

MICRO COMPUTER

PRINTOUT

A PLAIN MAN'S GUIDE TO
PERSONAL COMPUTING

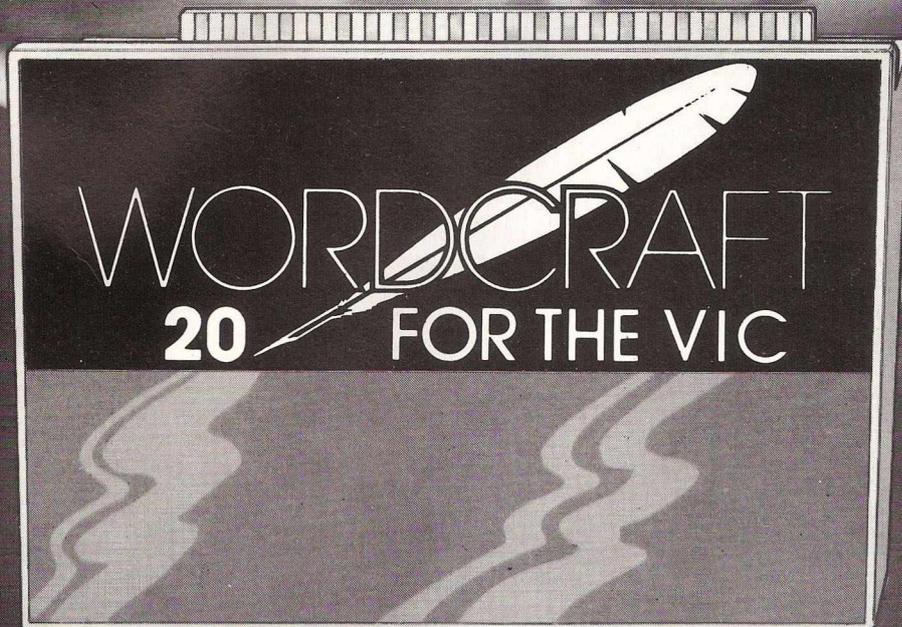
JANUARY 1983 95p

What about
CHEAP
WORD PROCESSING



Desert
Island
Disks

A NEW ERA OF WORD PROCESSING



The introduction of Wordcraft 20 for the VIC brings the benefits and advantages of full scale word processing directly to the general public. Until now only the business world could afford word processing systems but this amazing price breakthrough makes it available to everyone. Wordcraft 20 comes on a cartridge ready to plug into the back of the VIC. Included in the cartridge is an extra 8K of RAM that is also available for use with other programs – so not only do you get a word processor but you also get a memory expansion thrown in. The system also comes with complete documentation catering both for the inexperienced user and for those already familiar with Wordcraft 80.

Just look at these features:

- ★ Full use of colour and sound.
- ★ Full compatibility with VIC 1515 printer, parallel printers or RS232C serial printers.
- ★ Full control over margins, document width, tab

stops, decimal tabs, justified output, multiple copies. Complete control of the final output.

- ★ Automatic underlining and boldening.
- ★ Full screen display with automatic paging.
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- ★ Full compatibility with Wordcraft 80.
- ★ Name and address capabilities – including labels.

- ★ Full document merging facilities.

Wordcraft 20. The package that the VIC user has been waiting for. A word processor of proven quality at a low price.

For the first time ever, every home can have one.

audiogenic LTD

Wordcraft 20: £125.00 inc. VAT and p&p. Available from all VIC dealers or direct from Audiogenic Ltd. PO Box 88, Reading, Berks. Tel: 0724 586334. Wordcraft 20 is copyright P.L. Dowson 1982.

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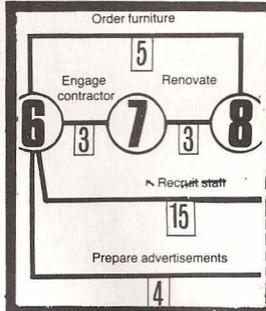
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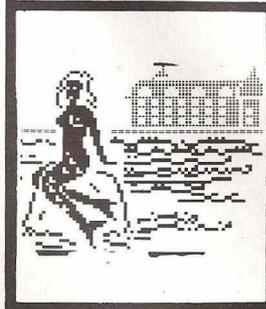
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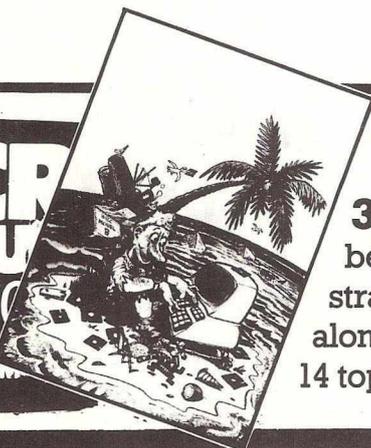
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More writ-defying libel.

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MICRO
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PRINTING
A PLAIN MAN'S
PERSONAL COMPUTER



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FRONTLINE

Cheap Word Processing

Several times when conducting training courses on the rudiments of business computing, I have asked for definitions of Word Processing from members of the audience. The result is always the same – as mixed and varied a collection of definitions as it is possible to imagine, from 'a typewriter which allows you to correct mistakes before printing' to 'a machine for printing standard letters to different names and addresses'.

The point of this exercise is that all these responses are correct – Word Processing is really what you make of it, a tool which produces different results in different people's hands. This, in part has caused the controversy over cheap or, if you prefer it, low-cost Word Processors.

In our September issue, we carried a major feature on WP packages for microcomputers and how they compared with dedicated systems. In the following weeks we received a large postbag from users demanding to know why their chosen package had been omitted from the line-up. Typically, the packages cited cost less than £100, yet performed substantially the same functions as packages costing three times the price. Deciding that a separate feature was clearly called for I investigated further. The most interesting thing I discovered was that the biggest difference between cheap and expensive WP packages was, paradoxically, not in their specification, but in their application. Cheap WPs tend to be used for lower-volume text handling (such as in a home or small business), and in consequence are usually hooked up to low-cost dot-matrix printers.

Bear this in mind when reading this month's main feature. If Word Processing is a completely new subject to you, refer back to our September issue.

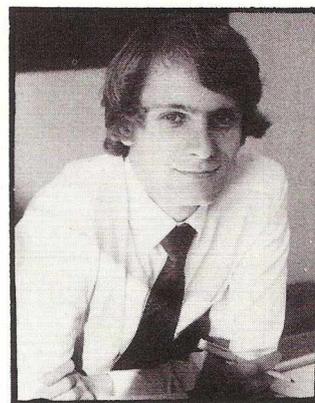
In addition to the survey of WP packages under £150, we have looked in detail at three different hardware solutions to the problem – Microwriter, Typewriter and VIC-20. *Microcomputer Printout*, as we have stated before, does not put any faith in technical benchtests so all three were put through exhaustive user tests. The 'guinea pigs' were three journalists – and each was required to produce the report on the device concerned. Julian Allason, being the gadget freak, got the Typewriter. James Woudhuysen opted for the VIC on design grounds, while yours truly got lumped with the Microwriter. You can read the results in the central pages, but suffice to say that I went on to write this column on the Microwriter too.

Journalists, of course are not typical businessmen – but at least we are intensive users of text!

P.S.

Next Month we shall be looking in depth at the most controversial subject in business computing – 16-bit software. Is it really magic – or a complete myth. We shall also be interviewing a very special *Microcomputer Printout* reader. Hint: he loves magic and explodes myths.

Finally, my thanks to the hundreds of readers who responded to our Reader Feedback Card last month. The results have already proved useful.



A stylized, handwritten signature in black ink, which appears to be 'R. Pawson'.

Richard Pawson – Editor

Superscript

The Ultimate CBM Word Processor

A Commodore enthusiast wanted a word processor that was simple, fast and easy to use. He wanted to handle up to 20,000 characters of text, to use a wide screen format of up to 240 characters, with full window scrolling in all directions, and be able to use the screen while printing. He wanted a word processor at a reasonable price. The enthusiast, Simon Tranmer, couldn't find one... so he wrote

Superscript

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Superscript

does everything Commodore wanted... which is why they are adopting it for all of their forthcoming models. And finally, the magic ingredient...

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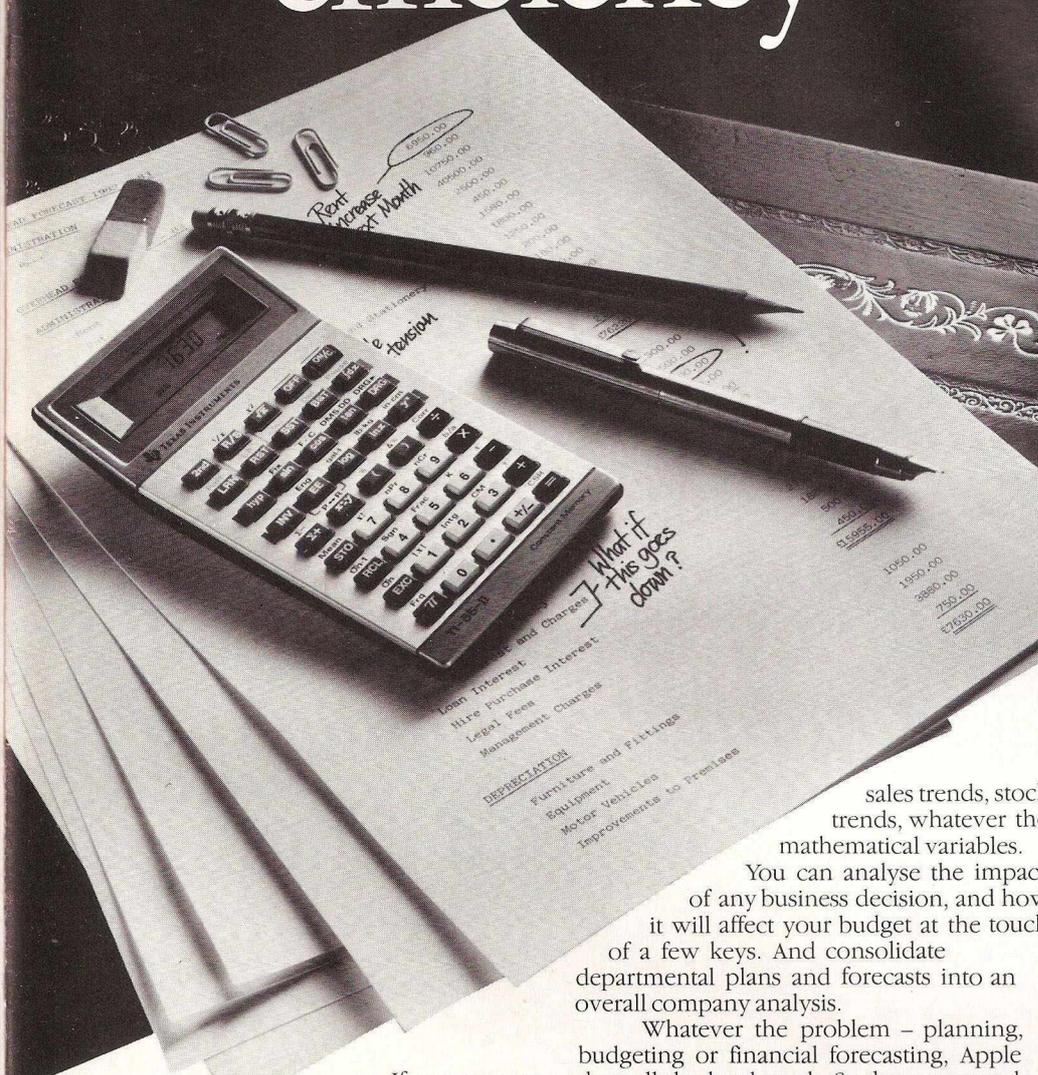


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How to plan for more efficiency



If you want to make smarter, faster business decisions, you need an Apple.

