tansoft, released as a follow-up to its Multigames 1 package. The mixture is very much as before; all the items here are games that have been around almost as long as home computers and indeed they are pretty much of the standard one would expect of games to be typed in from magazine listings. One assumes that this is the sort of package



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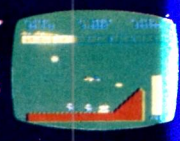

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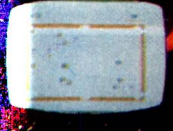

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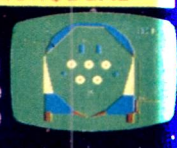

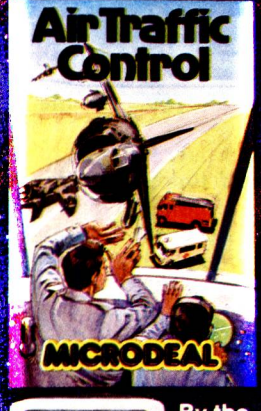





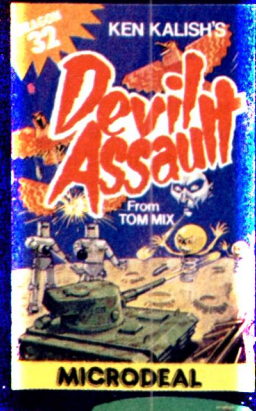



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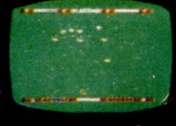

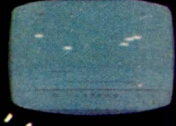

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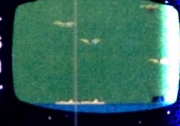

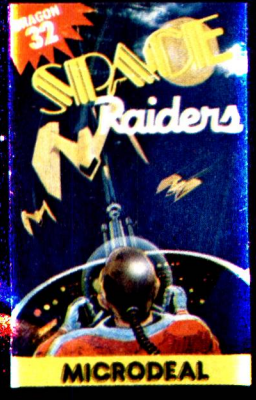

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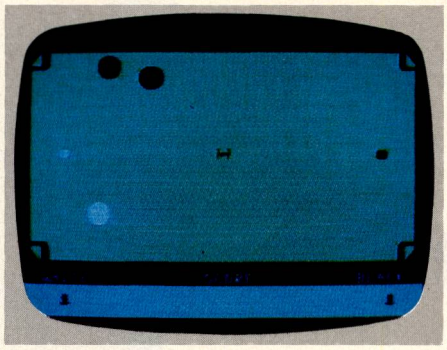
bought by proud parents at the same time as they purchase a computer for their beloved offspring.

Side 1 kicks off with that old favourite, Hangman. This makes good use of the Oric graphics (the hanged man wears an Oric T-shirt and has more detail than usual — even hands and feet) and offers the player the chance to guess the whole word with each letter correctly guessed. However, if the computer slips out of CAPS mode the program refuses to accept even correctly guessed letters; this is sloppy and could easily have been avoided. Next up is Moonlander, which is considerably easier than most such programs and requires the input of a figure between 0 and 30 as the amount of thrust required to cushion the landing. The display switches to give a closer view of the lander once a height of 50 feet has been reached. Last on this side is Roadrace, in which the player must steer a car along a winding track, avoiding tree trunks which have fallen into the road. After the first two minutes additional hazards in the shape of fences appear. Very little use of the Oric graphics is made in this.

Side 2 starts with Substrike, in which the player controls a ship, below which are four submarines. These simply pass to and fro beneath the vessel, which fires depth-charges down on top of them. Four charges may be in the water at any one time. As the submarines don't fight back, however, this soon gets boring. Tansoft has saved the best for last, and 3D Link 4 is the only game here that really stands up to repeated playing. It's really 3D noughts and crosses, with a winning line consisting of four in a line in any direction — up/down/diagonally.

All in all, this would be suitable for a first purchaser of a micro, but is hardly suitable fare for anyone who has played any of the more advanced computer games available. When you consider that there are several companies offering 'compilation' tapes that contain 50 games for less than a tenner, this hardly represents good value.

Presentation	**60%**
Use of graphics	**60%**
Addictive quality	**10%**
Value for money	**20%**



Pottit

Computer: Commodore 64 + 2 joysticks
Supplier: Romik Software
Price: £6.99

Pottit simulates that stage most people reach just after a long game of billiards, when both players hit their cue balls together and set up a situation where all three balls are racing around the table (just to see what happens). Romik has taken this idea and turned it into a highly enjoyable two-player game.

The screen display is simple, showing the Pottit table complete with four pockets and three Pottit balls. At the start of the game the balls are in a straight line, with the red ball between the two cue balls. No-one takes a turn in Pottit — the players are free to move their cue ball whenever they wish. The object of the game is to score points by potting the red and your opponent's cue ball, scoring two points and one respectively. The first to hit the red ball after the cue balls have collided scores an extra two points, as does striking your opponent's ball immediately after you have potted the red.

The winner is the first to reach 50 points. To make things more difficult the cue balls act as if they're very heavy or inert, so it takes a lot of effort to move them, but once in motion they soon reach frightening speeds.

That's all there is to it, except to warn you that not only is it enjoyable, it's also very tiring to play. I should reiterate the warning given in the cassette insert that bending your joystick won't make your ball move any quicker.

Presentation	**50%**
Use of graphics	**50%**
Addictive quality	**60%**
Value for money	**70%**

Supa Catcha Troopa

Computer: Commodore 64 + joystick
Supplier: Abrasco
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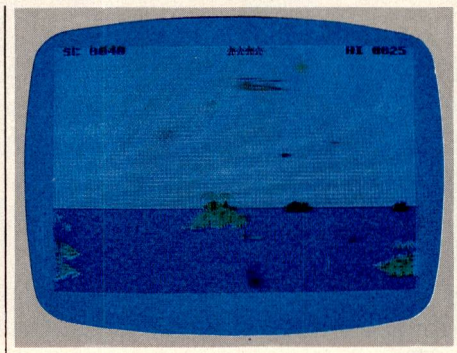

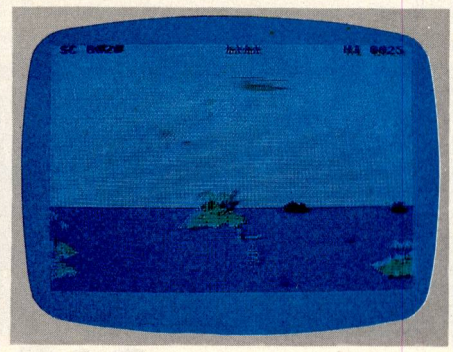

This game finds you sitting in a rowing boat in a stretch of water between two islands. Your object in life is to catch paratroopers as they jump from a Chinook helicopter, but if they fall into the water a net can be lowered to fish them out. If they're left unaided they'll attempt to swim towards one of the islands.

To make things more interesting, the water you're patrolling is infested with very hungry sharks, and if that isn't enough, you also have to contend with giant birds swooping down over your boat in an effort to snatch a paratrooper away. The game ends when seven men have been eaten or carried away to an unknown fate.

If you succeed in saving ten men then you proceed to the next level where two paratroopers jump together. The game continues in this way until in the fifth level all hell is let loose as five paratroopers are dropped simultaneously.

Paratroopers are dropped every time the helicopter flies across the screen, its speed increasing as the games goes on making the final screen almost impossible to play. The graphics of the game are extremely good, particularly the animated movement of the men, sharks and birds. This excellent game is highly recommended for those with strong nerves and a steady hand.

Presentation	**50%**
Use of graphics	**90%**
Addictive quality	**80%**
Value for money	**75%**

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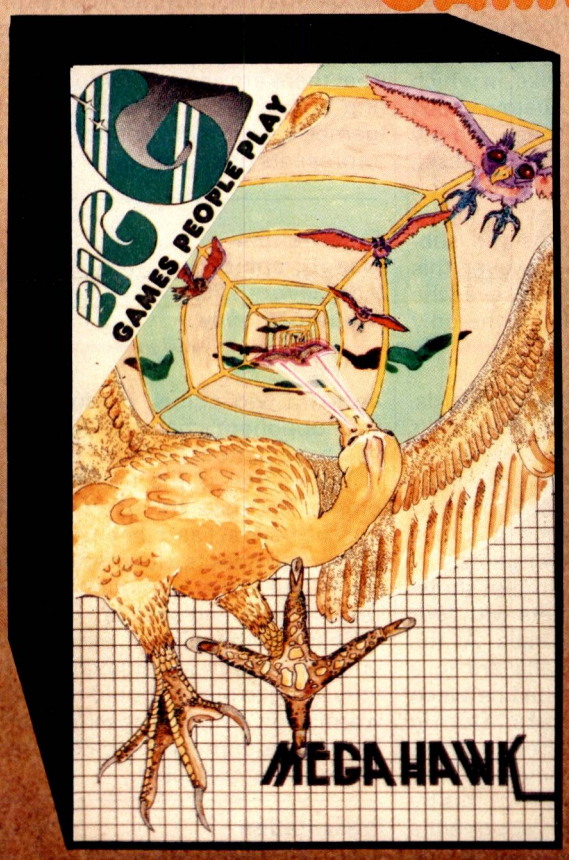

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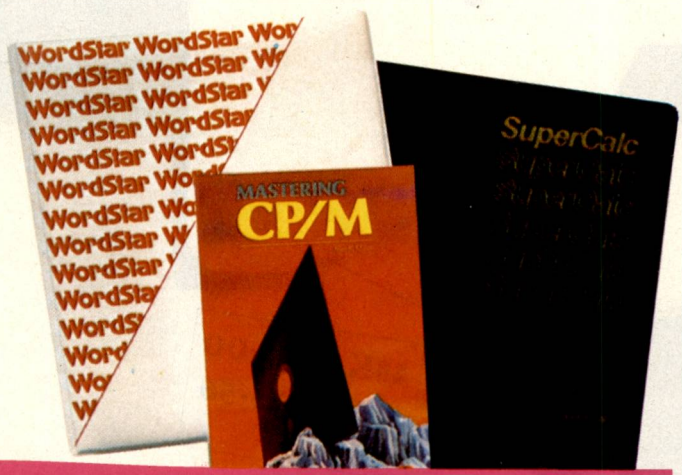

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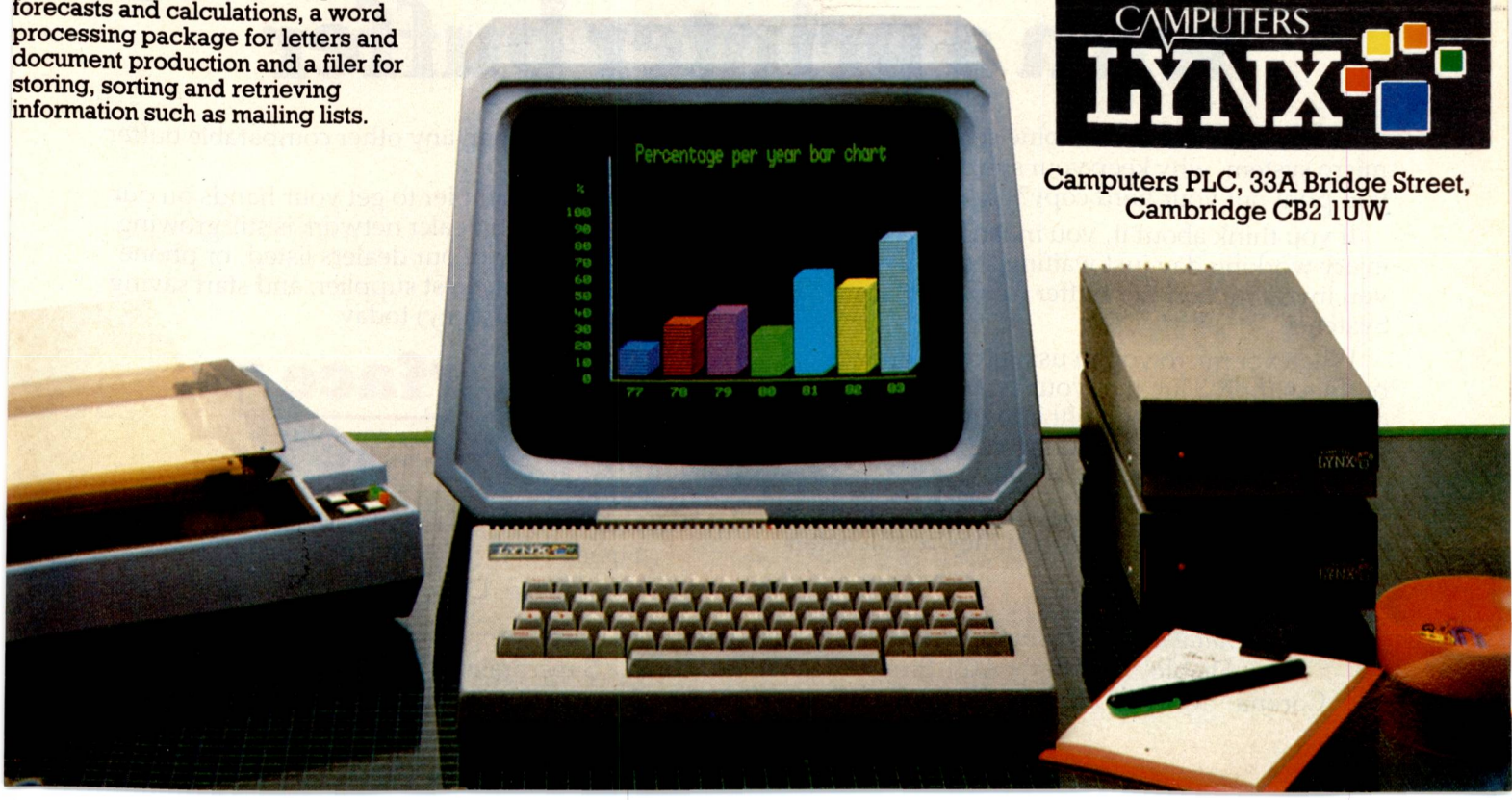