Apple is the world famous micro-computer that started a revolution to give business professionals everywhere computer power on their desktops.

Today, no other personal computer can give the businessman so many readily available solutions to the problems he faces.

Whatever business you're in, an Apple can help you budget, plan, and forecast in seconds, rather than the days it used to take with a pen or calculator and paper.

FASTER DECISIONS

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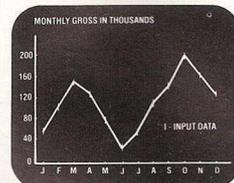
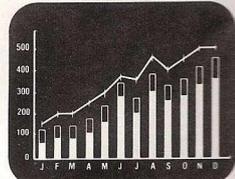
Whatever the problem - planning, budgeting or financial forecasting, Apple does all the hard work. So that you spend



more time considering the figures, not arriving at them.

BUSINESS GRAPHICS FOR THE FULL PICTURE

You can also program your Apple with Apple's Business Graphics system, a fast, easy way to produce line or bar charts on your Apple screen. Teamed with numerical planning software, it can help



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NUMBER OF YEARS	5
NUMBER OF MONTHS	4
PRESENT VALUE	UNKNOWN
FUTURE VALUE	7000
MONTHLY PAYMENTS	UNKNOWN
MONTHLY INTEREST RATE	892 % PM
TIME PERIOD IN MONTHS	84
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TARGET GROWTH	4% MONTH
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SALES	120 125 130 375
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BONUS	48 50 52 150
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In addition, it offers capabilities for word-processing, numerical analysis, mail list handling and professional accounts, payroll and invoicing.

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As well as being the most successful micro-computer in the world, consider the facts: It comes with a one-year warranty (easily extendable at very low cost). It can easily be leased through Apple's Lease Plan.

And Apple has a huge network of dealers in the UK trained to help and advise on any aspect of Apple and the large range of software written specially for it.

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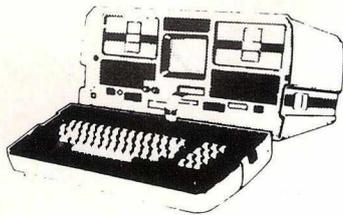


The Personal Computer

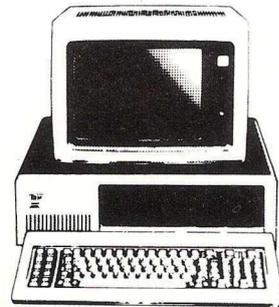
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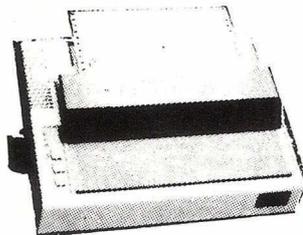


IBM Personal Computer.
Recommended Price £2800
plus VAT

Call us now you never know what we might offer (eg £100
for any calculator, £125 for a ZX81, £200 for a
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What competition?



**The amazing HX-20.
The most complete portable computer available today.**

The HX-20 is a portable computer with a full size typewriter keyboard, LCD Virtual Screen, printer and microcassette facility actually built in. A computer with a rechargeable power source that's large enough for writing programs and manipulating data virtually anywhere, yet small enough to carry in a briefcase.

But don't let the size fool you. The HX-20 is not a gimmicky toy or an excuse for a calculator. It's a precision machine using a full extended version of Microsoft BASIC with 16k RAM, optionally expandable to 32k and 32k ROM expandable to 64k, RS-232C and Serial interfaces. The ASCII typewriter keyboard and five programmable keys brings ten separate program functions to your fingertips.

Power to your elbow.

The HX-20 runs on its own power supply for over 50 hours and can be easily recharged overnight, or whilst in use, with the ability to retain its memory in RAM even when switched off.

Keeping you in the picture.

The LCD screen is unique - showing any 20 characters by 4 lines at a time - enabling you to carry out word processing or data entry as if you are using a large screen.

HX-20

PORTABLE COMPUTER



Print Out. Built In.

The 24 column dot matrix impact microprinter offers 42 LPM in a crisp, precise 5 x 7 matrix for perfect hard copies. Every time. And you can choose from a wide range of peripherals from bar code readers to acoustic couplers for total capability.

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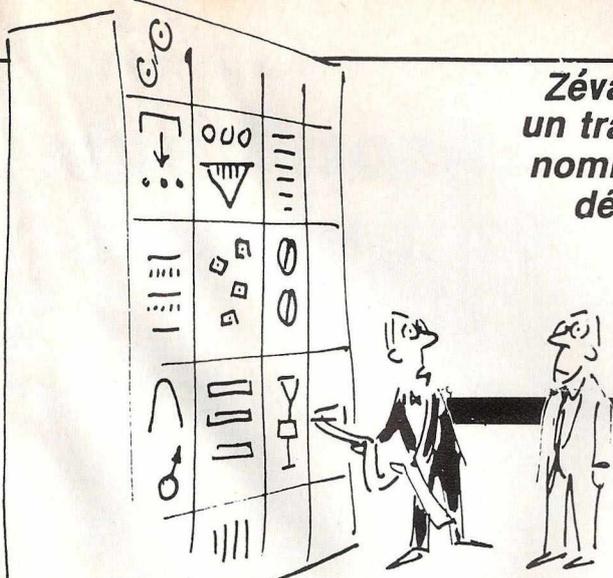
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Just take a glance at the competition and you'll soon realise that the HX-20 is the most portable computer available today.

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Exceptional quality.**



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nommé
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"It doesn't want to get involved."

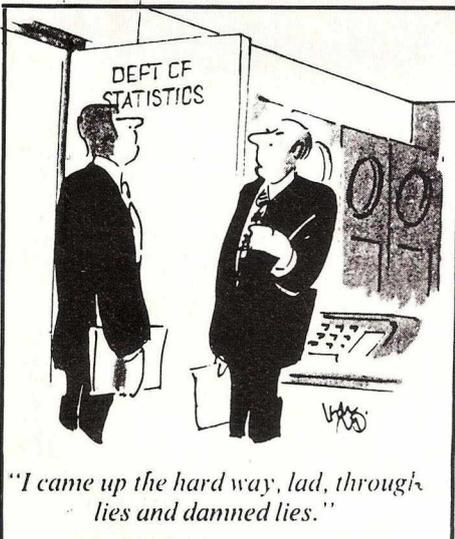
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REX MALIK'S



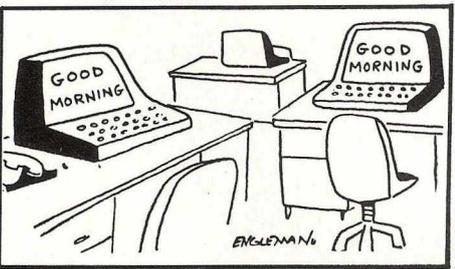
'Well, Let's See, That Comes to ... Yep ... \$40,000.'

Demchuck



"I came up the hard way, lad, through lies and damned lies."

Vaxx



EMBLEMAN



HEIDE

"I suppose one day I'll get round to replacing the whole thing by a silicon chip."



"You know what I miss? Paper aeroplanes."

HEIDE

ENFIN! DE TOUTES FAÇONS
JE VOUS LAISSE LA PLACE!
MAIS PAS QUESTION!!!
J'INSISTE CHÈRE
MADAME!
VOUS ÉTIEZ
LÀ LE PREMIER!
Si, si!

AU FAIT! EN SE FAISANT
TOUT PETITS, ON DÛT BIEN
POUVOIR TENIR À DEUX,
NOU?
AU FOND!
APRÈS TOUT!
ON PEUT TOUJOURS
ESSAYER!!
HE! HE!
HE! HE!

ALORS, LE
COUP DES
BILLETS?
ÇA A MARCHÉ!
ILS VEULENT
SE MARIER!!!
AGENCE
DE VOYAGES
AGENCE
MATRIMONIALE
HE! HE!
ZEVAR

CHRISTMAS SPREAD

ANDY CAPP

IT'S TOO BIG T' GO THROUGH THE DOOR, 'OW
ARE WE GOIN' T' GET IT UP THERE?
COMPUTER MK 11

PLUG IT IN, YOU TWIT,
AN' LET IT WORK IT
OUT FOR ITSELF!

NO WONDER THEY'RE
TAKIN' OVER
Smyle

**“We will be flying at a height of 30,000 feet.
Our air speed will be 500 knots.
And there’s a fair chance we’re going to crash.”**



READ/WRITE

Defenders

Hi Guys!

I thought the poster in last issue was brill. I've got mine at home, and would be extremely grateful (etc...etc...) if we could have 2 more - one for our Phys. Lab and one for the pokey little cupboard, which is otherwise known at the Comp. Sci. Dept.

We all read *MicroComputer Printout* and think it's fab. Keep up with the good work! If 'Big Douglas' and the gang give you any hassle, then tell us and we'll send 'Fat Boy' Wilsson up there to ferlatten the lot of them.

P.S. Pass on our 'get well soon' wishes to your pruff reader.

P.P.S. We bet you a fiver that that p*ll*ck S.P. Birch (of Glug, Blob, Libol Fame) can't clock 'Defender' like half of us. So there!!

Martin Hilton
Arnold School Comp. Club
Poulton
Blackpool

Want a job in our bad debt recovery department?

Blue Suede Shoes

Dear Sir,

Charles Christian's article on the Seven Deadly Sins (November issue) was in most respects admirable, but he has two of his facts wrong.

The read/write head does not fly over a floppy disk with air beneath it: it skates on the disk surface. Only on hard disks, which rotate at much higher speeds, does the head 'fly'. But his point is still valid.

Wearing rubber-soled shoes will not alleviate static build-up on your body; it will aggravate it. You would do better with bare feet on a damp floor! However, there are anti-static sprays available for carpets, which are quite effective if used weekly. The problem is very real.

J.P. Marchant
Putnoe
Bedford

Maybe that's why so many computer boffins wear open-toed sandals!

User-Savage

Dear Sir,

I am increasingly alarmed by the names given to personal computers.

PETs, ACORNs and APPLEs were cute. The new wave of LYNX and DRAGON are much more aggressive.

However, I dread the day when a manufacturer releases the VOGON, the VISIGOTH or the EXTERMINATOR.

This trend must be resisted at all costs.

David Wardill
Rowlands Gill
Tyne and Wear

Here's another of our quick competitions: what's the worst name you can come up with for a home computer? Bottle of Christmas cheer as a prize, unless the editorial department gets to it first. [N.B. Triton users will be disqualified].

Obfuscation

Gorilla suits were *de rigeur* at this year's Commodore Product Obfuscation Committee meeting, or Sea-Pock, as the initiates call it, so I was able to mingle unobtrusively with the crowd of executives making their way from tree to tree to the *sanctum sanctorum*. On the stroke of 0700, a tall lean gorilla entered the room, his newly-pressed for unobtrusively accented with gold sequins, and addressed the hirsute assembly, "Right chaps, what? Another jolly old P.O. session, pip pip and all that, don't y'know. Who's leading off today? Ah, Scombre, old fellow, I see you have the honour."

Scombre: "Right, sir, your highness! The model number obfuscation subcommittee report. Productivity-wise the past year has exceeded all records, with your obfuscation program for the VIC-type products alone. Not only is the competition completely confused, but our salesmen haven't an idea as to which is which, and of course the reviewers and magazine writers are tearing their remaining hair out in tufts. There's the VIC 10, the VIC 20, the VIC 30, the VIC 40, the VIC 80, Ultimax, the 2016, the 2064, the 64, and of course the 0104, designed by Lipra Loof, and which was disclosed on 01/04 in the ICPUG Newsletter."

Chairman: "Well-obfuscated, Scombre. Tell me, I've been meaning to ask: what's the significance of '64' in Commodore 64?"

Scombre: "It means that there is 39K of RAM available for BASIC programming, sir."

Chairman: "Of course, I see. Now I would like to hear from the pre-obsalescence subcommittee. Tupwell, what have you been up to?"

Tupwell: "Well, sir, of course our work overlaps that of Scombre's group to some extent, since we have obsoleted a number of products before they were ever produced, or very shortly afterwards. These include all the memory-expansion units ever promised, several printers, the Unimax, I think, the 3040 disk drive..."

Chairman: "Yes, yes, Tupwell, but that's all ancient history. What about (slurp, drool) the model 64?"

Tupwell: "We think we've really hit the nail on the finger this time, chief! Get this! The cartridges for the VIC 20 won't fit the cartridge slot on the 64!"

Chairman: "Pure genius, Tupwell! Now everyone who wants to upgrade will have to buy new cartridges for every program they own! We'll skip the report from the Instruction Book Errors and Omissions Committee this year, as I am satisfied that, as always, they are dedicating their maximum effort to ensuring that every page bears their muddy pawprint. Also note for the record my satisfaction with the work of the Cable Shortening Committee, the Non-ASCII Committee, and the I/O Nonstandardization and IEEE Disavowal Committee. Chadmore, we will conclude with the report from Marketing and Public Relations."

Chadmore: "Sir. Our work falls into three areas. First there is Fulfillment Assistance which guarantees that our customers' masochistic needs are met by ensuring that when they open their packages on Christmas morning they will find only preliminary documentation and unacknowledged bugs in ROM. Second there is Schedule Planning, which arranges deliveries so that only one customer in ten and none in the provinces will actually get the new model in time for Christmas, and last but not least, there is our warranty service, which warrants that indoctrination and backup documentation for dealers and programmers is not available until eight months after introduction and meets our very strict requirements for chaoticism and slipshoddiness. To this we pledge our every effort."

Chairman: "Thank you, Chadmore, a moving report. And now all rise and dance widdershins to the singing of our company anthem."

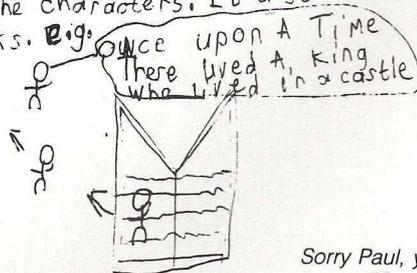
(All do so, while I and one other scribe on roller skates exit unobtrusively to the strains of 'Obfuscate them all, obfuscate them all, the long and the short and the tall...')

Yours surreptitiously,

Lindsay Doyle
Conshohoken, Pa. USA.

Dear Sir

I think I have a programme for a computer. The programme is you see a book on the screen and it opens quite slowly. The book is a story book as the book opens the characters jump out and tell the story. The words are printed on the screen next to the characters. It also could be used for school books. Big.



30 Shirley Rd
Garston
Lpool L19 7NU

He was A Very Mean King who kept his Five Daughters Locked up in the castle One Day...

Yours truly
Paul A Jones. Age 8.

Sorry Paul, your entry to the Commodore '64 competition arrived long after the closing date. But as our youngest reader yet discovered, we think you deserve one of our Silver Space Invader badges anyway...

READ/WRITE

The Editor welcomes your letters, but if you require a personal reply please enclose an S.A.E.

In Vogue

Some 10 weeks ago, I decided that it was about time that our family left the dark ages and invested in a computer. My reasons for making this giant leap for Hodgson-kind were as follows:-

1. For the sheer fun of it, (or is that a contradiction in terms?)
2. Home accounts, address listings, birthdays, recipes etc.
3. In the fond hope that my 10-year old son would become addicted, thereby increasing his future job prospects significantly.
4. The germ of an idea to go self-employed, offering computerised book-keeping/stock control to local small businesses.

Bearing in mind that my knowledge of the beasts was zilch and that there has been a prolonged 'run' on the Hodgson pound, my quest for information meant wearing out the carpet in W.H.Smith's magazine section, where a bewildering array on 'Monthly's' on the subject, beckoned to the innocent.

Armed with a selection of these, I soon discovered that they were written in a foreign language, except for the date and subscription details.

Eventually, in a flash of perspiration, it began to make sense and I was on the way to eliminating the ZX81 and IBM mainframe from my list of contenders, noting on my laborious way, that reviewers never said anything bad, I mean BAD, about a product and manufacturers always stressed their best merits but forgot to mention their shortcomings.

So it was with expectant irritation that I 'discovered' your contribution to the shelf, coincidentally beside a copy of Health and Efficiency (both of you trying to keep abreast of the times - sorry!).

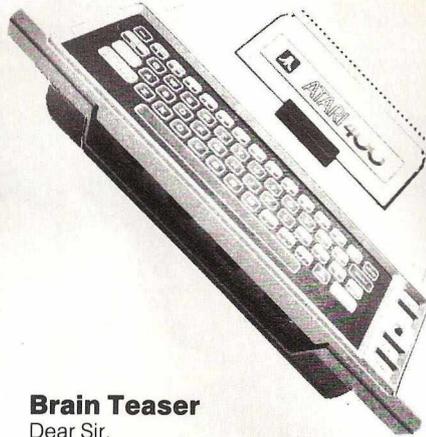
At last, a magazine that's factual and funny and not afraid to criticize it's sources of advertising revenue. You have a new disciple in tow.

The Micro choosing chart in the November issue was really useful and surprisingly complete. The next logical and much-needed step would be an IN DEPTH breakdown within each group.

Chris Hodgson
Saltdean
E. Sussex

We prefer Harper's and Queen Mr. Hodgson; there's no telling who you're going to end up on the newstand with these days. Usually the cover ensures we end up alongside Beano and Dandy!

Glad you liked the poster and thanks for the suggestion, but (swank, swank) we already thought of it. Starting shortly as a regular feature, we shall be looking in more detail at the micro's on offer within each group.



Brain Teaser

Dear Sir,

I put pen to paper, to relate a tale, which if continued will confuse the population further about computers.

At Waterloo Station an advertising stand was erected with a large sign saying 'The Atari Challenge', which was more true than was originally intended. The writer watched a teenager attempt to operate a program testing his knowledge on the BASIC language. The operator was given three options eg: (1) PRINT HELLO (2) PRINT "HELLO" (3) "HELLO" and was asked which one was correct.

But the challenging part was that no matter what choice was made the machine said 'wrong!' After the third try the program defaulted giving the correct answer, to the frustration of the operator.

How could such a simple demonstration program be allowed to be used in such a large promotion without being tested is beyond me.

This is the typical example of why people are frightened by computers.

The person who wrote this program deserves to move over, and give his job to some one who is competent, or to a major change in middle management in the promotions department of the company.

I would dearly love to hear the inept excuse for this travesty in advertising personal computers, not to state the damage it does to the industry as a whole.

Terrance A Miles
Raynes Park
London SW

Noble Cause

Thank you for the article in your November issue *Teach yourself CP/M*. I think it might have helped our noble cause, but that remains to be seen.

One point I would like to make, however, is that our's is a computer familiarisation course based upon the CP/M operating system, which, whether you love it or hate it, is as much a fact of microcomputing life as the also much derided keyboard.

There are seemingly respectable training organisations that are charging users £125 per day, excluding expenses, to sit in a classroom and be taught, according to their syllabi, more or less the same topics as our course and if trainees are lucky their turn may come around to touch the magical machine. Our package will allow an organisation to train

Theological Space Invaders

Dear Sir,

Saw a brief bit about the C of E in your magazine. More or less all spoof. I enclose a copy of Church Computer and a fact sheet. Few of your suggestions have proved possible so far. The nearest equivalent to Space Invaders is a teaching program for the Spectrum in which the Jew gets 'mugged' in the story of the Good Samaritan. Children call it 'The Vicar's Game'.

Membership of our group costs just £2 or send an s.a.e for further details.

Nigel Hardcastle
Church Computer User Group
St Thomas Vicarage
Rotherfield Road
Garrets Green
Birmingham

Rev. Hardcastle kindly sent us a copy of the CCUG's newsletter. Sample contents:- 'How to convert a program'(!)

Space Paranoids

I may be able to claim one of your 'solid silver' Space Invader badges as suggested in the article 'Allason altercation with Admiral', page 23 December 1982 issue of *MicroComputer Printout*.

The 'Pacman' could be seen gobbling just over the chief baddy's shoulder, (Sark is his name, I think) as he was declaiming to a subordinate.

Incidentally, is the fact that the Master Control program has the same initials as the magazine and Male Chauvinist Pig correct?

Does your magazine plan to conquer the home computer world possibly aided by 'Red Admirals' at Cheltenham GCI-Q?

Yours paranoically,

Anthony Martin Hill
Duffield
N. Humberside.

Or could it be that the Master Control Program (MC/P) is really just an anagram of the most unfriendly piece of software ever devised for microcomputers? Yes - you've guessed it ...

Incidentally, for those of you who still haven't got round to seeing TRON (shame on you, it really is worth seeing): the third time round we spotted a joke at Apple's expense. Anybody else notice?

any number of personnel, even the office boy, for whom there are usually never any funds left in the training budget.

I am sure that you share the view that everybody should know something of the use of information technology. If we, and the more conventional training organisations, have got it wrong and people don't really want or need, to know about aspects of information technology through programming or operating, then who is buying all of those 'Plain Man's Guide to Personal Computing' magazines?

Jon Shearing
Microcal
36 Elm Road
Windsor, Berks
Tel: 07535 68009

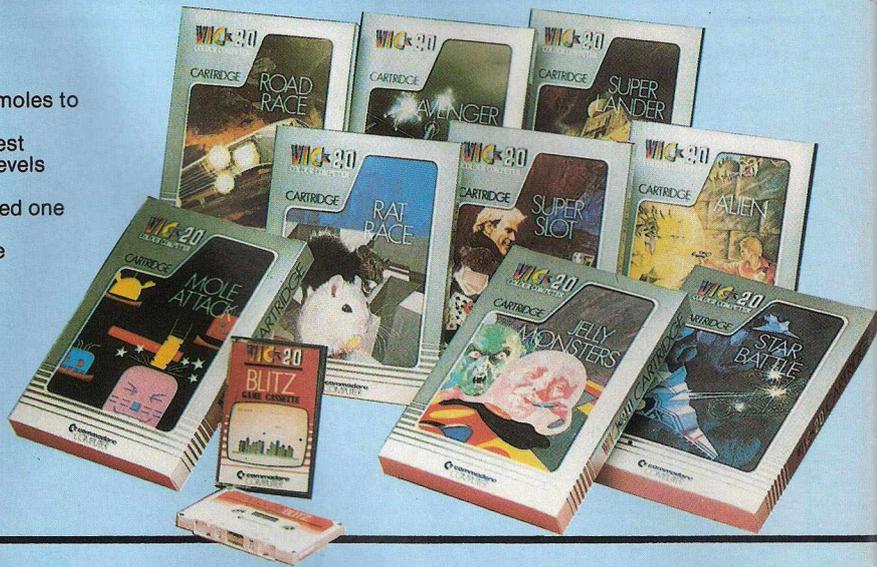
Touché!