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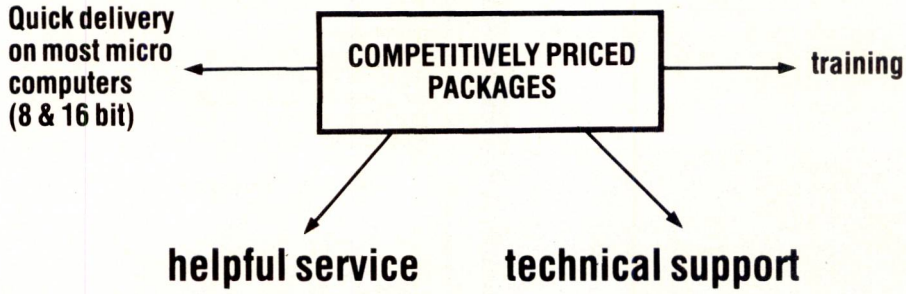

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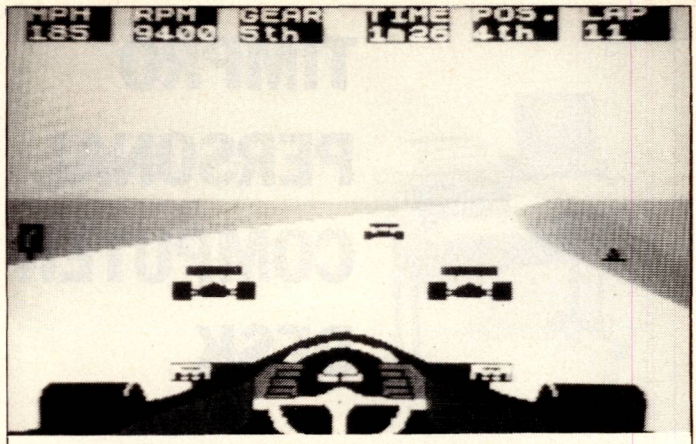

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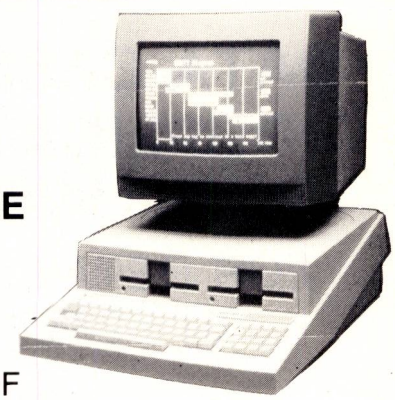

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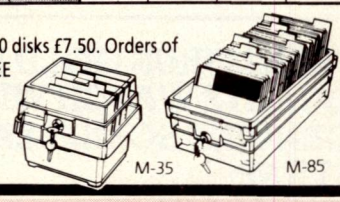

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BASF disks at low, low prices. **£12.99** + VAT. BASF 1SSD single sided single density disks (BASF equivalent for Dysan 104/1). APPLE, COMMODORE 64, VIC-20, BBC, or any other single density machine. Why pay more for unused double density, they don't last any longer!

£14.99 + VAT BASF 1SDD single sided double density disks (BASF equivalent for Verbatim 525-01, Dysan 104/1D). Special prices are so low that promotion items are excluded. A chance to buy at genuinely low prices, offer ends 30th April 1984, so don't hesitate. DIAL-A-DISK . . . 01-541 1144.

To: Direct Disk Supplies Ltd., FREEPOST, 29 Dagmar Road, Kingston, Surrey KT2 6BR. PCW 3/84

Code	Qty	Description	Price
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*excluding Bargain Box

Name

Address

Postcode Tel

Nett price
Carriage
Subtotal
VAT 15%
Total payable to DDS £

Cheques payable to DDS. Debit my Access/Barclaycard No:

Signature:

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FLOPPY DISKS FAST

FREE with EVERY TEN-PACK of diskettes from DISKING at these prices.

The complete DISKING DATA PROCESSING package

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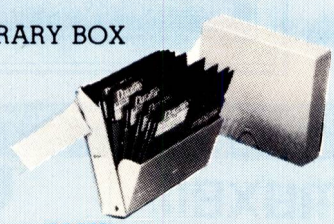


Value £2.50

** PLUS **

2. DISKWRITER

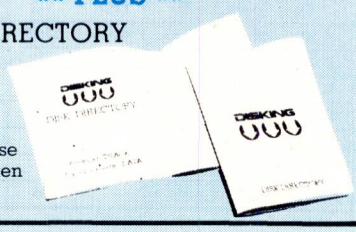


Value 20p
You may purchase these separately at £9.90 for 50 (specify blue or black ink)

** PLUS **

3 - DISK DIRECTORY

Value 99p



You may purchase these at 9.90 for ten

FREE LORUS GOLD PLATED QUARTZ WATCH WITH GENUINE SOLID LEATHER STRAP

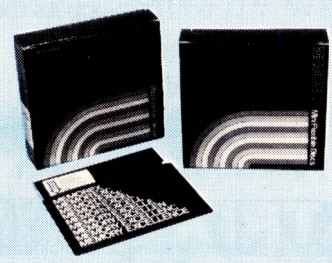
LORUS are part of the SEIKO group of companies



Order FOUR Ten-packs of any brand of diskettes (5¼" or 8") using the coupon opposite, or if telephoning credit card orders mention this ad. At these prices you will receive a FREE Quartz Watch. Order EIGHT Ten-packs and you will recieve TWO Quartz Watches and so on. Please specify when ordering whether you require Gents or Ladies models. Offer ends 28th February 1984.

All free gift offered at any time by DISKING are subject to availability. Disking reserves the right to substitue any similar alternative item or withdraw the offer without notice.

MEMOREX



MEMORY EXCELLENT

With their NEW FIVE YEAR WARRANTY MEMOREX prove once again their reputation for high quality media. Specify MEMOREX diskettes and you can be sure of reliable products with specifications far exceeding those stated on the label.

★ ★ ★ **FREE** ★ ★ ★

★ ★ ★ **MEMOREX C-90 CASSETTE** ★ ★ ★

A FREE MEMOREX C-90 CASSETTE TAPE will be packed with every ten-pack of any MEMOREX diskettes purchased at these prices. This offer does not affect any other promotions and is in addition to them. Offer ends June 30th 1984.

5.25" DISKETTES
PRICES EXC VAT

	10-40	50-90	100+
3481 S/S 48 tpi Soft Sect	21.90	20.90	19.90
3491 D/S 48 tip Soft Sect	27.90	26.90	25.90
3504 S/S 96 tpi Soft Sect	27.90	26.90	25.90
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48 tpi suitable for 35 or 40 track operation
96 tpi suitable for 77 or 80 track operation
10 & 16 Hard Sector available at same prices

DISKING stock around 80,000 of the world's finest diskettes and normally ship within FOUR working hours! Whether you want 1 or 100 ten-packs we are waiting.
Call Joan or Roger on 0428 722563 anytime. ACCESS, VISA or DINERS cards welcome.

Verbatim®



Datalife by Verbatim - With Five Year Warranty

VERBATIM have not become the World's favounte floppy disks by accident. Perfect magnetic media is their stock in trade, and to prove it they now offer an unconditional FIVE YEAR warranty on all DATALIFE products.

5¼" DISKETTES
Certified for single OR double density and with hub ring reinforcement.

PRICES EXC VAT	10-40	50-90	100+
MD525 S/S 48 tpi Soft Sect	22.90	21.90	20.90
MD550 D/S 48 tpi Soft Sect	29.90	28.90	27.90
MD577 S/S 96 tpi Soft Sect	28.90	27.90	26.90
MD557 D/S 96 tpi Soft Sect	36.90	35.90	34.90

48 tpi suitable for 35 or 40 track operation
96 tpi suitable for 77 or 80 track operation
10 & 16 Hard Sector available at same prices

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PRICES EXC VAT	10-40	50-90	100+
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MD200-01 S/S S/Dens. Soft Sect.	19.90	18.90	17.90
MD200-AS S/S S/Dens. Apple only	19.90	18.90	17.90

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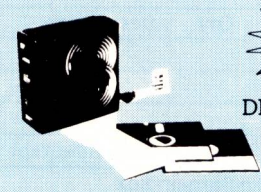
PRICES EXC VAT

FD34-1500 S/S S/Dens. Soft Sect.	22.90	21.90	20.90
FD32-1500 S/S S/Dens. 32 Hard Sect.	22.90	21.90	20.90
DD34-1501 D/S D/Dens. Soft Sect	29.90	28.90	27.90

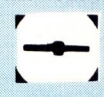
DISKETTE CARE AND MAILING



NEW LOW PRICES

DISK DRIVE HEAD CLEANING KITS

We're fed up with being asked whether our disk drive head cleaning kit actually works. So here's the proof:-

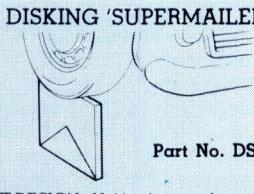
BEFORE.   AFTER

Can you really risk that breakdown?

CK5 for 5¼" disk drives	14.90
CK8 for 8" disk drives	14.90

The NEW DISKING 'SUPERMAILER'

(5¼" only)



Part No. DSM

* COPYRIGHT DESIGN - Unlike the rest, this ingenious mailer has a flute crossing action when folded, resulting in a virtually unbendable mailer.

* CAVERNOUS CAPACITY - will take, one, two, three or even four diskettes WITH envelopes.

* FULL INSTRUCTIONS - Each DISKING 'SUPERMAILER' is printed with full instructions

*PACKED IN 100'S - For convenience

1 PACK	2 PACKS	3+ PACKS
24.90	22.90	19.90

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Certified for Single OR Double Density, and all with Hub Ring reinforcement

PRICES EXC VAT	10-40	50-90	100+
104/1D S/S 48 tpi Soft Sect	25.90	24.90	23.90
104/2D D/S 48 tpi Soft Sect	37.90	36.90	35.90
204/1D S/S 96 tpi Soft Sect	36.90	35.90	34.90
204/2D S/S 96 tpi Soft Sect	46.90	45.90	44.90

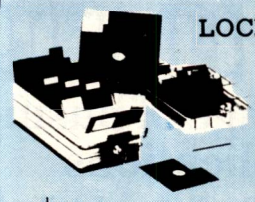
48 tpi suitable for 35 or 40 track operation
96 tpi suitable for 77 or 80 track operation
10 & 16 Hard Sector available at same prices

8" DISKETTES

PRICES EXC VAT	10-40	50-90	100+
3740/1 S/S S/Dens Soft Sect	30.90	29.90	28.90
3740/1D S/S D/Dens Soft Sect	37.90	36.90	35.90
3740/2D D/S D/Dens Soft Sect	41.90	40.90	39.90

32 Hard Sector available at same prices

DISKETTE STORAGE



LOCKABLE DISKETTE STORAGE

These anti-static, ABS plastic diskette storage boxes come in four sizes, two for mini disks and two for 8" disks.
They have a white base with a transparent smoked lockable lid, and hold 40 or 80 diskettes.
They come complete with keys and dividers.

PRICES EXC VAT	
M35 40 minidisk capacity	14.90
M85 80 minidisk capacity	18.90
F40 40 8" diskette capacity	18.90
F90 80 8" diskette capacity	27.90

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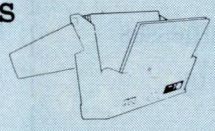

PRICES EXC VAT	1-49	50+
SEE 10 for minidisks only	2.50	2.20
	1-47	48+
8" LIBRARY BOX (NOT SEE 10 Design)	2.50	2.20

The new SEE 10 us probably the best 5¼" library box around.
(FREE with every ten disks ordered).

UK SHIPPING RATES EXC VAT

5¼" DISKETTES
1-2 Packs each pack @ 95p
3-5 Packs each pack @ 75p
6-9 Packs each pack @ 60p
10+ Packs ★POST FREE★

5¼" CLEANING KITS
Same postal rate as packs of 5¼" diskettes, 10+ POST FREE

5¼"NEW 'SEE 10' LIBRARY BOXES
SEE 10 1-4 off @ 40p
SEE 10 5-9 off @ 30p
SEE 10 10+ @ 20p

8" DISKETTES
1-2 Packs each pack @ £1.60
3-5 Packs each pack @ £1.20
6-9 Packs each pack @ 90p
10+ Packs ★POST FREE★

8" CLEANING KITS
Same postal rate as packs of 8" diskettes, 10+ POST FREE

8" LIBRARY BOXES
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DISKING DISK DIRECTORIES
10-Pack 2.00

DISKING SUPERMAILERS (5¼" ONLY)
100-Pack Complete with sealing labels **3.00**

DISKING DISKWRITERS
50-Pack **£1.00**

LOCKABLE DISKETTE STORAGE
All versions £2.00 each for one, £1.30 each for 2-7, 8+ postfree.

NORMAL ORDERS - We now welcome any official Government orders
We are now happy to accept any official orders with a minimum value of £30.00 from Government Departments, Ministries and Local Authorities. We do this on the understanding that invoices will be settled within thirty days or preferably less please.
Alternately, you may send your remittance with your order if you so wish.
All other non Government bodies, cheques with order please payable to DISKING. If you are a large establishment, and cannot raise cheques without an invoice please post or telephone us your order, and we will send a pro-forma invoice by return, for your accounts department to pay against.
Also bear in mind, that you do have to pay VAT, which will be added to these prices.
If you are in any doubt, please see the order form on this brochure to help you with your calculations, or telephone us for assistance.

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We welcome Access (Mastercharge), Barclaycard (VISA) & Diners Club International, & there is NO credit card surcharge. You may write your c/card No. on your order or telephone the order day or night, 365 days a year. You may speak for as long as you like, (but don't leave long gaps otherwise our machine thinks you've gone home) and don't forget to give the following details
1. The Cardholder Name, Address and day time telephone number
2. Delivery Address if different
3. First Class, ordinary or special post
4. Your Credit Card Number
5. What you wish to Order.

You may leave the rest to US!!

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If you're posting your order, omit the word FREEPOST from our addre is, and use our normal postcode GU30 7EJ and do not forget to stamp it FIRST CLASS. If you are a Government body as defined under 'NORMAL ORDERS' and are telephoning your official order OR are an individual or company using your credit card No., please make it clear that you wish to pay for your goods to be sent to you by FIRST CLASS POST.