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The Gospel according to Uncle Clive

This article launches a major new series in which the great thinkers of our time will attempt to forecast the future, and buy our columnist lunch. First Clive Sinclair:

"The next 15 years will be among the most momentous in our economic history ... By 1990 we shall all of us have jobs ... The coming years will see deflation rather than inflation ... By the end of the century automation will lead to the displacement of most assembly labour in Britain ... The idea that we need a manufacturing industry to pay for the rest is a fallacy ... Britain is in the wrong part of the world to make conventional goods - products with a strong creative context can be made here profitably ... In the next decades China and India will become the great producing nations ... Britain is curiously well placed to benefit from the opportunities. We are a particularly creative people and live in an exceptionally free society ... We must turn from the products of the material to the products of the mind ... Government must take a truly laissez faire approach to new business ... It must confine any 'make work' programmes to very short term palliatives so as not to inhibit the pressures which cause change ... Schools have prepared their pupils for life in large organisations. They should now reverse this ... We should face a golden age, as fully intelligent machines appear, if war can be avoided, the most golden age man has ever known."

Lunch cost £49.20 inc. VAT and service.

Pinballs

Pinball enthusiasts and anyone looking to buy a business computer could do worse than hasten to the Which Computer? Show held at the National Exhibition Centre, January 18th-21st.

Tickets are available free of charge to businessmen and pinball wizards over 18 years of age (are there any?) from the felicitously named Clapp and Poliak Company, 232 Acton Lane, London W4. Tel: 01-747-3131.

Oops, I nearly forgot to mention that finals of the national pinball competition are held at the show on January 18th. Winning wizards to receive prizes donated by Tandy.



Had to happen really, didn't it? The moment I wrote about an 80 column conversion for the VIC which cost an arm and a leg, someone else was bound to come up with a better one at a cheaper price.

Good news too that Commodore are officially supporting the new one. I always worry about invalidating the warranty by fiddling around adding unapproved bits and pieces.

The 40/80 card neatly solves the longstanding 'problem' of the 22 character screen width on the VIC. The 40 or 80 column screen widths are achieved by generating a second display in addition to the standard 22 character one. This runs the full VIC character set with upper and lower case letters, graphic symbols and reverse field (black on white) characters. Happily it works with the basic unexpanded VIC, and apparently with most expansion systems too.

Price £115 including VAT from Commodore dealers, or direct from Stack at 290-298 Derby Road, Bootle, Liverpool.

Olivetti Strike Ink

Because it is almost certainly Sorry about the noise, but it is this new daisywheel printer we have just had installed. Print quality is marvelous, as good as an IBM golfball typewriter in fact, but the noise, my dears, the noise...

When the quietly spoken Signor Olivetti rang me I had to switch the dratted thing off. "But why you no trya outta our new Ink Jet printer, I aska you, amigio mio?"

too big and too expensive, I told him. Ink Jet printers invariably are.

"Mama Mia. This is a job for my nephew, Sergio." And with that he was gone.

Two days later I was seated in front of an elegant black box, whence at the prompting of the sharply-suited and winkle pickered Sergio, the lyrics of 'O Sole Mio' were being printed out at a speed which would not have displeased Sergio's other Uncle, Enzo Ferrari.

By comparison with the daisywheel's high-pitched clatter, the discreet hum of the ink-jet was barely audible. Print quality was comparable to a dot matrix printer, so you would be more likely to use it for programming or general business applications than for word processing.

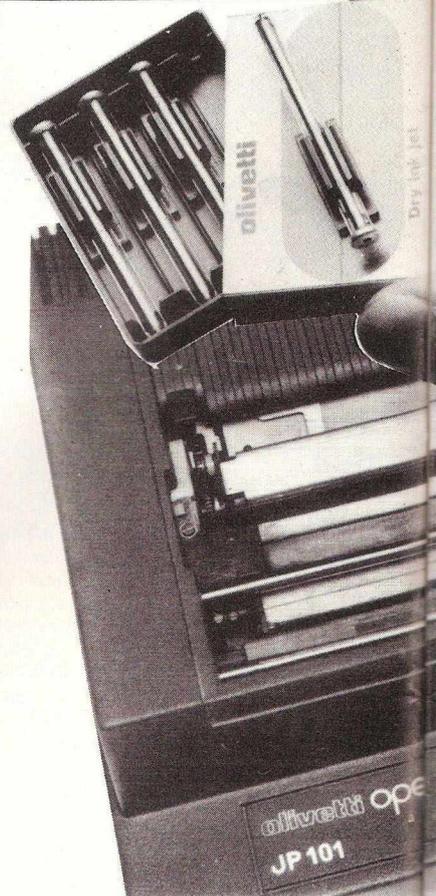
Each character is constructed from a 7 by 7 matrix, and can be printed out in 10 pitch (*that is to say 10 characters to the inch*), 12 pitch or 16 pitch. The speed seems to be about 50 lines a minute with full 80 character lines. All the features we have come to expect are there: underlining, condensed and expanded characters, standard parallel interface and so on.

Sergio says it will sell for fifty billion lire. That is £399 or our money.

My Old Man's a Dustman

'The garbage problem in the city has reached a crisis point. Streets are full of litter and there are lots of trash cans waiting to be emptied. Worst of all the flies are thriving in these conditions and have grown to vast man-eating proportions...'

No, not a description of the editor's office, but the scenario for a revolting convincing VIC cartridge game called TRASHMAN. From Audiogenic (who else?) Price £19.95 from P.O. Box 80, Reading.



First low-cost ink jet printer, Olivetti's JP101.

by Julian Allason



PC Paints pretty pictures

Saving the presence of my learned colleague, Terry Hope, King of Atari graphics in the UK, I don't think we have even begun to scratch the surface of microcomputer graphics.

Lots of reasons why this should be so. Until recently microcomputers were just too slow. But the arrival of the latest generation of 16 and 32-bit microprocessors should solve that.

Then there was the screen problem; ordinary raster scan devices – like that TV your computer is hooked up to – just couldn't handle the definition. That too is in the process of being taken care of.

But it seems to me that the real bottleneck has been caused by a shortage of good graphics handling software. Take my *Sirius* for example. With a high resolution screen format of 800 by 400 points it offers four times the resolution of most of its competitors. Yet apart from a superb 3-D graphics demo, and some high res.

screens rather cheekily ported across from other systems, I have yet to see its full capabilities used, let alone stretched. (*Stop Press: ACT announced a full hi-res. graphics package as we went to press – Ed.*)

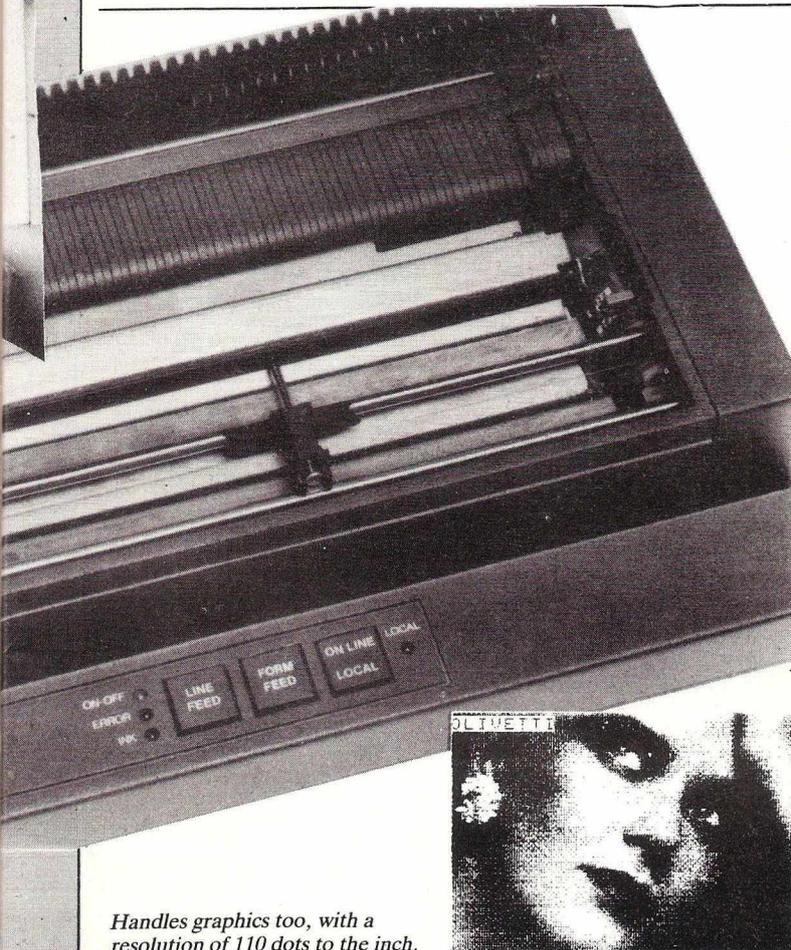
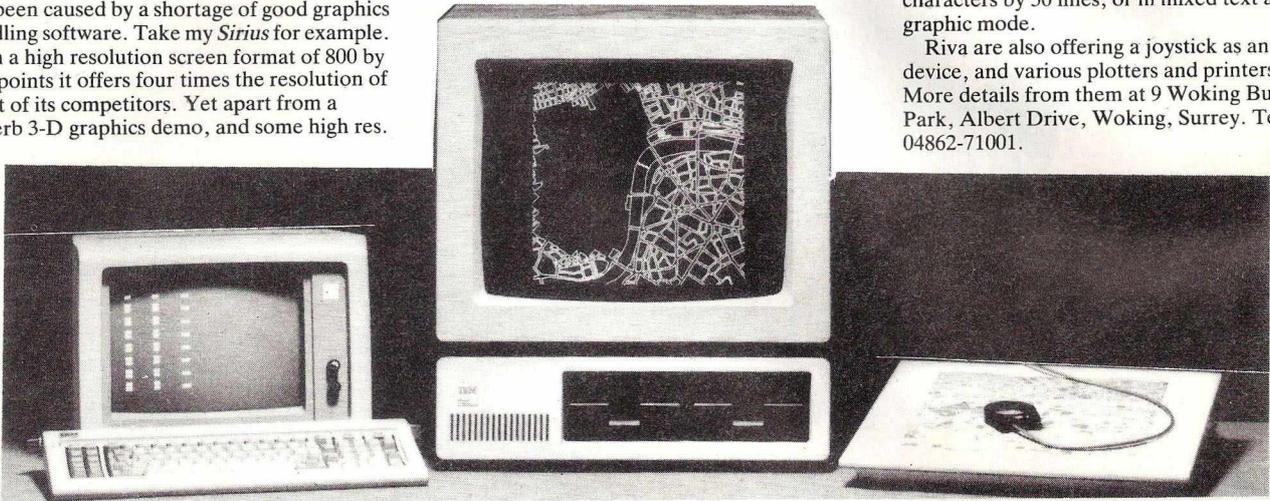
Meanwhile, the *IBM PC* still lacks any high resolution facility at all – officially anyway (*add-on boards are beginning to appear from various third party suppliers in America.*)

High resolution graphics driven by the IBM PC

So I rather suspect that Riva Terminals may be onto a good thing in offering a Tektronix-compatible workstation driven by the IBM PC. It essentially consists of a special 20" tube that provides a flicker-free high resolution screen capable of resolving 1024 by 780 dots, plus the necessary software to run under MSDOS, CP/M86 or the UCSD p-System (*all widely used operating systems*).

Pictures are drawn at an astonishing one million pixels per second. That is between ten and a hundred times faster than most other raster scan displays. It can also be used in alphanumeric mode with a format of 128 characters by 50 lines, or in mixed text and graphic mode.

Riva are also offering a joystick as an input device, and various plotters and printers. More details from them at 9 Woking Business Park, Albert Drive, Woking, Surrey. Tel 04862-71001.



Handles graphics too, with a resolution of 110 dots to the inch.



Spot the Difference

What do Colonel Sanders, Dynarod and Sperrings Computershop in Southampton have in common?

They are all franchise operations, the last-named being Britain's first ComputerLand franchisee. In the US ComputerLand are very big business indeed, acting as wholesalers and general handholder to over 300 independently run micro stores.

The deal works something like this. ComputerLand advise independant store operators on finding and equipping a shop, help with staff training, and provide national advertising and public relations backup. The franchise costs about £15,000, plus a monthly fee equivalent to 8% of turnover. The total cost of setting up here would be in the region of £130,000 they say.

The store owner must buy his stock from ComputerLand. This isn't quite as restrictive as it sounds since the company maintains a massive inventory of over 3000 items. Apart from the convenience of being able to purchase from a single source, the franchisee also enjoys the benefits of ComputerLand's mass purchasing muscle.

The company claims not to be tied to any one manufacturer, although for a long time they did enjoy a particularly close relationship with Apple. But, as a pal of mind observed after a recent visit to the States, Apples seem to get pushed towards the back of most ComputerLand stores these days: it is the IBM PC that hogs the limelight.

The joys of buying the ComputerLand way would probably have been with us earlier, had it not been for a succession of disasters that Basil Fawlty himself would have been hard put to improve on. First there was a similarly named franchising operation lauched here by persons unconnected with the original. This went noisily bust in due course, only for the spotlight to pass to an outfit styling itself MicroComputerLand. Their IBM PC-importing activities duly ground to a halt in a welter of accusations from former staff and Fraud Squad enquiries.

Not perhaps the ideal act to follow, but after discussions ComputerLand chiefs decided to press ahead with ambitious plans to franchise 25 stores here by the end of 1984. It will be interesting to see how they get on.

HOTLINE



coupler costing £269 from Lion House in the Tottenham Court Road. Press a telephone handset into it, load the communications software supplied, and your micro is ready to communicate over the telephone.

Boffins note: These Sendata 700 couplers operate in both originate and answer mode at 300, 1200 and 1200/7S baud speeds.

The Lions reckon you should have no difficulty using them in most parts of the world, and have interfaced the couplers to the portable Osborne 1 as the microcomputer most likely to be of interest to globetrotters. One nice touch: the device takes its power from the same plug through which data is transmitted. For details have your computer call the Lions on 01-580-7383.

Looks great doesn't it? But in case you were wondering what this space age gizmo is, I will let you in on the secret. It is an acoustic

Bubble is Back!

I told you bubble would be back!

And it certainly is. I must have the second sight (that would be the Irish side of the family); I even remarked on how suited the Apple and the bubble were.

Well sure enough this arrived a week later, and I quote: 'The Apple II Bubble Memory Module is 128K bytes of non-volatile memory that is more rugged than floppy disc (sic)'.

Says it all really, doesn't it? Turn the Apple on and there is all that stuff you were working on last night, still there. No nonsense with disk errors. No nonsense with disks period.

Actually that is probably not entirely true, as I suspect that the module will appeal to quite a few Apple owners who already own disk drives, and will use it in conjunction with them.

Other benefits of the bubble? Well, it is faster; about three times as fast as a disk access. And it should prove a lot more reliable. Distributors Xcalibur Computers (no, it is not a misprint) reckon on a mean time before failure of ten years.

They don't actually give a ten year warranty, but guarantee it fully for two years, which seems decent enough. More details from them at 3 Spencer Parade, Northampton. Telephone 0604-21051.

The price, by the way, is below £500.

Top of the ZX Pops

What is a Fellow of the Royal Society of Arts doing conducting a Top Twenty of the most popular programs for the Sinclair ZX-81 and Spectrum?

Beats me, but that seems to be how Alec Fry ARPS, FRSA and wife Erna Fry BA (Hons) spend their free time. And good luck to them too, as the results are very interesting.

Alec and Erna monitored program rentals to members of the Sinclair Owners Software Library for three months. The members were asked to rate the quality of each program they hired with a score of between 0 and 10.

Not a single *Spectrum* program appeared in the top ten, and only three in the top twenty, suggesting that the quality of *Spectrum* software remains questionable.

The highest rated program was something called, believe it or not, the *Fast One*. Ironically it was my colleague Inside Trader's joke about a program of this title that brought forth a threatening letter from solicitors acting for the perpetrators of *The Last One*.

Joint second place in the popularity poll went to *Mazogs*, *Vu-Calc*, and *Personal Banking*.

Membership of the Library cost £5 a year plus £1.25 for a fortnight's rental of any of the 200 cassette programs. Details from Alec Fry ARPS, FRSA, Heather Cottage, Warren Road, Liss, Hants. Tel: 073082-3832.

ARPS stands for Associate of the Royal Photographic Society.

Polly's Pancan



"Sexist caption: Pancan's Pretty Polly."

Do you know Steve Strange, post punk entrepreneur extraordinaire of the London glitterati?

Never mind. But if you are in London a visit to his Camden Palace is well worthwhile, if for no better reason than to study the amazing lighting.

Theatrical lighting has become a fearsomely complex subject, after being booted, kicking and screaming, into the 20th century by sixties psychedelic rock. It's not unusual for a lighting technician to have as many as a hundred lamps under his control, with perhaps 30 scene changes in a typical production.

Steve Strange's mastery of lighting state-of-the-art is achieved using an ingenious new microcomputer based system called *Pancan*. For years electricians monkeyed around attempting to make spotlights pan and tilt, without, it must be said, an enormous degree of success. Designer Peter Wynne-Wilson came up with an ingenious idea which has just won the Association of British Theatre Technician's Award as best product of the year. The *Pancan* is a motorised elliptical

mirror which attaches to virtually any stage luminaire, movement being programmed on a microcomputer.

To set up a scene yer actual stage Sparks moves the light beam using a joystick. Once it's in the right place, he punches a button on the controller and the position is recorded in the program. The exercise is repeated for each light that is required in that scene. Thereafter Sparks has only to press the 'Scene Change' button and the correct combination of lamps fade up, all correctly positioned.

Computers being anathema to stage unions, *Pancan* is described as a 'memory lighting system' by its delectable managing director, Polly Williams, sister of Simon (*the rotter in Upstairs Downstairs*).

"The software is so user friendly it practically takes you out and buys you a drink after the show," she says.

I think she should meet Gary Kildall.

Polly and Pancan are at Manton House, Marlborough, Wiltshire. Tel: 0672-53797.

by Julian Allason



Bring on the Dancing Girls



Dancing girls there were a-plenty at ACT's launch of their new range of *Pulsar* 16-bit software, writes our man in the front row, Martin 'Legless' Banks.

Clad in corsets, they were, and stockings, and ... (*Ahem, tell us about the software, Martin - Ed.*)

Who is the Ed person who keeps interrupting when I get to the interesting bits? The software? Oh yes the software. Well it runs on the *ACT Sirius 1* sure enough, and doubtless also on its other incarnation, the *Victor 9000*. Not that there was any mention of *that* at the ACT show.

Anyway the three hundred odd (and some of them were, believe me) computer dealers appeared to be enjoying the corsets, the stockings, the ... (*Ahem again - Ed.*)

Yes, well it seems that ACT have lumped in together under the Pulsar brand name, most of the standard business applications. Pride of place went to their new integrated accounting system, developed at an apparent cost of £1m as a series of interlocking modules comprising Sales and Nominal Ledgers, Purchase Ledger, Invoicing, Stock, Payroll and Data Analysis. The idea is that you mix 'n' match whatever applications you need and they all link together automatically to run as one integrated system. So a single entry should be all that is necessary to update the whole caboodle. Such well know packages as the *Wordstar* and *Select* word processors, *MicroModeller*, *MultiPlan* and *SuperCalc* forecasting programs, and *dBase II* database have also been packaged up for the *Sirius* under the *Pulsar* colours.

According to ACT's gvnor, Roger Foster, the new software has been designed to port across to other 16-bit machines. So versions for the DEC and IBM Personal Computers can be expected early in the New Year.

Having got that lot out of the way, let me tell you about the girls. The one I liked best, Sharon, comes from Wigan. During the course of a revealing interview she confided to me that she just loves dancing in front of men. "It's always nice to know you are appreciated," she purrs. "They all seem so interested in software."



How to beat the system

Let's keep this between ourselves, but I think I've found a way of beating British Telecom at their own fearsome game. In some parts of the country it's known simply enough as confuse the customer. Where I come from it's baffle the buyer, whilst in remote parts of Wigan, it's called puzzle the purchaser.

The rules seem to be much the same wherever you live. And what it boils down to is that by giving you, the customer, as little information as possible, you will not be in a position to make unnecessary work for B.T.'s sales department.

I've just discovered a book that tells you everything you could possibly want to know about telecommunications, and to be honest, a little more. It's the *Telecomms Users Handbook*, and it covers everything from what's available - and some amazing devices are - to data transmission, which is going to be of considerable interest to the likes of you and I in the not too distant future. Plus some interesting stuff on future Prestel facilities; such is the pace of development however, that several of those listed are already available.

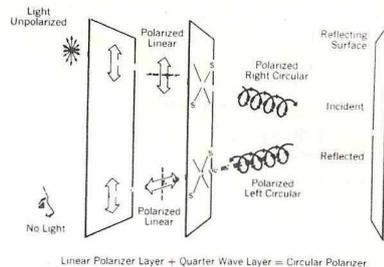
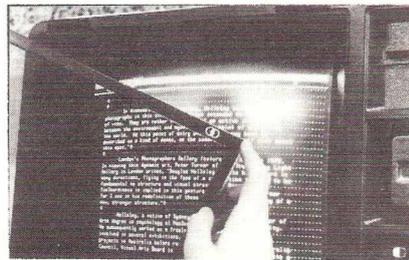
The Guide is a fund of useful information and advice. The Mickey Mouse telephone has, I learned, enjoyed a vogue with gay liberation communities. The Guide advises that 'potential customers should be aware that installations can be liable to misunderstanding in some quarters'.

There are also quite useful sections on such topics as word processing, although no mention is made of microcomputers in this connection. This is a curious omission since sales of word processing software packages suggest that 7 out of 10 word processors are in fact microcomputers!

It also contains the most comprehensive guidance on how to complain!

The 1982/83 edition of the Handbook is published by the Telecommunications Press and is available from bookshops or direct from them at 9-13 Queen Anne's Gate, London SW1. The bad news is it costs £20, but then when you consider how much of your time and money British Telecom are capable of wasting, it is probably a sound investment.