FIRST CLASS RATES EXC VAT	MINIDISKS	8" DISKETTES
First TEN-PACK	2.00	2.50
Second and subsequent TEN-PACK	1.50	2.00

DESPERATE ORDERS U.K.
Your options are - DATAPOST Which will deliver the goo.ds within the United Kingdom over night (usually before 10 am the next day) provided they are ordered and paid for from DISKING by 3.00 pm or EXPRESSPOST Which will deliver the goods the SAME DAY provided they are ordered and paid for from DISKING by 10.30 am, and provided you are no further north than Manchester.
These services put great stress on our sales order processing and packaging departments. Please therefore, spare a thought for our girls, and make sure that
a) The required goods are in stock and
b) A full complement of manpower and vehicles are available at DISKING.

SONY.

3½" MICRODISK

	10-40	50-90	100+
OM-D3320 S/Sided Auto Shutter	42.90	41.90	40.90

(There is no free library box with these yet)

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5, 10, 15 & 20MB Hard Disks for YOUR Micro.



We just bought a 20MB sub-system for our micro., to service the ever increasing number of you lovely people who keep ordering diskettes, adn were so impressed with the performance, service and price, that we decided you'd all like one of these magic boxes. So we now sell them.
They come in four sizes, and there's one for YOUR machine:-

Part No:	5MB DS505	10MB DS510	15MB DS515	20MB DS520
APPLE II	1190.00	1290.00	1390.00	1490.00
IBM-PC	1290.00	1390.00	1490.00	1590.00
SIRIUS/VICT.	1190.00	1290.00	1390.00	1490.00
EPSON QX10	1190.00	1290.00	1390.00	1490.00
DEC LSI 11	1390.00	1490.00	1590.00	1690.00
Z80 System	1190.00	1290.00	1390.00	1490.00
S100 System	1290.00	1390.00	1490.00	1590.00
ONE slave may be added at these lower prices				
Slaves	990.00	1090.00	1190.00	1290.00

Complete with intelligent controller, host adaptor power supply unit, fan, cabling, software and User Manual.
Free delivery in the UK.

TRADE CORNER

Write or call for our 1984 Trade pack, including our FREE sample unlabelled diskette.

A Seasonal Message to all our Customers

You'll find our prices good, and our service even better. Cheaper products you may find, but anyone can advertise anything at a silly price. Just try buying it — it's always next week! Like car salesman with the new £1000.00 cars, he had plenty of orders, but he just couldn't get the stock! surprise surprise.

Our thanks this month go to Alistair who always leaves his order for 1000 diskettes until 6.15pm and then wants delivery in London next morning — A Hapy New Year to him from DISKING, and from our local taxi driver who's getting to know the route quite well. To ALL our customers both Trade AND End User, without whom we wouldn't be here:-

*** * * A HAPPY AND PROSPEROUS NEW YEAR * * ***

STOP PRESS * STOP PRESS * STOP PRESS *

400 Brand New, Unlabelled Grey Superluxe Disk Libraries (20 minidisk capacity) at half price to Clear. Minimum order quantity 10 pieces.
Only . . . 4.90 each. (3.00 P&P per 10, 30+ FREE)
This offer is open to the trade OR end users. First come, first served.

Order any 4 Ten-packs of diskettes use this coupon and you will receive a FREE Quartz watch, specify

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or
Ladies Qty . . . . . .

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Access
DINERS CLUB

QTY	PART NO.	DESCRIPTION	PRICE EXC VAT
			£
			£
			£

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TOTAL DELIVERY AND INSURANCE	£
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VAT	£
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MD3/84

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Losing is often funnier than succeeding — don't play it, play with it. — 48K Spectrum £5.50 incl. p&p.

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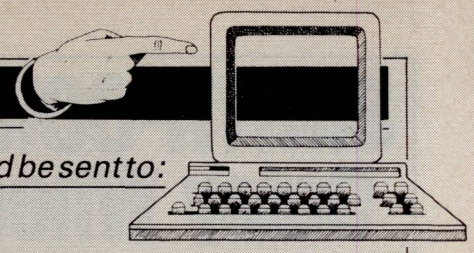

Our bi-monthly guide to microcomputing systems. Updates should be sent to: Tracy Dear, PCW, 62 Oxford Street, London W1A 2HG.

Machine & Price	Main Distributor	Hardware	Software	Miscellaneous
Altos 580-20 £5560	Logitek 01-723 0012/3	192k, Z80A, 5¼" FD drive (1Mb), 4xs/p, p/p, 5¼" HD (20Mb)	MP/M11 O/S	1-3 users
Altos ACS8000-14 £9450	As above	208k RAM, Z80A, 8" FD drive (1/2Mb) 6xs/p, pp, 8" HD (40Mb)	MP/M11 O/S	1-4 users
Altos 58640 £10150	As above	512k RAM, 8086, FD 5¼" (1Mb), 6xs/p 5¼" HD (42Mb)	MP/M11 O/S	1-5 users
Altos ACS86000-14 £13750	As above	512k RAM, 8086, 8" FD drive (1/2Mb), 8" HD (40Mb), 8xs/p, p/p	MP/M11 O/S	1-8 users
Apple IIe £1199	Apple (UK) Ltd 44442 60244	6502A, 65-12k RAM, 16k ROM, 24 x 80/40, C int, up to 8,143k (DiskII)	C/S-Dos 3.3, UCSD Pascal CP/M, Applesoft Basic & others	8" FD & HD from other manufacturers. Ask Apple dealer about purchase of Apple II s/w.
Apple III £2395-£3495	As above	Based on 6502B, 256k RAM, 24 x 80, Built-in 143k	O/S-SOS, DOS (emulation) Bus Basic Pascal, etc	Up to 3 add on disk IIIs available.
BCL 3050	Business Comp's Ltd. 01-207 3344	64k RAM, Z80A, 8" FD (2Mb), RS232	CBasicII, Basic 80 & others	Facility to use CP/M based s/w & h/w compatible with larger BCL systems. 3150 upgraded model.
BCL 3300	As above	256-960 RAM, 8086, 14" disk drive	Basic, Cobol, Pascal, ALL	CP/M based s/w & BCL, expanded to support 16 terminals in multi-user & multi-tasking.
C3000 Series £2450	Country Comp's 0527 29826	64k RAM, Z80, HD (10Mb), FD (500k), 2 x RS232 c/p	CP/M 2.2	Various H/D options multi-user c/p/NET
CANON AS100 £2290	Canon UK 01-680 8880	128-512k RAM, 8088, 5"/8" disk combinations. (1.2Mb-85Mb) HD, Networking	Many languages & s/w	With dual 8" F/D, Multi-processor systems up to 16 users. HD 7-50 Mg.
Clenlo Ace from £2425	Clenlo Computing Systems 01-670 4202	64k RAM, Z80A, dual 5¼" ds dd FD (720k per drive), 2xs/p, 2xp/p, inc in price CP/M 2.2	CP/M Plus, Turbodos, DPC, Fortran, Pascal, Cobol, Multiuser	dual 8" FD available, Multiprocessor systems up to 16 users HD 7-50Mb.
Comart Communicator £1595	Comart 0480 215 005	64k RAM, Z80A, dual 5¼" FD (Z80k), 2xs/p, p/p	CP/M included + other O/S, Basic, Cobol, Fortran, Pascal	With 15Mb FD £1895 or 4.8Mb HD and 790k FD £2995. Option 20Mb HD £3995. Other options.
Commodore CBM RANGE £495-£795	Commodore Info Centre 0753 79292	6502, C int, 32-96k RAM, p/p, dual 5¼" FD (2.1Mb) available among other options.	Basic + other languages	Field service available.
Commodore SP9000 £795	As above	As CBM plus 6809, RS232C, Options as above	Various languages	Cobol, Fortran & Pascal are interpreters for use in teaching programming.
Commodore 700 £650-£1195	As above	128-256k RAM, 6509, 25 x 80, RS232	Commodore DOS + others	700 requires separate monitor, 8088 second option.
Commodore 64 £229	As above	64k RAM, 6510, C int, TV, 25 x 40, s/p, p/p, Options include single 5¼" FD (170k)	As above	Option 1701 monitor. Prestel modem option.
Commodore VIC 20 £150	As above	5-32k RAM, 6502, C int, TV, 22 x 23, s/p, p/p, Options as Commodore 64	Commodore DOS, Basic, Kernal	Option 1701 monitor, Starter pack includes 1530 cassette unit.
Country Computers from £2450	Gecas 01-639 3758	64k RAM, Z80A, (10/15/21Mb), RS232	CP/M, Cobol, Basic, Pascal, Fortran	Expandable to Multi-user + Multi-tasking.
Digital DMS3 £3000	Digital Microsystems 0734 793131	64k RAM, Z80A, single 8" FD (100Mb), 3xRS232 p/p, 1xRS422	CP/M + others, Fortran, Pascal PL/1	Expandable to 23Mb or 46Mb to Multi-user HiNet system with HD. Much s/w available.
Digital DMS3/102 £7000	As above	64k RAM, Z80A, single 8" FD (500k), HD (23Mb), 3 x RS232, p/p, 1 x RS422	CP/M + other OS, Cobol, PL/1 Fortran, Pascal	Up to 31 workstations on HiNet, 1280k.
DMS 3F FOX	As above	Z80A, 80k, 2 x 5¼" ds dd disk drives (640k), 80 x 25, 4 x RS232C	CP/M 2.2 (or current version) Basic + other languages	
Epson HX20 £402	Epson 01-902 8892	16-32k RAM, 32k ROM, Twin 6301, 20 x 4 LCD RS232	E Basic	Barcode facility. Communications capability as option.
Epson QX10 £1735	Epson 01-902 8892	192-256k RAM, Z80A, dd FD 5¼" (320k per disk), p/p, RS232, 80 x 25	CP/M, many languages	5 light pen option slots.
Gemini Galaxy 2	Micro Value 024 0328321	64k RAM, Z80A, dual 5¼" FD (800k), 25 x 80, RS232, p/p, C int	CP/M, Basic, Cobol + others	Dual 8" FD (2.4Mb). Galaxy 3 £2500 5.4Mb HD + one 800k FD.
Gemini Galaxy 4 (Network) File server £2600 workstation £695	As above	Same as Galaxy 3 with optional centronics printer I/O, 64k RAM, Z80A, 80 x 25, RS232		Galaxy systems can be upgraded to network superstations.
Gemini Multiboard £500	As above	64k RAM, Z80A, 8 x 25, 5¼" Hard FD, additional memory + I/O, Centronics I/O	CP/M, Basic, Cobol, Pascal, Fortran, AP/L	Modular BUS base system 20 + expandable cards available.
Genie I £287-£381	Lowe 0639 4995	Z80A, 16-48k RAM, up to 4 FD drives, single or dd	Microsoft Basic + other languages available	Optional items available. Contact Lowe for details of Genie II.
Genie III £1950	As above	Z80A, 64k RAM, up to 12k ROM, dual 5¼" double sided dd (730k each), p/p, RS232	New DOS, CP/M, Microsoft Basic, other languages available	Add on and optional drives available.

List of Abbreviations

A Assembler
BT Benchtested
C Cassette
E Extensive
F/D Floppy disk
G/C Graphics card
H Hardware
H/D Hard disk
I Introductory
Int Interface
M/A Macro assembler
N/A Not available
N/P Numeric pad
O/S Operating system
p/p Parallel port
s/w Software
S/P Serial port
T/E Text editor
TBA To be announced
U Utility

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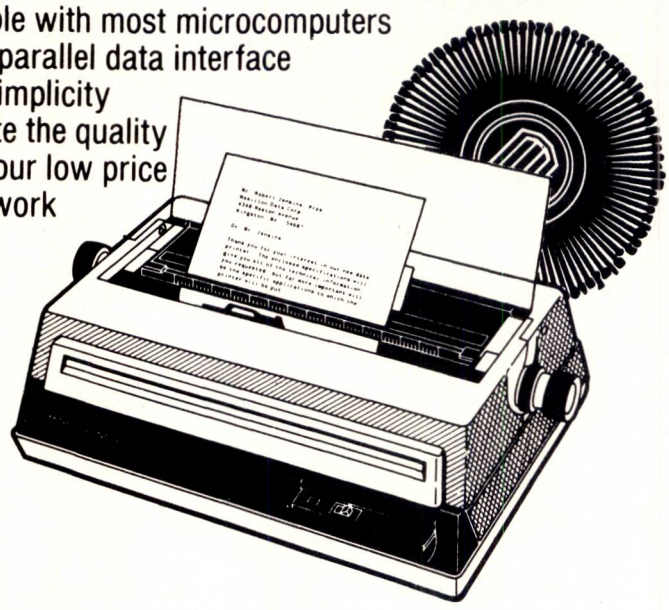