Boffin's Corner



Linear Polarizer Layer + Quarter Wave Layer = Circular Polarizer

The last time my friend Tubbins sent off for something to cut down screen glare, he received for his £12.50 about 40p worth of green transparent film and a roll of double sided sellotape.

Tubbins still suffers from screen glare.

But perhaps for not much longer. Cave & Tab Ltd of Northampton have struck a deal with the Polaroid Corporation, no less, to market their CP-70 Contrast Enhancement Filter.

I won't attempt to explain how it works; either you already understand the principle of linear polarity, or you are beyond any explanation I could muster. In any event I hope you will enjoy the splendid diagram they sent me.

To get your polarity adjusted, contact Mr. Cave & Mr. Tab at Tenter Road, Moulton Park, Northampton. Telephone 0604-47238.

You could save yourself a nasty dose of VDU syndrome.

Wordnet Links Typewriters

Journalists, who are often paid by the word, might be thought to have a vested interest in verbosity. Sometimes however, a story can be told in a sentence. This is one such:-

Up to eight electronic or golfball typewriters can be used to enter data to any CP/M micro at the same time.

That is it.

Now let me earn my keep by telling you what I have just told you, but at greater length, and thereby earn a crust.

The system is called *WordNet*, and it consists of a combined central processor disk unit and interfaces to connect virtually any electronic or golfball typewriter to any microcomputer running the CP/M operating system, or indeed to mainframe, minicomputer, or any terminal system supporting standard TTY communications.

Some bright spark (a *WordNet* employee perhaps?) has calculated that most information processing terminals are used for 80% of the time merely to input data. If that is the case, *WordNet* ought to appeal to any cost-conscious businessman equipped with electronic typewriters.

Apart from providing multiple input for microcomputers, the system also offers the possibility of networking up to eight typewriters. I am not sure how many people would make use of this facility in practice, but that is more of a reflection on the general unfamiliarity of the networking concept than it is on the *WordNet* system.

The idea of utilizing existing resources is attractive, but I suspect that much of the appeal will lie in the fact that it will be familiar, friendly, old technology that is on offer; in other words no staff retraining problems.

I had rather assumed that what the boffins had done was get MP/M, the multi user version of CP/M, up on a chip. Not so according to Godfrey Smith, *WordNet*'s marketing director. The whole thing runs under a proprietary operating system of their own, which simulates the CP/M file structure. Mr. Smith says it runs eight to nine times as fast.

In effect the central processor unit, which costs £2250, is itself a microcomputer minus the screen. That bit you provide! The interfaces cost £465 per typewriter. On the face of it that sounds expensive, but with all the typewriter functions to handle, they are inevitably more complex than, say an RS232 interface. As Mr. Smith (*sorry about that; our typewriter has a lisp*) points out, the unit cost is very competitive once you get several typewriters linked in.

Of course, if someone were to come out with a low cost printer/terminal and a multi-user operating system that was easy to use, *WordNet* would look expensive. Mr. Smith didn't sound overly worried when I mentioned the possibility however.

Details from him at *WordNet* UK Ltd, 78 Buckingham Gate, London SW1. Tel: 01-222-0592.



The two lovely black eyes sported by my colleague, Tommy, are the fruit of an altercation in the bar at the Compec exhibition in London last month. It was perhaps unwise of him to vouchsafe the opinion that the *IBM Personal Computer* was obsolete before it had even been launched with quite so many IBM enthusiasts present. Such nice quiet types they usually are too.

Unfortunately for Tommy there was no one from Mediatech at hand to lend moral, and perhaps rather more than moral support. For but a few yards away they were exhibiting a new computer that effectively underlined the very point Tommy was making when so rudely interrupted by that bunch of fives.

The *Eagle 1600* looks like the *IBM PC*. If you sit down and program it, the darn thing even feels like the *IBM PC*. But for one small matter. It is three times faster.

Lift the *Eagle*'s bonnet and the source of this supercharging is plain to see.

In place of the Intel 8088 microprocessor that drives the *PC*, is its big brother, the 8086, commonly described as a 'true' 16-bit processor. (*The argument that the 8088 is actually an 8-bit chip presently advanced in certain quarters was effectively demolished by Chris Preston, but the Editor fell asleep reading it, so the piece ended up on the cutting room floor; but that is another story*).

The intention is to develop the *Eagle* as a network machine, although no networking software appears to be built-in - yet. According to Mediatech, who are distributing it here, the *Eagle* will be able to support up to 64 terminals in due course.

For the present the operating system supplied is Microsoft's MSDOS, as used in the Columbia and other PC look-alikes. As we have noted on these pages before, MSDOS shows every sign of evolving into a network system eventually. Perhaps sooner.

The version of the *Eagle* unveiled to the enthusiastic boffins attending Compec, proved rather up-market, offering ten megabytes of hard disk storage, a single 780K floppy disk and 1228K bytes of RAM memory for £5500. To give you an idea of what that means, Mediatech calculate it as the equivalent of 6000 pages of double spaced A4 typing!

Two more models, with rather more modest storage capacities - and price tags - are likely to appear in a few weeks. In the meantime details can be had from Mediatech Business Systems, Woodside Place, Alperton, Wembley, Middlesex. Tel 01-903-4372.

Lunch with Colonel Sanders

Scriptwriters in search of a replacement for 'Dallas' could do worse than consider the saga of pioneer personal computer dealer, Mike Sterland.

My first brush with him occurred in 1977 when I tried to register the name 'Personal Computers Ltd'. "Frightfully, sorry, sir," murmured with Registrar of Companies, "but that name has just been assigned to a Mr. Sterland - a most extraordinary gentleman."

The extraordinary gentleman was soon dealing in the newly invented Apple II; indeed, Personal Computers was Apple's first U.K. dealer and soon their *de facto* distributor. It was not a position they were to hold long, Apple soon succumbing to the blandishments of Michael and

Stephen Brewer of the rival Micro-Sense company. Apple's handling of the matter, demonstrating the tact and diplomacy for which Californians are so celebrated, succeeded in enraging everyone; dealers were described as being in a 'negative gruntlement-situation'.

Despite this, and subsequent abrasion with Apple UK, when they in turn took over British distribution from the brothers Brewer, Sterland remained loyal to the marque. "It is a marvellous system with an unrivalled range of expansion possibilities. Anyway," he adds, "we would have been mad to abandon all the expertise we had built up."

Sterland, whose taste for double-breasted white suits and courtly old-fashioned manners

have earned him the soubriquet of Britain's answer to Colonel Sanders, is now at a crossroads. Personal Computers Ltd. operates from impressive offices in a former Rolls-Royce showroom at the heart of the City of London. "The problem is that we simply can't compete with discount merchants flogging machines from single room premises with next to no support." It is a problem that Apple's new sales director Keith Hall, a former Commodore man with a reputation for wearing a pair of brass knuckles under his elegant black gloves, has been trying to resolve. Since he took over more than a third of Apple dealerships have been terminated.

Fortunately for Personal Computers, who remain an Apple-

only establishment, Apple III sales have picked up nicely. "These are machines which are going to businesses who value the support which we can offer," observes Sterland's partner, Stuart Lakey.

Nonetheless it's rare for a week to go by without representatives of new computer systems to offer dealerships, and on ever-improving terms. Sterland has started a small corner shop operation to test the water, but for the time being, at least, Personal Computers Ltd. remains committed exclusively to Apple. "It is partly an act of faith, but then they are due to unveil a new range of computers in January," he says, giving the sort of wink that makes you think he *must* know something you don't.

by Julian Allason



After a flying visit by Microsoft's Bill Gates, it was inevitable that Microsoft's other terrible twin would hit town. JULIAN ALLASON talked to the man they call 'The Quiet American'

Gary Kildall, country boy from Pacific Grove, California, sat in his riverside suite at London's Savoy Hotel and considered Life, the Universe and Everything.

Life had certainly been good since that day back in 1974 when he had put the finishing touches on the operating system he had developed for Intel's newly invented 8-bit microprocessor. Control Program/MicroComputers he had called it. CP/M for short.

Since then more than a million people had bought microcomputers running it. Which made CP/M something of a standard. If not *the* standard. Indeed, whenever an investment banker asked Gary what his corporate philosophy was, which happened quite often these days, he always replied that it was to standardise microcomputer systems software.

Of course, with the pace of hardware development you couldn't stand still. The new 16-bit microprocessors hadn't caught Gary and his Digital Research company napping. No sir! They'd been ready with 16-bit versions of CP/M, and now he was about to announce something which make those little 16-bit chips sing and dance.

Concurrent CP/M they'd called it. A sure fire winner, and one that would teach those noisy folks up at Microsoft who was boss.

Concurrent CP/M would enable a single user to perform several jobs simultaneously. Print a file, enter information into a database, and receive electronic mail from a communications port, all at the same time. Why, an individual using it could even call up the directory without having to leave the concurrent program. Yep, he was real proud of Concurrent CP/M.

Of course, the present generation of 16-bit processors, like the 8088 used in the IBM P.C didn't really offer much more computing power. But they did hold out the promise of a lot more memory. On the other hand, you might just need it. Concurrent CP/M itself used up 96K of RAM, so without 256K to start with you would barely be in business.

Still, most users would be commercial and professional people who wouldn't begrudge spending whatever was necessary to achieve sufficient memory capacity. IBM had told him that

most of the P.Cs they sold were used as personal productivity aids.

Developing a product like Concurrent CP/M wasn't easy. Lordy no! Thinking back over the problems they had had with a previous product, MP/M, he had to admit they had learned about concurrency the hard way; but the result was real solid. The protections likewise. He had used it for a year without losing a single bit of data.

The 8-bit users were being taken care of too. He had announced CP/M Plus, the equivalent of Concurrent CP/M for 8-bit systems. It all went to provide an upgrade path all the way to networking with CP/Net.

The funny thing was that so much of the information and knowledge that helped him develop the CP/ family still came from micro hobbyists. Most people were unaware that there was an underground of groups, real enthusiasts, communicating computer-to-computer over telephone lines. Some of it was real sophisticated, but no standards. That was something he should attend to...

It was true that there were people who still criticised CP/M for not being user-friendly enough. Yet the latest versions were real affectionate. The problem was the two years it took between getting a prototype up and running in the lab and the public realising what was now available.

Take CP/M Plus for example. It included more intelligible error messages, a Help facility, and had an unmatched standard of documentation. Indeed, the manual now had an index!

But what of the future? These days he was spending 95% of his time working on the technology. No danger of *him* becoming a bureaucrat.

But the area that really interested him was the educational market - and he wasn't just thinking about kids either. Perhaps it was because his background was in education. He had, after all, been a teacher for 16 years. But it certainly represented a new direction for the company.

The thing was he felt so strongly about it. Teaching kids BASIC was not good for them. He couldn't help being sympathetic to educators who refused to teach them anything other than LOGO.

The kids got hooked on it because of the turtle graphics, and then they discovered that they

could learn just about any subject they were studying by using the LOGO environment.

He was sure glad to see educators taking a stand about it at last. He'd gone on record in 1976 as saying that he wouldn't teach his kids BASIC.

Perhaps he was just a country boy at heart.

CP/M Plus arrives

On his flying visit to London, Gary Kildall announced version 3.0 of the industry standard CP/M operating system. The new software, known as CP/M Plus is fully compatible with previous versions and the 3000 plus application programs available.