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IN STORE

Machine & Price	Main Distributor	Hardware	Software	Miscellaneous
Colour Genie £195	As above	Z80, 16k RAM, 40 x 24, RS232, 2 x p/p	Microsoft Basic	TV or monitor, 16 colours at one time.
Gimix 6809 £3250-£4310	Windrush 0692 405189	56k RAM, Twin serial, 2MHz, 6809 cpu	Much s/w	Designed as a development for industrial control 19Mb HD.
Grundy 8200	M-Tec Comp Service 0603 070620	Z80A, 64k-256k RAM, 24 x 80, HD (6-18Mb), FD ds dd (0.5Mb per disk)	CP/M, Basic and others	Various HD options up to 26Mb.
Haywood 9000 Composite £1795	Haywood 01-428 0111	64-192k RAM, Z80A, dual 5¼" FD (640k) RS232, p/p, 24 x 80	CP/M, Basic, Cobol, Fortran, Pascal, W/P	Expandable to 20Mb HD, networking version planned, other expansion options.
Kemitron 2000E £2300	Kemitron 0244 21817	64k RAM, Z80A, single 5¼" FD (150k), 24 x 80 2 x s/p, p/p	CP/M, Basic, Fortran, Pascal, Cobol, A	Extensive range of support cards & industrial interfaces.
Kemitron K3000E £3300	As above	64k RAM, Z80A, dual 8" FD (2Mb), 2 x s/p, p/p	As above with MP/M	Up to four screens and 4 printers can be attached: Option: 10 Mb HD.
Krypton series from £1695	Transtec 01-247 1327	64-256k RAM, Z80A, 2 x RS232, p/p, dual FD (400/800k) or HD(5/10Mb) + one 400/800 FD	Many languages	
Lynx £225-£445	Computers Ltd 0223 315063	48-192k RAM, Z80A, 24 x 40/80, TV, C int, s/p	Basic, Forth, CP/M	CP/M compatible, 5¼" FD & printer peripherals available.
Minstrel £1790	Hotel Microsystems 01-328 8737	5100 Bus, Z80 8086 or 68000, up to 1Mb RAM	CP/M, MS-DOS, Unix	Networking also available.
Monroe EC8800 £2200	Fi-Cord Int 061 445 7716	128k RAM, Z80A, single 5¼" FD (320k), 3 x RS232, p/p	Monroe multi-tasking O/S, CP/M, Basic, & others	Hi-res colour graphics option: single 5¼" FD (320k), graphics tablet.
Monroe OC8828 £3350	As above	256k RAM, Z80A, dual 5¼" FD (640k), 24 x 80 2 x RS232	As above & system builder	5-20Mb HD
Multi-Computers from £4750	Gecas 01-629 3758/2057	64k RAM, Z80A, 10-600Mb + 8" FD, RS232	N/Star, CP/M, Cobol Basic/Pascal, Fortran	True Multi-user, multi-tasking building block concept system.
Olivetti M20 £1795	Olivetti 01-785 6666	128k-512k RAM, Z8001, 2-8k ROM, single 5¼" FD (160k), RS232, p/p	Basic, PCOS, A & others	Alternative 8086, HD int/ext 370k/640k disks, colour display.
Onyx C8000 £5558	Onyx Comp Ltd 09066 5432	64k RAM, Z80k, 12Mb cartridge, 10Mb HD, 4 x s/p, p/p, 1024k RAM, Z8000	CP/M, MP/M, Oasis, Unix, Fortran, Pascal, W/P, System III	C8001 with 128k RAM, Multi-user version using Oasis are options.
Oric 1 £100-£130	Oric Products Int 0990 27641	16-48k RAM, 6502A, 28 x 40 TV int, C int, s/p, p/p, loudspeaker	Basic (16k ROM) Forth	240 x 200 colour graphics. Micro disk & modem available soon. Viewdata compatible.
Panasonic JD850M £4550	Panasonic IDST (UK) 0753 75841	64k RAM, 8085A, 4k PROM, dual 8" FD, JD850M (2Mb), 24 x 80, 3 x RS232, p/p	CP/M, Basic, A, Micro-Cobol	Option 8.4Mb HD.
Rair Business Computer £5250	Rair 01-836 6921	256k-1024k RAM, 8088 + 8085, 19Mb HD, one 5¼" FD (1Mb), 4 x RS232	Choice of O/S & languages	256k RAM expansion, colour work-stations.
Research Machines 380Z £1867	Research Machines 0865 249866	32-56k RAM, Z80A, dual 5¼" FD (300k), RS232, p/p	Ex Basic, A, T/EU, CP/M, Fortran, Cobol, Algol, Pascal	Hi-res colour graphics. Many possible systems, 56k RAM & dual 8" FD (1Mb) option.
Research Machines Link 480Z £560	As above	32-64k RAM, Z80A, C, 2 x s/p, CP/M 5¼" dd	Basic, T/E & other languages	Hi-res colour graphics, network stations.
Sage II £5445	Micro APL 01-622 0395 or TDI 0272 276447	512k RAM, 2 x RS232, 2 x 720k disks, APL 68000 under Mirage	Free UCSD P system with Basic, Fortran & Pascal	One year's free onsite h/w maintenance.
Sage 1V £4850	As above	128k-1Mb RAM, 68000, 1-4 HD, (5-50Mb) 1-2 FD (640k) 6 x RS232, p/p	Many O/S & languages	Price includes one year's service and s/w bundling.
Sanyo MBC 3000 £2250	Logitek 01-723 0012/3	64k RAM, 2 x 8085A, 2 x 8" FD (2Mb), p/p, 2 x s/p	CP/M + S Basic	
Sanyo MBC 4050 £2450	As above	128k RAM, 8086, 2 x 5" FD (1280k), p/p, s/p	As above	512k optional
SEED System 1 £2000	SEED 0543 378151 (direct only)	32k-56k RAM 6800 5" or 8" FD Dual s/p, p/p	DOS: Basic: M/A: T/E: CBasic	Graphics prom prog A-D/D-A 12 month warranty.
SEED System 19 £1304 64DS5	SEED 0543 378151 (5-20)	64k RAM 6809 based dual mini FD. One SASI interface 3 x s/p, p/p	Range of languages	Commercial applications packages. 12 month warranty.
SEED System 19 £2000+	SEED 0543 378151 (5-20)	64k– 1Mb 16k EPROM + 6809, mini FD, FD HD, cartridge	Wide range	Commercial applications packages. Multi-user up to 12 term. A-D/D-A. 12 month warranty.
Sharp MZ-80A £549	Sharp Electronics 061-205 2333	48k RAM, Z80, 25 x 40, C, p/p, options: single 5¼" FD, dual 5-FD, RS232	Basic, CP/M, A, Pascal, Fortran, Cobol	Expansion unit needed for disks (£100), Low-res 80 x 50 graphics, loudspeaker, numeric pad.
Sharp MZ80B £1095	As above	64k RAM, Z80A, C, 25 x 80, RS232, p/p, ds dd, (560k)	Basic, A, Pascal F Dos	Hi-res graphics, options 5¼" FD (560k), 80 Cps printer.
Sharp MZ3541	As above	Z80A, 128-256k RAM, ROM 8k, p/p, RS232C Dual ds dd (320k)	Basic	
Sharp MZ-711	As above	Z80A, 64k RAM, 40 x 25, TV, printer/C int		Optional equipment — colour plotter, printer, data recorder.
Sharp PC5000 (portable)	As above	8088, 128-256k RAM	MS-DOS, Basic	Liquid Crystal Display, peripheral options.
Sig/Net S3 £1290	Shelton 01-278 6272	64-256k, Z80B/8088, dual 5¼" FD (200k), 2 x RS232	CP/M, Basic, Cis Cobol, MCNOS	Disk options to 56Mb + multi-user options.
SWTP F/09 £3050	SWTP 0733 234433	64k RAM, 6809, up to 4 FD/HD drives, max 48Mb, 6 x s/p, p/p, 82 x 25	Flex OS, AT/EWP Basic, Forth, Pascal	Applications packages available for single user.
Sord M5 £189.95	Sord (UK) Ltd 01-930 4214	20k Z80A	Falc, Basic-I, Basic-G	

List of Abbreviations

A	Assembler	G/C	Graphics card	M/A	Macro assembler	s/w	Software
BT	Benchtested	H	Hardware	N/A	Not available	S/P	Serial port
C	Cassette	H/D	Hard disk	N/P	Numeric pad	T/E	Text editor
E	Extensive	I	Introductory	O/S	Operating system	TBA	To be announced
F/D	Floppy disk	Int	Interface	p/p	Parallel port	U	Utility

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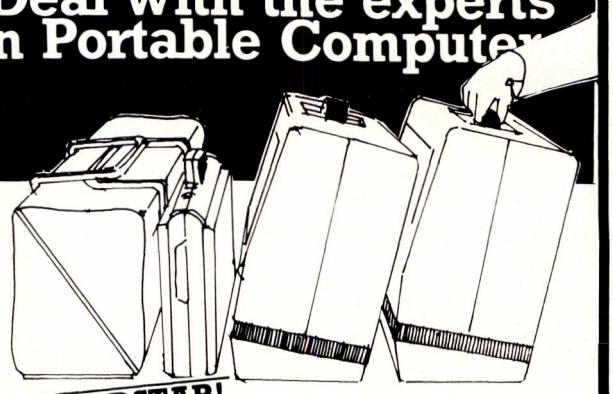

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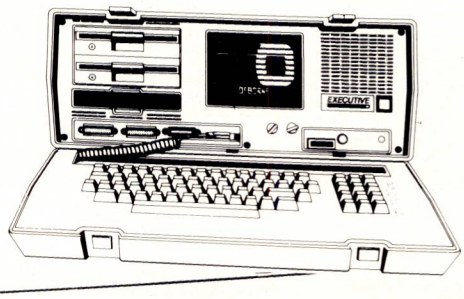

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Machine & Price	Main Distributor	Hardware	Software	Miscellaneous
Sord M23 MKV £2850	As above	128k RAM, Z80A 2 x 1M 8" F/D (80 x 25) 2 RS232C p/p	Many languages	Optional SB – 80 Optional SGL graphics
Sord M23P £1800	As above	128k RAM: Z80A Liquid Crystal Display (80 x 8) Dual micro F/D (290k) 2RS232C p/p	Many languages	Optional SB – 80 Optional SGL graphics
Sord M343 MK V £6100	As above	256k-768k RAM, 8086 128 x 64, 4RS232C ports p/p 2 x 1.2Mb 8" FD	Many languages	Full Hi-res graphics. SGL Language. Data comms feature.
SWTP S/09 £5110	As above	64-768k RAM, 6809, 2.5Mb FD, 80Mb HD, tape streamer	Many languages & s/w packages	Expand to 12 users, modem link.
SWTP S + £7260	As above	256k-1Mb RAM, 6809, 20Mb-220Mb	O/S Uniflex, AS, S/09	Expand 24 users, modem link.
TA Alphatronic £1895	Triumph Adler 01-250 1717	64k RAM, 8085A, dual 5¼" FD (1Mb), HD (5Mb) (P4) 12", 24 x 80, s/p, p/p	CP/M, Basic, etc	P2, P3 link to Micromite LAN, option of 8088 on P3, P4.
TA Alphatronic P30, P40 £2495	As above	64-128k RAM, 8085A/8088, dual 5¼" FD (1Mb), HD (5Mb) P40, 24 x 80, p/p, s/p	CP/M, Basic etc	P30 links to Micromite LAN, (up to 340Mb HD).
TRS 80 100 Portable £499-649	Tandy 01-836 1327/0599	80C85, CMOS, 8 x 40, 8-32k RAM, p/p, RS232C	5 ROM Based progs	Liquid crystal display.
TRS 80 4 £749-£1499 (3 models)	As above	C based 16-64k RAM, 2/1 disk 64-128k, 5¼" dd 184k, disk-advanced Z80A	O/Ss, Advanced Microsoft Basic	
TRS 80 12 £2399-£2999	As above	Z80A, 80k RAM, 1/2 double sided dd 8" slim line floppies (1.25Mb), 80/40 x 24, RS232C x 2, p/p	Interpretive Basic + others	
TS100 Multi-user £2300	Transam Microsystems Ltd 01-404 4554	64k cardframe, Z80A board, dual 5¼", 790k FD, 2 x s/p	CP/M single user, MP/M multi-user, 7 languages	HD available, C card up to 4 FD, up to 8 users MP/M.
Tuscan CP/M System from £1699	As above	60k RAM, Z80A, Dual 5" FD (190k each), p/p, Dual RS232, 8 x 24, S100 BUS	CP/M + 7 languages	Many options.
Wilcox 1000	Wilcox comp's (0978-83) 4866	Zilog Z80, 32-64k, 2 8" ds, dd flexible disk drives (2.4Mb), 4 x RS232C	Wilcox multi-tasking Multi-user O/S	1 x HD (40Mb) may be connected to system. Options available.
Wilcox 2000	As above	8-bit 6502, 30-512k RAM, 2 x 5¼" double sided dd (320k each), or 1 of above and HD (5/10Mb), p/p, RS232, 80/132 x 24	40 systems, MBasic CBasic, Cis Cobol, C	Z80A or 8080 used under s/w control for applications programs.
Windrush 6809 £2418-£5803	Windrush Micro Systems (0692) 405189	56k, non volatile CMOS RAM, 6809, DMA HD controllers, 2 x s/p, 2 x pp	Much software	Designed ad development system for industrial control/comp station for commercial OEMS.
Zenith ZF 120-22 £590	Zenith Data Systems 0452 29451	224k RAM, 8- & 16-bit processor, 2 x 320k FD, 2 x RS232, p/p	CP/M, ZDOS ZBasic	10Mb HD available and multi-user system.
Zenith ZF 120-22 £2590	As above	192k RAM, 8- and 16-bit processor, 2 x 320k FD, 2 x RS232, p/p colour optional	As above	As above
ZX81 £39-£95	Sinclair (0276) 685 311	1-16k RAM, Z80A, C int, TV, full keyboard 44 pin expansion port	Basic 8k ROM	Advanced chip design, printer available.
ZX Spectrum £95-£129	As above	16-48k RAM, Z80A, 16k ROM, TV, C.	Basic	Option- 32k RAM, RS232, Microdrive disks.

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E	Extensive	I	Introductory	O/S	Operating system	TBA	To be announced
F/D	Floppy disk	Int	Interface	p/p	Parallel port	U	Utility

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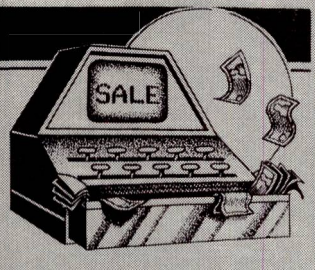

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● Apple peripheral cards: 16k RAM card £25, Snap Shot £35, speech synthesis card £30 ono, Write Bob Wong, School House, Chapel Close, Oakham, Leics. LE156QG or Tel: (0572) 3695.

● Genie I, 48k. With sound, lower case, integral cassette, lots of software inc Accel 3 compiler, Editor Assembler, Space Invaders, Chess, and books. Specially made carrying case, £290 ono. Tel: Potters Bar 45598.

● Microline 80 printer — friction traction, roll paper, pound sign. Recently overhauled, spare ribbons, manual, £160 ono. Brandes, 46 Field Way, Chalfont St Peter. Tel: Gerrards Cross (0753) 882982.

● BBC model "B". Unused, under guarantee, in original box. Complete with all leads, manuals, and books. (Latest operating system). Selling for £350. Please Tel: Jonathan on 01-892 0646 (day or eves).

● S100 boards, 64k dynamic RAM £150, IDS disc controller £160, VB4 memory mapped 80 col VDU £110. Tuscan main board, complete, professionally built £170. All ono. Wood, Rugby 69447 (eves).

● Newbrain AD Hantarex 9 in green screen monitor and Sharp cassette recorder + printer cable. Manuals and some software. All as new, £350 ono. Tel: Bristol (0272) 743111.

● UK 101, 8k, Demon, cased, fan, £80. Prefer buyer collects. Tel: Witney (0993) 4890 eves.

● British micro MIMI802G twin 350k disk drive computer system. Dedicated Wordstar keys. Ideal word processor, uses all CPM software. Includes Philips Amber Monitor. Tel: Slee, 01-943 1137.

● Apple II 48k with two disk drives, switchable 3·2/3·3 controller, 16k language card, 80-column card, colour card and software £800 ono. Tel: Basildon (0268) 21930.

● Acorn Atom 12k + 12k + floating point. PSU + cassette player + manuals. Also Atom Magicbook and Programming The 6502. All leads included + printer interface. Good condition, £195. Tel: Madden, Hornchurch 47899.

● TSR-80 model I, level II, 48k. Expansion kit, Tandy cassette recorder monitor, cassette WP program. All as new, £200. Tel: Combe Down (0225) 832156.

● TRS-80 and expansion interface 48k, + 2 disc drives, £700. Including DOS (4 disc) instruction course, green screen £70, MX80 printer, with Ajedit and Scripsit £400. Tel: Richards, (0482) 843303 after 8pm.

● HP85A. 32k RAM portable with integral VDU, printer and high speed cassette. I/O ROM and IEEE 488 module. Worth over £2000, will accept £975 ono. Tel: Tim, 01-240 0085 (day), 01-769 5191 (eves).

● TRS-80 + 32k. Interface + monitor + 3 disk drives + software, £950 ono. All as new, must sell quickly. Write to Dave Milburn, 8 Queens Walk House, Queens Walk, Ealing W5.

● Apple software. Masses available, over 50 arcade/adventure games, business Visicalc, Last One, Format 80, many more, utilities best, PLE, S.A.E. details: Paul White, 19 Sunset House, Wessiters, Seaton, Devon.

● Apple II + . 48k with disc drive and controller, ALF colour, and clock cards. Large quantity of software including Pascal, spreadsheet etc. With manuals, £850 ono. Tel: (0734) 760421 X365 (day).

● TRS-80 MK1. Level 2 48k with expansion interface and disc drive. Also tape recorder and programmes £500 to clear (collect or add carriage). Tel: Worthing 202693, ask for Ken Wiber.

● Commodore PET 32k RAM (4032) professional keyboard, cassette drive, soundbox, software, books. Hardly used. Will consider genuine, reasonable offers. Tel: 01-3600495.

● Sharp MZ-80K 48k RAM, £300. software, 6 Basics, Forth, Pascal, Fortran, M/Cloader, Utilities, wordpros, editor assembler, disassembler, stock control, music editor etc, + 200 programs £85. May split Cyan, 8 Stanley Terrace, Fishergate Hill, Preston PR1 8JE.

● VTC 20 + C2N cassette unit, 8k RAM pack, ROM software, Jelly Monsters, Star Battle, Cassette software Andes Attack, Lazerzone, Moons of Jupiter, Gold Rush, VIC Panic, Night Crawler, Vic Men. Complete £150. Tel: 01-504 1474, Drake.

● TSR-80 model I, level II, 48k. Expansion kit, Tandy cassette recorder monitor, cassette WP program. All as new, £200. Tel: Combe Down (0225) 832156.

● TRS-80 and expansion interface 48k, + 2 disc drives, £700. Including DOS (4 disc) instruction course, green screen £70, MX80 printer, with Ajedit and Scripsit £400. Tel: Richards, (0482) 843303 after 8pm.

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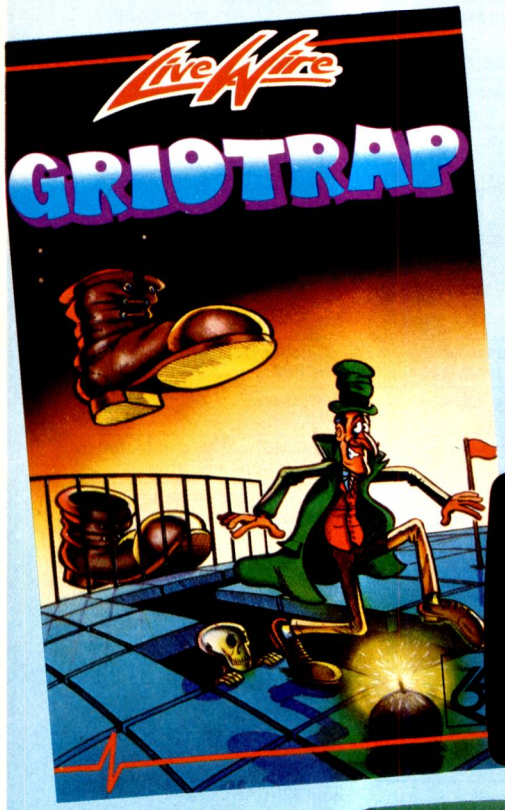

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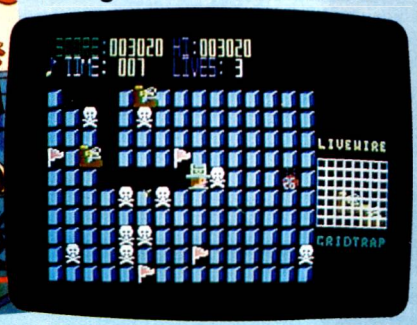

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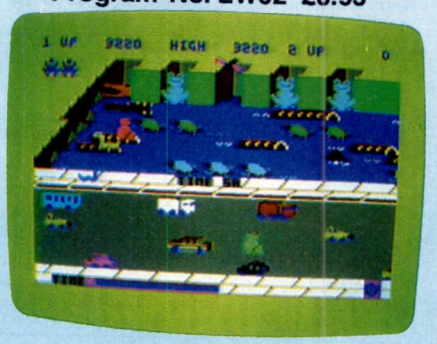

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● Sharp MZ-80K 48k RAM, £300. software, 6 Basics, Forth, Pascal, Fortran, M/C loader, Utilities, wordpros, editor assembler, disassembler, stock control, music editor etc, + 200 programs £85. May split Cyan, 8 Stanley Terrace, Fishergate Hill, Preston PR1 8JE.

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● VIDEO GENIE 6k RAM, 12k ROM. Built in sound and VU meter. £200's worth of software as well as books/manuals. Genuine reason for sale. Only £150. Tel: Morpeth (0670) 514615.

● Wanted Hewlett Packard HP85A computer HP1B interface ROMs etc. Tel: Terry Maidenhead (0628) 26412.

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● VIDEO GENIE with hi-res graphics board, Kaga B/W monitor, cassette recorder, 3 C60 cassettes, programs etc. Various books on machine code etc £325, ono. Tel: Mr Stephenson (Findhorn) 03093 2580.

● COMMODORE 64, 4022P printer, Interpod interface, 4 months old + 3040 CBM dual disc drives, + manuals, leads and extras. Superb bargain, £1,150 ono. Tel: Josh 01-229 9693 eve.

● SHARP MZ80A; + MZ80B programs inc. Spirograph, Jintor, Puck-man, education, name & address data, etc, £3. Tel: 01-588 8216 for list.

● APPLE II 48k Europlus, BMC monitor. Epsom MX80 disc drives £900. Also offers for VisiCalc, VisiTrend/Plot, Easywriter, Videx, Cocol card, complete tabs, accounts system, 16k card Vitopia graphics tablet, DET Bromley. Tel: 0134 866372.

● NASCOM 3. 48k. Zeap, Nasdis, Debug in ROM. Extended Basic, Pascal on tape. Other software and manuals. Offers Please. Tel: 01-340 7479 after 5pm.

● OSBORNE I, portable. Dual floppies, (2x100k), 64k RAM, integral screen, CP/M, Wordstar, Mailmerse, Supercalc, Basic, included. Hardly used. £1,000 incl box diskettes. Tel: 04865 3406 (Surrey).

● Sharp PC-1211 pocket computer, + printer. Mint condition, hardly used. Complete with manuals, leads etc. £90, ono. Tel: 0532 664443 (Leeds) day or night.

● Sharp MZ-80K 48k Basic, Toolkit, Forth, Fortran, Pascal, M/Code languages, including books, manuals, etc. £40, software. Boxed as new. Cost £610 +. Bargain at only £360 ono. Tel: David (Kirkham) 682059.

● Epson TK80B dot matrix, 80 column printer, 150cps, tractor feed only, centronics compatible. Brand new, boxed, never used. Documents included. Price £215 ono. Tel: (0753) 651904.

● APPLE II + 48k Disk drive, green screen monitor, some software, £600. Tel: 01-859 5963 Chris.

● Sharp MZ80K, 50k RAM, 4-Basics, Forth, 2-Assemblers, Dis-Assembler, M/Code, many games, manuals, monitor, + Basic listings, books, magazines, usernotes, Quantum hi-res, EX. cond, dustcover, Cost £800 + accept £450 ono. Tel: (01) 889 1090 after 7pm.

● APPLE software-dBase II, Cobol, £130, each. Wordstar, Supercalc, Last One, Multiplan, £95 each. Applewriter 2, Visicalc, Logo, Spellstar, Mailmerge £45 each. Utilities, games, sae list. J. Davey, 44 Hazelmere Road, Stevenage, Herts.

● Loan of copy of Ashton-Tate DBSII and documentation to run on Apple. Wanted for food allergy research project. Please contact: D. Edwards (11) Chester College of H.E., Cheyney Road, Chester CH1 4BJ.

● Acoustic coupler minimodem 3001 complete with manual + cables. Offers £100 +. 2 suitable VDUs also available. Tel: 01-946 2928 eve for details.

● Newbury VDU 3 page editing memory. Many programmable options. RS232 line + printer ports. Serial/Parallel printer interfaces. Modem cables + manual. Offers £250 +. Suitable acoustic coupler available. Tel: 01-946 2928 eve.

● Wanted Sharp MZ-80B software. CP/M OP-system, Wordstar, Database, accounts + spreadsheet systems. All secondhand. Tel: 01-421 2204.

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● Sharp MZ80K 48k. Integral monitor, cassette, reset switch, 4MHz upgrade. Basic, Pascal, Assembler, Commander, software. Original packing, all leads. Ready to run for only £275. Tel: Sam on 0207 542366.

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● TEC 10/40 daisywheel printer. Word processing quality, RRP £1,400 +. Unused, £900 ono. Phoenix Hi-Res green screen monitor. Virtually new, £60. Exchange both for Sharp MZ80B/APPLE with disks. Tel: (0268) 285406.

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● Hazeltine 1200. VDU 24X80 screen. Upper and lower case. Complete with cables + manual. Suitable acoustic coupler also available. Offers? Tel: 01-946 2928. eve for details.

● Hewlett Packard HP87A personal computer, 32KB, HPIB, manuals £1,300 ono. Tel: Kim on Egham (0784) 38441 (day) 01-673 3584 (eve).

● Atari 800 (48k). Boxed, disk drive, cassette recorder, DOS II, Macro Assembler, Disassembler, Forth, Basic, controllers, books and magazines, software including Star Raiders and Submarine Commander £575. Tel: Marlow (06284) 6136.

● VIC-20, + cassette recorder + 16k RAM, with £40 arcade game software + joystick + programmer's reference guide. Mint condition, original packing, + plug! £140 secures. Tel: 01-290 1726 (Bromley).

● SHARP MZ-80K 48k RAM. Inbuilt screen + cassette. MZ-80I/O interface unit. MZ-80FD floppy disc unit 280k bytes. Interface unit and floppy disc unit and printer unused. £1,299. Tel: (0902) 752499 757321.

● APPLE II Europlus 80k. Centronics, language & color cards. Apple monitor III + stand. Apple disk drive II + disks, TV interface. All leads & manuals £800. Tel: Torrington 2979.

● Sharp MZ-80K 48k RAM. Basic and Extended Basic, Supercopy, Frogger, Asteroids, and other games; complete with manuals and dustcover. Excellent condition. £310 ono. Tel: Trowbridge (Wilts) 61144 after 5pm.

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● APPLE II 48k + 2 disk drives, (DOS 3.3), Epsom printer interface, Colour, Paddles, all manuals, books, etc. + over £300 software £575, for quick sale. Tel: Chorleywood 2680 (260-2680 from London).

● APPLE II Europlus, Twin disk drive, green monitor, Apple silentype printer, Joystick, Software £700 ono. Tel: Horndean 0705 594871 (after 6pm). Will deliver if necessary.

● Sharp MZ-80K, 48k RAM and Epson FT80/III printer, + software including word processor. Accept offers around £600. Tel: (0782) 643843 after 6pm.

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● Wanted Hard Disc compatible with Commodore. Also printer buffer. Tel: (0323) 639043 business hours.

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● SHARP MZ80K, 48k with Basic manual, cassettes including Space Invaders, The Valley, Home Budget and many others. Excellent condition £250. Mr White, 13 Lismore Court Glenrothes Scotland. Tel: (0592) 741254.