Kildall is convinced that 8-bit microcomputers are here to stay - thanks to this wealth of proven application programs.

CP/M Plus is intended to enhance the performance of 8-bit microcomputers with one or more banks of 64K RAM, and to make them easier to use. For example a Help facility is now included, which explains how the different operating system commands are used. Users also get the option of adding date and time stamps to files.

There is also a new feature that allows application problems to trap system errors, and then uses plain English messages to instruct users how to correct them.

Another welcome addition is an automatic disk log-in feature that eliminates the need to reset the disk every time the media is changed.

CP/M Plus will be available from this month.

... And Concurrent CP/M

Available initially for the IBM Personal Computer and look-alikes, Concurrent CP/M allows a user to interact with a computer as if it were several computers in one.

The user is able to go from one screen to another at the push of a key to monitor several operations running simultaneously. The software is compatible with the 16-bit single user single tasking operating system CP/M 86, and MP/M 86 which permits more than one operator to use a single CPU simultaneously. It offers file structure compatibility with all Digital Research operating systems.

A Typical application might have the user keying information into the database whilst simultaneously printing out a letter and receiving electronic mail via a communications port.



Just a country boy - Gary Kildall of Digital Research.

PARADE OF THE PORTABLES

Following the appearance of a giant in advertisements for a well known portable micro (to make it look smaller) the editor empanelled a commission of dwarfs and midgets to evaluate the latest crop of miniature microcomputers. JULIAN ALLASON sat in.

First system submitted for subminiature scrutiny was the Sord M23P, a diminutive device that would not have looked out of place on the desk of the Mighty Mekon.

Our chief dwarf had counted no less than eleven new microcomputers at the Compec exhibition, each claiming to be the first of a new generation. There can be little doubt that Sord have the strongest claim. For one thing the M23P was the first system we have encountered with the new 3-1/2 inch Sony type microdrives.

At present these offer 290K bytes apiece, but my colleague, Inside Trader, recently saw a double density version in Japan and was told that a one megabyte model was under development. Makes you wonder whether the present 5-1/4 inch disk isn't about to go the way of the 8 inch drive.

The other revolutionary aspect of the Sord is the 80-character by 8 line liquid crystal display. In fact, both green and white, and colour monitors can be plugged in to give an 80 character by 25 line screen display – ideal for business use.

The colour monitor supports high resolution graphics of 640 x 200 dots and – let there be rejoicing – a graphic language wherewith to manipulate them.

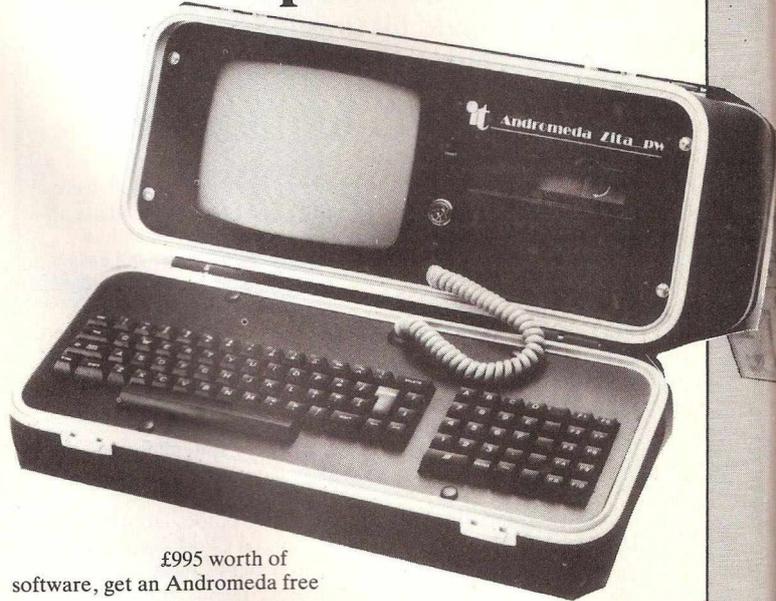
At 17-1/2 x 15-1/2 x 5 inches and weighing 20lbs., our panel voted it truly portable, by all but orthopaedic cases.

The 128K of RAM is handled by a memory mapped paging system, since the CPU is the 8-bit Z80A. BASIC is resident in the system, with FORTRAN, UCSD Pascal, and Assembler promised as options.

Ambitious claims are advanced for the PIPs software system, and ultra simple programming language, notably that the 'essence of office tasks are concentrated into approximately 60 commands'. Clearly further enquiry is indicated, and our trusty editor has been tasked to investigate. So watch this space.

Meanwhile, more details are available from Doug Sidle, Sord U.K. Ltd., Samuel House, St. Albans Street, Haymarket, London S.W.1. Tel: 01-930-4214. The prices by the way are £2060 with LCD display; £1560 without.

Free Computers



£995 worth of software, get an Andromeda free

Ever since the 7'6" tall Dr. Adam Osborne conceived the idea of giving software away with his portable Osborne 1, competing manufacturers have been striving to come up with an even better marketing ploy. One who may have succeeded is the British IT Computer Services, whose pitch is 'You buy the software – we supply the hardware free of charge.'

And it looks to be some of the best software around, with packages from premium software houses like Padmede, Intelligence U.K. and Sapphire Systems. Programs to the value of £995 would be accompanied by the

most basic model in their new Andromeda range, with a single 125K disk drive, 10" screen and 64K of RAM, all in a waterproof aluminium case. By contrast £1895 worth of software would warrant a system with twin 1 megabyte drives.

Details of this ingenious scheme and the maintenance programme from IT Computer Services, 173 High Street, Staines, Middlesex. Tel: 0784-63211.

Nonetheless, I suspect they may have their work cut out achieving their stated aim of putting Osborne out of business.

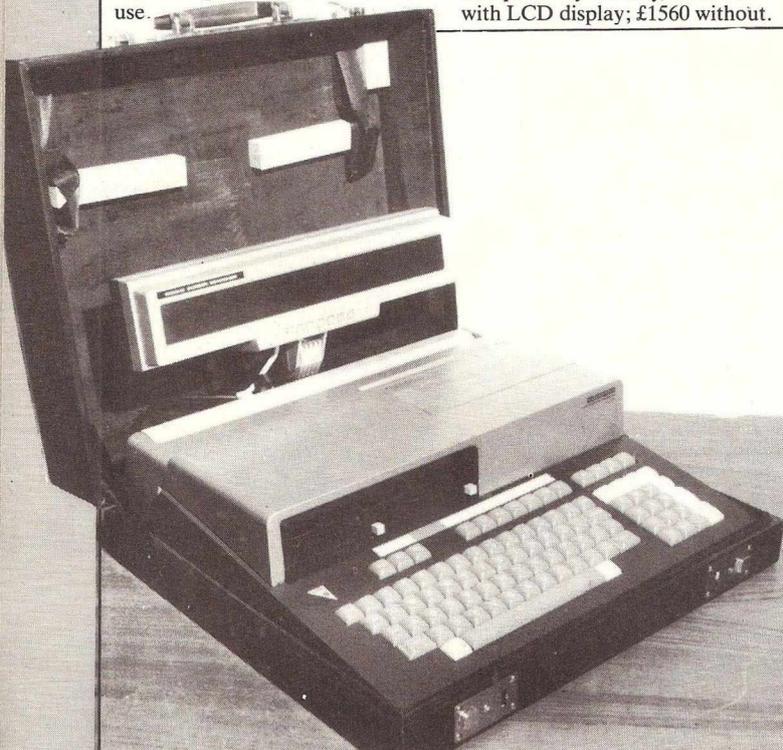
Fishy Story

You might reasonably enquire what a microcomputer is doing submerged in a tankful of piranha fish.

I did, and the answer was proving how robust the Husky micros is. Forseeing an invitation to put my hand in to recover it ("We feed them on rump steak actually") I moved on to safer topics. Like who could possibly want a micro rugged enough to resist attack by thousands of piscatorial dentures.

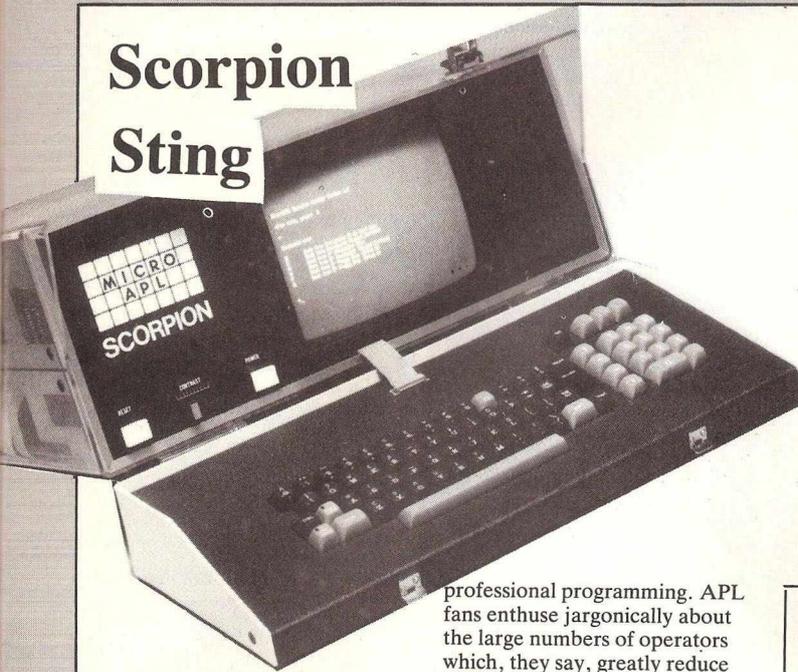
The Water Board, the Army and Parking Wardens in Droitwich apparently. (It is just conceivable that they were pulling my leg about the traffic wardens).

The particular appeal of the Husky as a data capture device is its large memory – up to 144K of RAM – portability and communications capabilities. IBM 2780 synchronous comms is a firmware option (if you don't know what that means, you don't need to), and is compatible with the Husky's BASIC interpreter.





Scorpion Sting



Our panel had to go and lie down after just reading the specification for the *Scorpion* from Micro APL. Billed as the world's first fully portable 16-bit APL microcomputer, its designers have managed to stuff up to a megabyte of RAM workspace, 10 megabytes of disk storage and a 16:32 microprocessor into a package the size of the best selling Osborne 1 portable. That is to say 20 x 8 x 16 inches, into which are also packed an auto adjusting power supply, high resolution 9 inch APL/ASCII screen, integral APL keyboard, which hinges open for use, and 5¼ inch hard or floppy disk drive.

APL, acronym for A Programming Language, is fairly close to FORTRAN and BASIC, and has something of a cult following in the world of

professional programming. APL fans enthuse jargonically about the large numbers of operators which, they say, greatly reduce the size of programs. How much of a demand for a micro version of APL there is remains to be seen. It's our bet that Scorpion may well create a resurgence of interest in the language.

The panel, some of whom had difficulty lifting its 29lb weight – and that was the lightest version – were unanimous in their admiration for the sheer density of features compressed into such a small space. Much interest was shown in the Irwin 10 megabyte hard disk with its own built-in 6 megabyte tape cartridge for back-up and program interchange.