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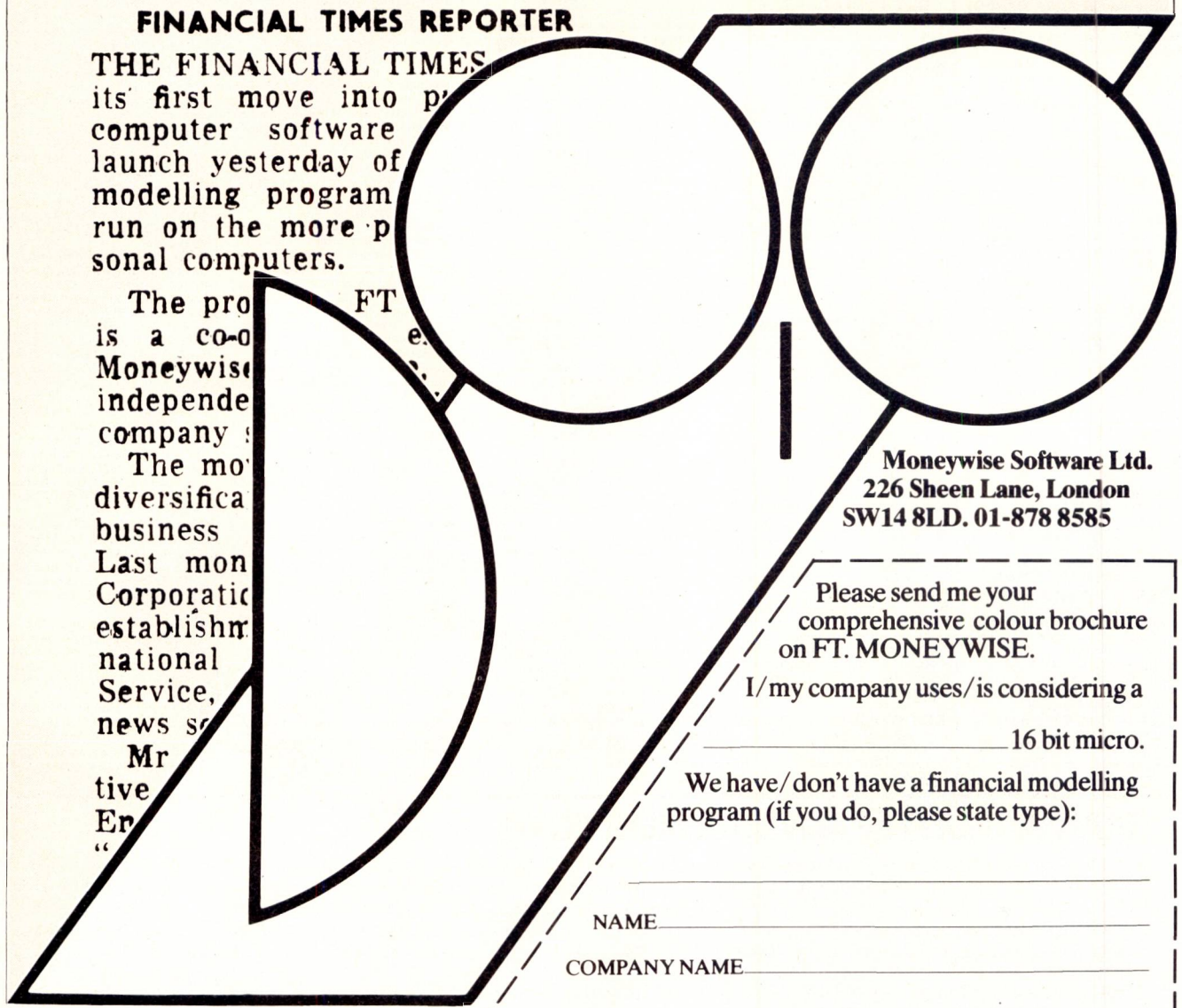

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● TRS-80 Model 1, 48k. With expansion interface, lightpen, joystick, VDU, tape recorder, books, manuals. Loads of software. One year old. Excellent condition, worth £700, only £350. Tel: Consett 503044 eve.

● Sharp MZP80K 48k. Basic tape + Sharp Pascal and Editor — Assembler with manuals. Dust cover and some games. Excellent condition, £300 ono. Tel: Hull (0482) 795486. After 6pm weekdays.

● Sharp MZ80K, 48k Joystick, Basic, Fortran, Machine Language, £150's worth of games incl. Scramble, Pacman, Defender, Adventures, Chess, Othello, £350 ono. Tel: Manchester 603801 eve only.

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● GENIE EG3003, 48k, lower case, 2 speed clock, sound, joysticks, modified for scripset. Over £300 worth of software including Editor, Assembler, Scripset, ZChess, Pascal. Highest offer secures. Tel: Colchester 865260.

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● Galaxy I, CP/M 2.2, including Wordstar, Comal compiler, 2 x 400k disk drives, monitor, RS232 + parallel interfaces, £1,000. Tel: (0442) 47748 days. (0442) 43635 eve.

● APPLE software — Wordstar/Mailmerge, dBaseII, Cobol, Last One, Format 80, Applewriter II, Visi-Calc, Visi-Dex, Fortran, Super-Calc, Goodspell, many utilities + over 100 games, sae full list, J. Davey, 44 Hazelmere Road, Stevenage, Herts.

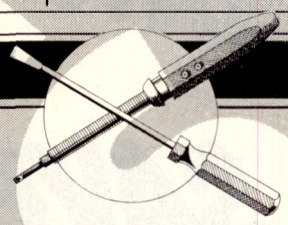
● MICROTAN 65 + Tanex + PSU in 19in rack + ASCII keyboard. All manuals, two pass assembler in Eprom, £125 ono. Tel: (0734) 24394 (Reading) after 7pm weekdays.

● OHIO Scientific C2-8P, 48k RAM 2x8in floppies 500k. Basic + OS-65u, televideo 920, VDU with many facilities. £700 ono. May sell separately. Tel: Northwich (0606) 74767.

● VIDEO GENIE. 48k, lower case mod fitted. Faulty but probably repairable; £50. Aculab floppy tape for Genie, working, with 20 tapes; £50 — both together, £85. Peckett, Farnborough Tel: (0252) 517498.

● TRS-80 Model 1 Level II. 16k micro, including B/W video monitor, tape recorder, power supply, over £160 worth of software, manuals and books. Only £150 for quick sale. Tel: Harpenden 61779 now!

ACC NEWS



This month Rupert Steele reports on the ClubSpot 800 Editors Forum and the International Sinclair User Group.

ClubSpot 800

Many thanks to all those who turned out to the **ClubSpot 800 Editors Forum** before Christmas, held in an old school building in a village cul-de-sac known as Park Street, near St. Albans. After the local Christmas tree seller had directed a large number of lost souls to the venue, the event was a great success. Almost all the amateur editors on Prestel, including George Foot of the Micronet Independent Users' Group (MIUG) were there, and everyone had a chance to discuss their favourite ideas.

The event was ably organised by ACC ClubSpot manager Len Stuart, assisted by Vernon Quaintance. They discussed how to make your pages on Prestel easier to use by setting the routine right — the idea is that on most pages, hitting 0 sets you to the ClubSpot index, 9 takes you browsing around the database on topics similar to the current one, and 8 will take you one level up the tree structure. They also showed how some colour combinations aren't legible when Prestel is displayed on a normal TV rather than a monitor, or when it's used with a black and white monitor.

But what is ClubSpot, and what does the '800' mean? ClubSpot 800 is the amateur users' area on Prestel. It is part of the Micronet 800 database, on which clubs and interest groups can 'do their thing' and edit their own material. It includes news about the Amateur Club movement, an 'Art Gallery' of graphics set up by ACC creative guru David Annal, and much more. It starts at page 8008, so to look at ClubSpot, find a Prestel set (there may be one in you public library) and type *8008*.

For more information on how to edit your own material on Prestel for free (except for the phone bill), contact Andy Leeder, Church Farm, Stratton St Michael, Norwich NR15 2QB. For existing users who want info on the ClubSpot routing conventions or colour legibility, you should mailbox Vernon Quaintance (Systel: 017646556) and he will tell you all about it. Finally, I should like to thank David Bolton for making the facilities available to us for the Editors Forum.

It's about time I reminded you of the **ACC Clubs Database,** and how to get on it. The ACC maintains a list of clubs around the country, which contains details of any club that tells us of its existence, either through this column or at an exhibition. The list is published from time to time in *PCW*. To get details of your club on the list, write to me at the address below and I'll do the rest . . . If you write to me with information about your club, I'll also try to mention it in this column.

As well as getting on the club list, a club can, for £6 (except for the larger national groups who pay more), become affiliated to the ACC. This entitles the club to take part in the running of the Association of Computer Clubs, through the meetings of the ACC Council. Council will meet on 25 February in County Hall, London: ACC News will report on the events in a future issue of *PCW*. Individuals can also join Council, as non-voting members, for the sum of £2 per annum. For more information about either of these schemes, contact me.

Club News

This month's club news comes from parts of Britain other clubs don't reach.

Shropshire now has two clubs. Mr Edward Collier, of 26 St John's Road, Ludlow, writes to tell me that he is secretary of the Ludlow and District Microcomputer Club. The club meets at 7.30pm on the second Monday of each month at the Bishop Mascall Centre, Lower Galdeford, Ludlow, Shropshire.

Mr E R Tibbetts, of 12 Trimpley Street, Ellesmere, Shropshire SY12 0AE writes to tell me that he wants to set up a local club. So if you're anywhere in the area and you wish to get involved with Mr T's venture, then drop him a line.

Mrs M Warden, of 64 Nursery Road, Bloxwich, Walsall WS3 2DU, has set up the Bloxwich Computer Club. Membership of the club is free, and you will have the use of machines belonging to the Frank F Harrison comprehensive school, Leamore Lane, Bloxwich. Membership is small but growing, and the club welcomes visitors. For times of meetings, ring the community centre at the Frank F Harrison school on Bloxwich 400670.

I have received a letter from the boondocks (the where . . .?). I am advised that Donald Shamash, of Underwood Farm, Ringford, Kirkcudbright, Dumfries, is setting up a computer club in this area. The club is described as 'local', although I think it covers a fairly large area. Try looking it up on a map . . .

Staying celtic, I visited Mr N J Butters, the chairman of the Beddau and District Computer Club. It's a small club intending to expand in the near future, and meets in the Beddau Community Centre every Monday at 7pm. If you live within striking distance of Beddau then write to Mr Butters at 6 Lewis Street, Church Village, Pontypridd, Mid-Glamorgan, or ring him on Newtown Llantwit 206305.

Mr Brian Sheldon, of the Lancaster and Morecambe Computer Club wrote to me too late, alas, for me to mention his open day on Saturday 29 October. Topical items need to reach me three months in advance to be in time for a mention, and you should indicate clearly that the note is topical, otherwise it may get lost in the rubble. Anyway, Mr Sheldon's address is 375 Lancaster Road, Torrisholme, Morecambe, Lancs LA4 6LZ for more information about the club.

ZX81 & Spectrum owners

Mr P Paton and Mr V Webber have written to me to announce the formation of the **International Sinclair User Group.** The original ZX user club has been disbanded and this group has

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GG

ACC NEWS

stepped in. It's not clear how the group is run, but they have sent me an 11 point set of aims and objectives, including the formation of a software library and the dissemination of information among the membership. The address of ISUG (or does it use a different acronym?) is 176 Todmorden Road, Burnley, Lancs BB11 3EU; alternatively, you can ring the club on (0282) 53241 between 9.30am and 9.30pm Monday to Saturday. I look forward to hearing how people get on with the International Sinclair User Group.

ACC Council

The ACC Council plans to meet in London on Saturday 25 February. If you'd like your club to be represented, ring me or look at ClubSpot 800 (page 8008) on Prestel, or see FIFO news magazine for details.

For further information about the Association of Computer Clubs, write to:

Rupert Steele
17 Lawrie Park Crescent
London
SE26 6HH
Tel: 01-778 6824 (evenings)

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
```

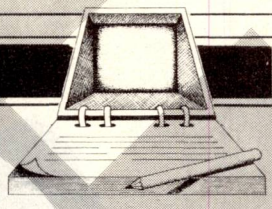
```
100 REM Benchmark 5
110 PRINT "S"
120 K=0
130 K=K+1
140 A=K/2*3+4-5
150 GOSUB 190
160 IF K<1000 THEN 130
170 PRINT "E"
180 END
190 RETURN
```

```
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, printer's errors, etc.

London	(Int Press Centre), Computer Seminar & Exbn. Contact: London Science Centre 01-839 4901.	14-15 Feb
London	(Barbican), Information Technology & Office Automation Exbn & Conf. Contact: BED Exbns Ltd, 01-647 1001.	21-24 Feb
London	(Wembley Conf Centre), Computer Trade Show. Contact: Reed Exbns, 01-643 8040.	13-15 March
Chester	(Northgate Arena), Computer & Business Equipment Show. Contact: Glendale Exbns, (0244) 45031.	13-15 March
Glasgow	(Albany Hotel, Holiday Inn & Anderston Centre), Scottish Comp Show. Contact: Clapp & Poliak Europe Ltd, 061-832 4242	13-15 March
Brighton	(Met Exbn Hall), Computer Aided Design Conf & Exbn. Contact: Reed Exbns, 01-643 8040.	3-5 April
London	(Cavendish Conf Centre), Computers For Builders Exbn. Contact: A4 Publications Ltd, (088 385) 2051.	12 April
Wilts	(Dauntsey's School, West Lavington, Devizes), Educational S/W Fair. Contact: Peter Harris, (038 081) 2289.	2-3 March

If you feel there isn't anything you don't know about the DEC and DEC Compatible market we suggest you turn the page.

However, should you want to get up to date with the latest equipment and innovations in this market, you shouldn't miss the 1984 DEC User Show.

It's the only way that you can actually compare and discuss your needs, in detail, with the people who supply or manufacture the hardware, software and services. Areas which are vital to the profitability of your organisation.

A vast range of distributors, dealers, software houses, systems integrators, retailers and OEM's will be presenting the widest possible choice to the busy user.

There will also be a conference organised by Arrick Wilkinson, Chairman of DECUS U.K., giving answers to problems, and explaining the benefits of DEC Technology.

These are the most important dates in the DEC Calendar so put them in your diary now, or fill in the coupon and send for your free tickets.

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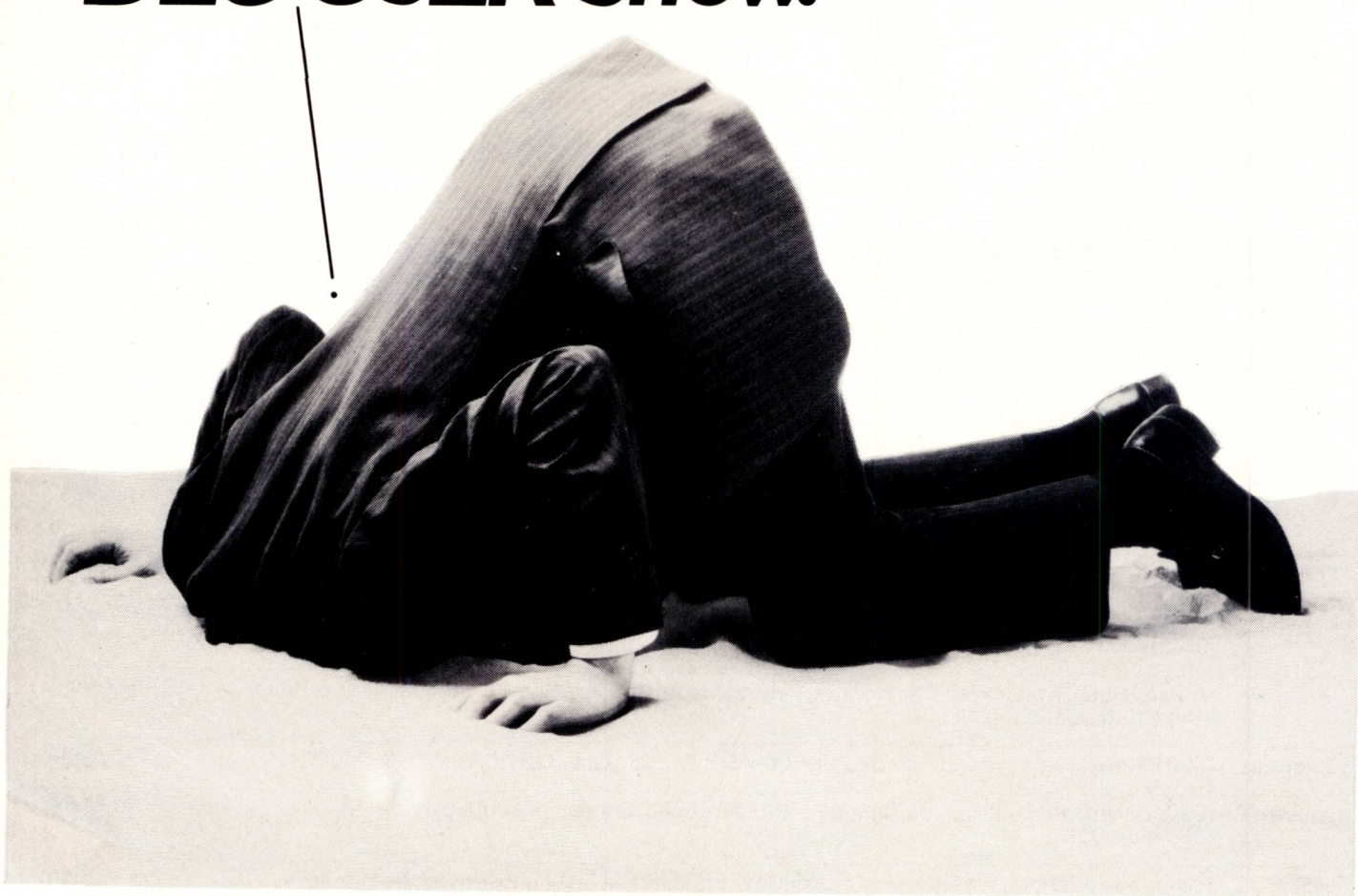

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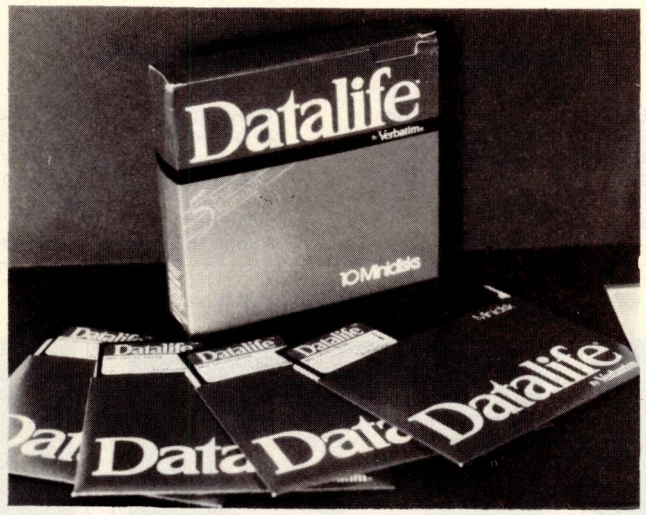

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Secret Sam II
Following the success of his last mission – Sam is off once more on his journey into intrigue – tread carefully though for if you thought SAM I was dangerous your in for a shock! This really is an adventure game for the adventurous – be careful and mind how you go. Are the 'phone kiosks for changing into Superman? We're not saying but what we will say is "have the aspirins ready because this will certainly cause some headaches".

Q-MAN



The very popular 3D pyramid game. Hop around the pyramid avoiding the bouncing balls and Jake the Snake. A highly entertaining game with increasing difficulty plus our own totally unique features. Game includes TRANSPORT DISCS, BONUS, HIGH-SCORE TABLE, HYPERSPACE and SMART BOMBS. Excellent graphics and terrific sound. One of the three top selling games on MICRONET this month.

No 1 on Micronet

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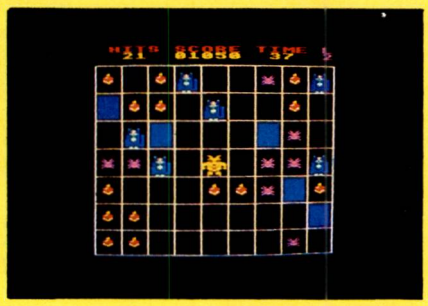
Q-MAN'S BROTHER is featured in the high score table of Q-MAN and now has his very own game. Have you time to paint all of the maze? Not if the PAINT POTS have anything to do with it or especially the deadly PAINT ROLLER which will erase all of your hard work! Increasing difficulty, excellent sound, AMAZING 3D graphics and high score.

No 5 on Micronet

BANANA MAN



A totally new concept from MRM. You are the BANANA MAN and you must eat 40 BANANA SANDWICHES each minute to **stay alive. There are BLUE BLOCKS which may prevent you from** reaching the food and deadly PURPLE TARANTULAS that are fatal if stepped upon. ETHEL the CAT also appears but can be **scared away for mystery points. But watch out, she conceals a** spider. Features include BONUS BANANAS, BLOCK 'SHUFFLE', INCREASING DIFFICULTY, HIGH-SCORE TABLE and GREAT GRAPHICS.

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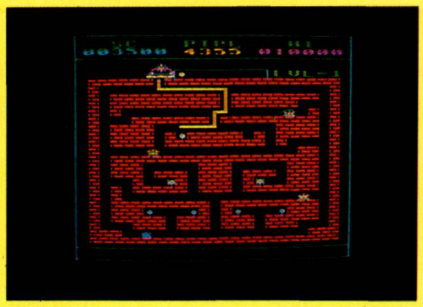
DIAMOND MINE



An absolutely fascinating and compulsive game designed to test your skills of dexterity and coordination. Steer the lengthening pipe to the diamonds buried deep in the depth of the diamond mine. But be careful avoid hitting the walls with the pipe and watch out for those monstrous menacing meanies . . . the bugs. Have you enough pipe left to collect all the diamonds? Have you got steady hands? Find out with this sparkling gem from MRM.

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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.

Lotus 1-2-3

This is to clear up a few of the problems described in your November review of the Lotus 1-2-3, specifically:

1. A display of remaining memory can be obtained through the Worksheet Status command.

2. Printing may be stopped at any time by striking Control-Break. This may also be used to stop printout of graphics. Note, however, that many printers have a buffer of 2k or greater. Therefore, Control-Break will not necessarily stop printing immediately but will stop filling the printer buffer. When the print buffer empties, printing will stop.

One other feature that was not tested was Lotus' Customer Support facilities. They are available freely to end-users and dealers in the US and the UK. The UK support number is (0734) 884949.

Tracey Jellows, Lotus Development Corp, US

Garbage

I've never written to a magazine before, but one of your current advertisements has prompted me to do so. On the whole, I regard your magazine as being rather exceptional, in that it exhibits a degree of social awareness which is seldom seen in the technical press. On the whole, this also tends to be shown by the advertisers, so I was very disappointed to see that you have agreed to carry the advertisement for 'adult' video & computer games by Silver Fox.

I'm well aware that there are many who will consider my complaint trivial or Victorian, but I see a real danger in such advertising. You can't fail to be aware of the high proportion of young children who are computer users, and therefore likely to be *PCW* readers. How about allowing them to have a childhood which is free from such garbage?

Perhaps it seems to you that the content of these games is likely to be no more than just innocent fun — it might just possibly be (although I doubt it), but can I remind you of your own reply to Steve Rewey in the letters page of the November issue?

I urge you to have another think about the advert, and put your reason above revenue.

Bob Almond, London SE25

(We're sorry the ad slipped through, but we have an undertaking from the publisher that it will not appear in PCW *again — Ed)*

AID

Using microcomputers for scientific applications in a large company, I am occasionally aware of the temptation to proliferate other people's useful software. Whether proliferation within a company constitutes breach of copyright is part of the current debate on software piracy. For example, what is the practical difference between using software held on another computer via a communications line and using the same software on a copied disk?

A simple idea which would be highly effective in reducing unauthorised software proliferation is the introduction of the addressable identifier (AID) in microcomputer systems. The AID is a unique code fixed in ROM at the microcomputer manufacturing stage. In its simplest form, purchased software packages are modified before despatch to the user, to contain the users AID at several points. The software contains instructions to compare the software and ROM AIDs: where a mismatch is found, the program crashes. The security problem is reduced to hiding the AIDs and disguising references to them within the software.

While such a method will not provide complete protection against a sophisticated pirate, it might at least stop the low level proliferation; that is, several copies for different computers within a small business.

R G Brown, Guisborough, Cleveland.

Games Special

In your Games Special supplement with the January issue of *PCW*, Tony Hetherington reviewed our 'Feasibility Experiment' adventure for the BBC Micro and the 48k Spectrum. It's wrongly assumed that the package supplied to him to run on the BBC Micro is the same as the Spectrum version.

I would like to point out to your readers that the review contains nothing at all that could remotely pertain to the Spectrum version, which contains detailed colour graphics and full sentence input facility.

Brian Howarth, Digital Fantasia Ltd

Sirius & Liszt

The Liszt Society is having a great deal of difficulty in the preparation of Liszt's works, both in revised, authentic editions, and also the pubication from manuscript of previously unknown compositions, some of which are of great importance.

The main difficulty lies in the layout and editing of the works before printing, and I would be very grateful if anyone could tell us if there is a program available that is able to produce, with a plotter or other printing method, a good layout of music over two staves, and with the ability to edit. We have a Sirius micro, and there are probably other computers to which we have access.

As far as format goes, if the program can be printed over standard music paper, this would be very acceptable, but the main problem lies in the layout of phrases, with the ability to insert tie-bars so that the printed result can be easily *musically* understood.

I realise that this is a somewhat esoteric request, but your journal has a history of being able to

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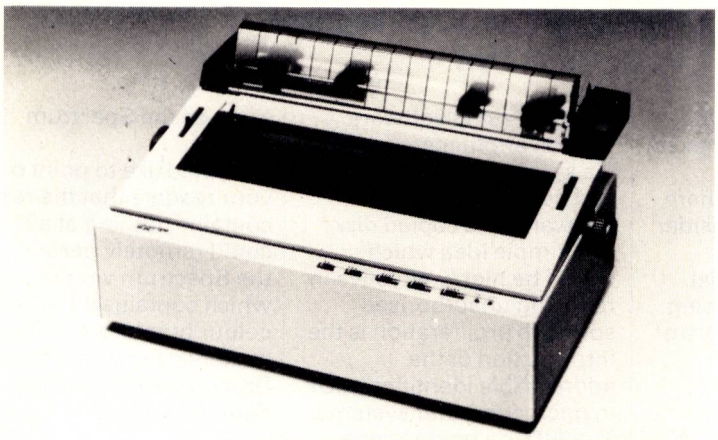

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provide the right answer, and I would be grateful — if you are not able to give us a solution — if you could point us in the right direction so that we can resolve this.

Paul Gregory, The Liszt Society

(Suggestions to: 70 Church Rd, Teddington, Middlesex TW11 8PY)

Suggestions

In the *Sunday Times* of 13th November 1983 Sharp publicised its PC5000, which is the closest answer to the mobile management man since the plague of pocket computers.

I could understand no mention of it in the December issue, but, despite your claim to be the leading micro magazine, not even a mention in the January issue makes me wonder if you're not asleep down there. Sharp has explained that the PC5000 is not yet available in the UK, and I have it from a Japanese friend that the company's popularity in its home market is such that it doesn't even need counter space.

But how about a review, or even a remark?

Also, I see that you have started to pack articles into sequential pages, instead of having run-ons at the back. This is infinitely better for those of us who wish to file required articles rather than stowing tons of unrequired advertising.

It would also be appreciated if you can avoid starting articles on the back of preceding ones. They can then be segregated without the problem of photocopying a page to go with an article of separate index classification.

J S Pullin, Shipley

(It has been strikingly difficult to get hold of a PC5000 for review purposes. However, we hope to benchtest it around April this year.

I hope you find our new format meets your filing requirements — Ed)

Finance Manager

I was very surprised to read the review of Finance Manager in the January edition of *PCW*. I hardly recognised it as the program I have been using for several weeks and find invaluable. My control over my accounts has improved so much that I have been able to close one bank account, which I used for household expenses, and deal with all expenditure from one account. This has removed the need to keep enough money in two accounts to avoid charges.

It seems churlish to object (as the reviewer did) to an improvement in the function of double entry bookkeeping. The program works logically — if I pay a bill, the amount is debited to my account and appears as a credit elsewhere. This is how we think about the movement of money so why not use it in the program? I like to know how much money I have paid to my local council in rates over a year. Because there is an account for the council, it's easy to see exactly how many payments have been made.

I simply don't see how the reviewer gets in such a muddle about the system. He quotes the example of paying for a meal in a restaurant. If he used Access to pay, the sum would appear as a debit on the Access account and a credit on Luigi's. When the Access statement is received it's a simple matter to check the amounts included, to reconcile them and transfer funds from a bank account to Access to cover the total. I like to have an account for each restaurant I use, but if I don't use Luigi's often enough to warrant a separate account I simply leave out the name of the account and use the description 'restaurant'. This means that I can analyse my expenditure under the heading 'restaurant', but I have reduced the number of accounts opened.

It seems to me that the reviewer has not worked through the system properly and I think he gives a very unfair impression of what I find a fast and flexible program. When there are so many poorly documented programs on the market it's a pity when the good ones are not recognised.

Elizabeth M Oliver, London N5

Basic loop

In response to AW Sheppard's letter (*PCW*, January 1984), I would like to point out that there is an easier way to simulate a REPEAT-UNTIL loop in Basic. The method takes advantage of the fact that boolean expressions can be included in assignment statements and will be evaluated as 0 for false and 1 (or −1 in some cases) for true.

This method, example given below, avoids the 'unbalanced stack' Mr Sheppard referred to:

```
100 REM previous part of
    program
110 REM
120 REM "REPEAT"
130 FOR REPT=0 TO 1
140 REM
150 REM instructions to
    be repeated
160 REM
170 REPT=(condition to
    terminate loop)
180 REM "UNTIL
    (condition)"
190 NEXT REPT
200 REM
210 REM rest of program
220 END
```

If your version of basic uses −1 to represent true, use 170 REPT= — (condition to terminate loop) instead of the above (and also in nested REPEATS), and so on.

Line 170 sets the loop variable to false (0) so that when the NEXT statement is encountered, the loop will be repeated. When the condition is true (1) the NEXT will cause termination of the loop, and so restore the stack (Mr Sheppard's problem).

By including the statement 125 IF (condition to terminate loop) THEN 200, we obtain a simulated WHILE DO . . . ENDDO statement. It should be obvious that with this method, we can construct all the structured formats available (other than procedures) in languages such as Pascal without resorting to PEEKs and POKEs.

Brendan W Hanrahan, Dublin

Criticism

One of the beguiling things about reading *PCW* monthly is the acerbic and iconoclastic tone of many of your editorial team, and the feeling that you are beholden to no-one in what you say or how you say it.

After all that, I think that Mike Liardet overstepped the bounds of objectivity in his review of the Commodore 715 in the January '84 issue.

I deduce from his article that he has:

— Never used a Commodore machine before.

— Never looked closely at one either.

— Cannot believe that anything not locked in to 'seepy/M' and its clones is worthy of the name computer.

To start with, a minor point: criticism of the IEEE-488 port being an edge connector — '. . . not on a £1000 one'. Why not? The Osborne 1 has the same set-up. Anyway, once the



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C·O·M·M·U·N·I·C·A·T·I·O·N·S

peripherals are plugged in, you don't spend a lot of your time unplugging them regularly, so what's the problem?

'Commodore has had an unenviable reputation for providing poor documentation'. Agreed, but that's part of the mystique of using CBM kit.

He appears to be shocked that nothing had to be booted to get the beast going. Ask the tens of thousands of home micro owners how often they boot their systems from a disk. This, dear Mike, is how micros ought to work. It's only historical accident that the majority of business machines require you to fill one drive semi-permanently with a system disk, instead of having the system tidily stored in ROM where it belongs.

Sneering at the provision of a cassette drive port implies a superiority that takes little account of fact. If you can't afford a hard disk, then you can't afford a tape streamer, and the humble cassette offers a cheap and convenient way of taking backups of files and copyable software. Very sensible, too.

Now the crunch: 'Commodore... has steadfastly refused to adopt any of the standard operating systems, and arrogantly persists with its own.' That 'arrogant' really gets up my nostrils. CBM is a standard among those who use their products. It's a robust and workable OS using clear and (mostly) unambiguous commands. But, most importantly, it does what an OS ought to — it manages the data flow without getting in the way of the primary task of the user, which is to use the machine to enhance his company profitability.

A decent OS will perform its functions while being 1) unobtrusive, and 2) efficient. To borrow some of the review's arrogance, I am not convinced that CP/M manages either. My clients (mostly businessmen) make it abundantly clear to me that what they ask of a machine is something which enhances the running of their work, without requiring hours of study to get it going. Whatever other faults they have, Commodore machines certainly are in the 'plug in and go' class, needing no complicated setting up or configuration.

I have no connection with Commodore other than as a very satisfied consumer and purchaser of their kit for home and office use.

Mr Peter L Gillman, Coulsdon, Surrey

Simmering debate

The debate about the relative merits of various programming languages, particularly between the proponents of Basic and Pascal, simmers on. The truth is that none of the available computer programming languages is perfect. Since discovering CP/M I have made regular use of Basic, Pascal, Forth and Assembler, and am at present learning C. All of these have a use but none is suitable for all the tasks I undertake. For the record, my perfect language would have the following features:—

It should be fully interactive. This implies the use of an interpreter or incremental compilation as in Forth. Editing the program should not dump variable contents.

Array sizes should be dynamically allocated at run time. For example, the equivalent of the Basic statement:—
10 A=100
20 DIM MATRIX (A)
should be legal.
The language should support a full range of structured programming features. In particular, it must be possible to write closed subroutines or procedures to which parameters can be passed. Long variable names should be allowed.

It should have a compiler option which is 100% compatible with the interpreted mode of the language. This makes the dynamic allocation of array space difficult but surely not impossible. Bascom fails in this respect.

The language should operate on two levels. It should be possible to write virtually any application using 'normal' programming techniques and, with the language's help, detect type mismatches, and so on. At the same time, advanced users should not be prevented — as they are in Pascal) from taking short cuts and playing clever tricks. Of the languages I have used, Forth and C come closest to having this attribute. Easy linkage to machine code is an essential part of this requirement.

Any offers to develop such a language? The nearest I have seen to this specification so far is Hewlettt Packard Basic as implemented on its scientific micros, but even this lacks a true compiled mode. BBC Basic has many of the desired features but, again, lacks a compatible compiler.

Peter Amey, Salisbury, Wilts.

BBC Esperanto

It was interesting and encouraging to read the Newsprint feature on Esperanto as an intermediate language in natural language translation (*PCW*, December 1983).

Perhaps it's not surprising that the EEC is supporting the Dutch Bureau for Systems Development in its feasibility study for the project, since about 55 per cent of the Community's budget is spent on translation alone.

But Esperanto-land has a strong computing fraternity: computer conferences have been held, most recently in Hungary, with Esperanto as the conference language; an international journal, 'Interkomputo', is to be published in Esperanto, starting in 1984; and there's an Esperantist's Computer Club, details of which can be obtained from the Secretary, EKK, 200 Nevells Road, Letchworth, Herts SG6 4TZ.

Esperanto is claimed to be five times easier to learn than natural languages, and I am able to vouch for this, having started to learn it in June 1982 with the Esperanto Centre's free correspondence course. My Esperanto is now as good as my French, acquired painfully over a period of about 35 years. I can write to friends in Bulgaria, India, Japan and Russia and understand their replies without knowing a word of their languages, or they of mine. This is not to say that Esperanto is trivial (though it has been refused an 'O' level examination by one Examining Board on the grounds that it's too easy), but my BBC micro has been of great help in drilling vocabulary and those 'little words' which I, at least, found difficult to master at first — 'who', 'where', 'this', 'everyone', 'then', 'some', and so on — because they are formed similarly, though with firm logical structure.

The program is precise and easily adaptable.

Arthur Radford, Tarnock, Somerset

(We'll be featuring Esperanto on computers in a future issue — Ed) END

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CHIP CHAT

You can't please some people at any time, but if you're a software house that doesn't document its software responsibly, you don't deserve to. Getting one's just desserts is the stuff tragedies are made of.

Psion distribute Vu-File for the BBC. *Micro User* reviewed Vu-File: Mr Tolson (*PCW*, Communications, January 84) bought it. *Micro User* stated that the program, a database, coped with a secondary sort field. The manual said it did too. Mr Tolson bought the program and discovered that it didn't, and alleged that *Micro User* reviewed the product 'from the manual'. He also said that he spoke on the phone to *Micro User*'s Mr Cook, who was described as energetically 'leaping to his feet' to defend the honour of his house. *Micro User* phoned *PCW* and alleged that a) the product *was* reviewed properly and that b) Mr Cook had never answered the phone to Mr Tolson, let alone leapt to his (Mr Cook's) feet.

Can you guess the *dénouement* of this web of intrigue? The fickle finger of fate had arranged matters so that the secondary sort field worked, *sometimes*. Not by design, but by coincidence, and only if the secondary sort field specified by the user happened to have been input into the database *in alphabetical order*.

All is now explained: *Micro User*'s reviewer did precisely that, and so had no reason to doubt the manual; Mr Tolson didn't, thereby assuming malpractice at *Micro User*. Which points to Psion: on the admission of Psion's Peter Norman, the software and documentation were written at the same time . . . but in different countries!

Mr Tolson, however, must be regarded as somewhat uncharitable, as *Micro User* claims to have done its best to unravel the alleged bug during the course of several long phone calls (in which, ChipChat is happy to accept, Mr Cook took no part). Moreover, according to *Micro User*, Mr Tolson was actually very pleased with Vu-Calc in every other respect, a fact which Peter Norman of Psion was able to confirm.

★ ★ ★

In last month's ChipChat we told you about the car dealer who offers a free car with every £3000 BBC computer. Epson, not to be outdone, has arranged a special offer on its HX20 portable. If you buy two of them for the remarkable price of £20,000 or so, Daimler will throw in — completely free — one executive limousine.

The limousine comes equipped with a sophisticated VHF radio telephone which will enable the micros to access remote mainframe computers at 70mph. A note of caution was sounded by one Chief Constable, who said that any Epson parked in a layby with a trace of readout on its liquid crystal display could be liable to prosecution for being drunk in charge of a mainframe.

★ ★ ★

As electronic mail gathers speed and mailbags fall into disuse, a new line of work has to be found for the inmates of Wormwood Scrubs.

ChipChat's own little bird was doing some voluntary prison visiting (nothing to do with the Acorn settlement last month) and discovered that some long-timers are now finding employ, while doing porridge, courtesy of a company called Rabbit Software. The graft is packing games cassettes and inserts.

Our supergrass further revealed that one of the section leaders in charge of the tape gangs is ex-civil servant Dennis Nilssen, he of the loose floorboards and outsized pressure cookers.

Coincidentally (we hope), Rabbit's latest games release is called Murder.

★ ★ ★

Psion's experience with Mr Tolson may be the reason it has entered into an exclusive contract with Sinclair on software problems with the QL. For £35, QL users join QLUB, the official users bureau (they couldn't call it a club because they'd already used it in QLUB, and *group* is too downmarket for a 32-bit machine). QLUB members then have the right to obtain software assistance from Psion, as long as they quote their membership number. Does this mean that anyone else phoning Psion with queries about software will be told to Psi...off?

Incidentally, it's clear that the new QL has gone to the heads of everyone at Sinclair. Photographs of the manual included in the glossy launch pamphlets clearly show that all documentation sub-titles are in Latin. Unfortunately, the phrases in question don't make sense: *PCW* will therefore offer a prize of a games cassette for your machine if yours is the most amusing translation we receive of the phrase: *'Lorem ipsum dolor sit amet, consectetur'*. The *PCW* laughometer will be the final arbiter: *Larfometa locuta est: causa finita est.*

★ ★ ★

A well-known London nightclub recently played host to a rather unusual floor show: four of the dancers were robots. The occasion was the UK press launch of Topo, a domestic robot selling at around £1500. Distributor Prism hired a team of dancing girls to cavort around the robots to the accompaniment of a very impressive laser show. The robots themselves sat largely immobile, although one of them did roll backwards from time to time, and make a rather pathetic attempt to rock in time to the music. William Woollard, of 'Tomorrow's World' fame, presented the show.

Somewhat unimpressed with the robots' idea of dancing, and not much more impressed with the efforts of the girls, ChipChat agents in attendance decided to take a look at the Apple controlling the Topos. We were rapidly shooed away, and a quick glance at the display showed us why: '*** Topo 1 not responding ***', '*** Topo 3 not responding ***'. Of four robots, not a very good percentage. END

BLUDNERS



Three errors crept into John Hearn's 'Neater BBC Program Listings' (TJ's Workshop, *PCW*, January 1984).

Line 90 should read:
FOR I%=0 TO 3 STEP 3
Line 100 should read:
P%=&C00
Line 310 should read:
*KEY10?&20E=&00:?&20F=&C:VDU12|M

★ ★ ★

Our thanks to Ken Otter for spotting a misprint in January's NewBrain dissassembler program (Z80: Read-only Secrets). On page 241, under Installation notes for NewBrain, the third line of code should read:
"OP$(";I;")=";:LINPUT 0,OP$(I):NEXTI. To ensure all streams are opened, change lines 1350-1370 inclusive to be lines 266 to 268, and add line 265 to read 265 PR=TRUE.

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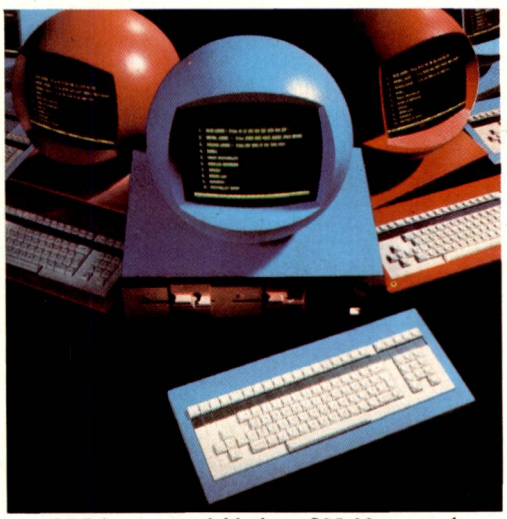

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