A full blooded evaluation of the 'Computer Company's' APL 68000 interpreter and the MIRAGE operating system, was torpedoed by our panel's near-total ignorance of APL operations. However, our full size boffin

The keyboard is a Clive Sinclair-type laminate, and user-programmable to boot. The screen is one of Epson's 32 character by 4 line liquid crystal displays, of which we shall without doubt be seeing more and more in future. The whole is powered by the good old Z80 instruction set, so there is no problem supporting CP/M.

The memory protection appears truly squaddie-proof, with no less than three levels of batteries protecting the data! The standard 32K version costs £1983 one-off, with discounts available on quantity orders. Not cheap, but then how many micros would survive being run over by a tank? Or being put in one?

More info from DVW MicroElectronic Ltd, P O Box 135, 345 Foleshill Road, Coventry. Tel (0203) 668181



Husky, the piranah-proof computer'

reports that this is a multi user, multi tasking operating system permitting up to five simultaneous users, with software defined memory allocation and full RS232 communications.

The other feature which brought a beam to our boffin's face was the compatibility of the APL 68000 interpreter with IBM's VSAPL language standard, although the interpreter offers a substantial number enhancements.

With these sort of features the Scorpion was clearly not going to be a petty cash item. And at a starting price of £5,950, it isn't. Nonetheless, we suspect that Micro APL are going to be busy. Their address is 19 Catherine Place, London. S.W.1. Tel: 01-834-2687.

Tuscan Makers to Market Midget Micros

"Morning Squire, interested in a pocket computer, are we? Would that be hip pocket or breast pocket?"

Such a conversation will be not in the least fanciful from the end of this month when those ever-enterprising entrepreneurs Nigel Stride and Graham Clifton open Britain's first portable computer shop. Likely lads Graham and Nigel plan to offer no less than ten such gizmos ranging from the merely portable, through pocketable to the walletable. By which I mean small enough to fit inside your wallet – in place of the one hundred greasy oncers they are likely to cost.

When I paid our two Yorkshire-born friends a visit at their Theobalds Road, London headquarters, I found them deep in discussion over the thorny question of whether the *Osborne I* qualified as a truly portable computer (*Yawn, not again!* – Ed) and whether to take up a dealership. The other goodies on offer will include the cigarette packet-sized *Sharp PC1251* (see separate story), that being a pack of 10 cigarettes! Those with a yen for a portable word processing facility will be able to try out the new *Epson HX-20* which has a full sized typewriter keyboard, 20 character by four line display, printer and micro cassette storage built-in (more on my adventures with this wonderbox elsewhere).

Come May time, Graham and Nigel reckon to have Sony's long-

awaited, and much delayed, *Typewriter*, otherwise known as the commuter computer, on account of its suitability for use on aeroplanes, hovercraft, dirigibles and possibly even London Transport. Rumour in the divine shape of debugger-in-chief Katina has it that, that an even more amazing machine will be unveiled at the opening of the shop. Close interrogation of our deep cover sources – the lovely Katina again – suggests that this will be the hitherto secret TeleRam computer of which few details are at present available. Clearly further probing is indicated.

Nigel and Graham's names may already be familiar to you as the onlie begettors of the *Transam Tuscan*, and before that the *Triton* (*never heard of it* – Ed). Transam have built up a tidy business



providing the one commodity most other computer manufacturers wouldn't touch with a barge pole, namely software support.

Their willingness to develop tailor-made applications for specific applications has won them a steady business from hospitals, Government departments and large companies needing to standardise on a British system but with a rather specialised software requirement. Much of Transam's current business comes from customers such as these who have a multi-user requirement; their top-of-the-line system is based on MP/M.

"We may not be able to compete with the glamour of the Olivetti's of this world," says Stride, "in fact, the Tuscan looks like a Sherman tank. But if it is multi-user you need, our system is tried and tested and support is available."

Nonetheless I can't help thinking that in a year's time the portable tail could be wagging the Tuscan dog.

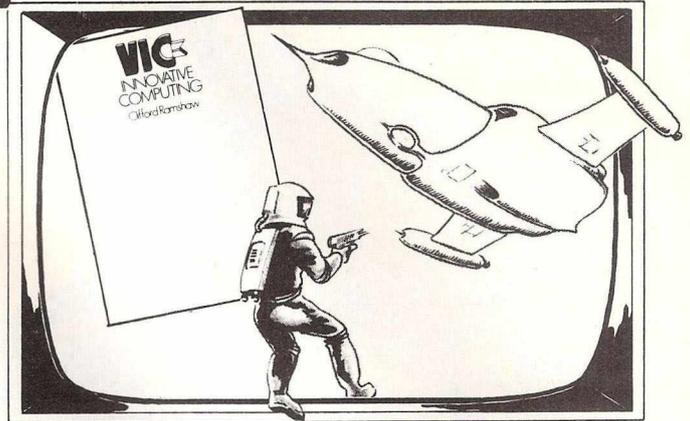
P.S. A further session with Deep Throat reveals that the portable TeleRam computer has an 80 character by four line liquid crystal display(!) and a full typewriter keyboard. The CPU is a CMOS Z-80, with 64K of bubble memory expandable to 256K. The batteries have a life of five hours continuous use. Price in the US-\$2795 (about £1700).

Tonight on your micro



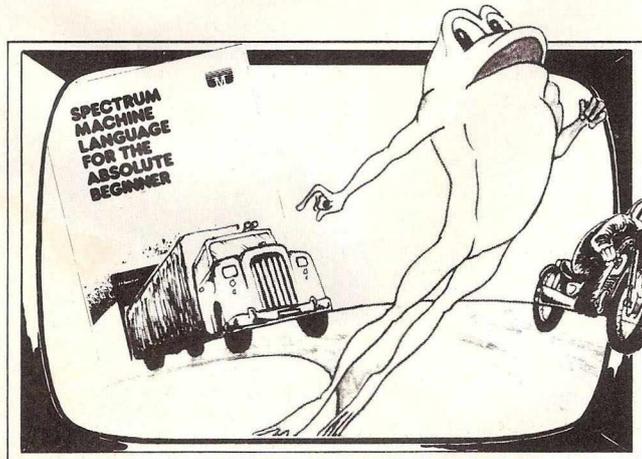
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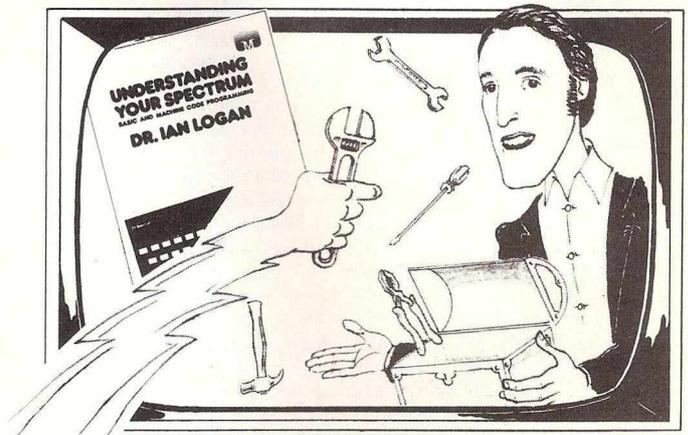
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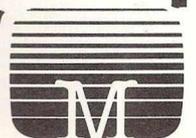
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meet the manufacturer ...

Guy Kewney finishes off his lightening sketches of the computer manufacturers with a look at IBM and The Rest.....

IBM

People like to talk of IBM as 'Big Blue' because it is a big company, and used to sell blue computers. This has been refined to say 'blue whale' by at least one journalist with a sense of humour.

But there is absolutely no resemblance between IBM and a harmless Leviathan blundering around out of its depth amongst the fast-moving predators.

Really, the closest thing to IBM that moves under the water is the mythical submarine in the 'Illuminatus!' books by Wilson.

And IBM reminds me less of the submarine than it does of the conspiracy of the Illuminati. It is, above all, a conspiracy of the superlatives, a freemasonry of excellence, an internally friendly, intelligent pyramid.

For as long as anybody has known the giant corporation, it has been the leader, able to take its pick from the best people who wanted to work in the computer business.

You can find companies where the very attractiveness of the organisation eventually destroys it.

What often happens in that case is that people are prepared to work for relatively little reward, in a firm which they admire.

There are some perfectly ordinary people inside IBM...intelligent, talented, but people who would never rise above divisional management in most computer companies. They tend to be receptionists, truck drivers, doormen, and the like, in IBM.

Am I starting to make IBM sound a bit scary? Good, because it is.



IBM - 'a freemasonry of excellence'

The company, however, has at its head some 'sharp' cookies who think they would be very soft to pay high salaries when they can get the best for rather lower than normal. So they hire green whizzkids, and refuse to increase their salary according to the market...and so they lose them. IBM doesn't lose them, not, at least, for want of paying the right rates.

IBM keeps its whizzkids, and fosters them. When they turn into elder statesmen, it even has a

method of turning them into Dons...it calls them Fellows of IBM...who are paid to sit and think and talk and investigate their own whims.

There are people who don't like working in big companies. But if you meet

somebody in a big company that is not IBM, and who is pretty good at his job, and he tells a tale of turning down an IBM offer, you can safely dismiss him as somebody who made the short list, but was not accepted. ▶



Nascom

Perhaps you have met somebody in a wheelchair...somebody with tremendous vigour, a cheerful outlook, drive, determination, and no apparent sense of lacking anything that you have...and have later found out that this person used to be a world class athlete.

That is the feeling that you should have when you meet Nascom Microcomputers. It makes a range of machinery based on the Z80 micro, capable of running CP/M, and with a wide range of interesting software.

There are supposed to be 30,000 users of that system in the UK, judging by past sales. It's impressive, until you come to realise that there were 20,000 some two years ago, when there was almost no other micro with a quarter of that size of market.

Nobody has ever written the whole story of what

happened to Nascom and why it turned from the great white hope of British microcomputing into a subsidiary of a midlands electronics firm, Lucas.

Part of the story has to do with careless financing, part of it has to do with unmanageable managers, scapegoats, and premature publicity. There are also endless rumours of darker things from till-fiddling to industrial sabotage.

Today, a beginner meeting Nascom would say: "Hm, that's an interesting company, making an interesting product. I'll consider it."

The rest of us remember when it was the first microcomputer for public sale with a proper keyboard, the first microcomputer that could display its output on an ordinary television screen, and the first screen-based system for less than £200.

We tend to try to change the subject.

Transam

English vicars come in a wide range of personalities. Some of them are devastatingly intelligent, but somehow seem totally suited to preaching to a small, faithful congregation in a small, cosy church.

Ah, you've guessed what I was going to say!

Now I must emphasise that Transam is not a small-time bunch of good-mannered vicars. The people there include some who are like that, but there are also several who are decidedly un-vicar-like.

Nonetheless, the users and Transam itself seem to be stored in my mind as a small parish and its worthy clergy. The locals know them for devout and holy men, and constantly go to them for advice and support...but outside the small village, they remain unknown.

Transam's directors started life in a small components store in North London, and expanded steadily, slowly and without spectacle from there.

The Tuscan is a design which follows the design behind the Apple in being a single board system, with cardslots into which expansion modules can be plugged. IBM has followed this design, too. The Tuscan, like its predecessor, will be slow to go out of date. But unlike the Apple, and the IBM machines, I suspect that the Tuscan will never be a world-beater. Its authors do not believe in beating the world, or bringing the world's money-lenders into the temple. They tend their small garden with care, and accept what little excitement there may be in the parish.



Nascom - 'Great White Hope'

Transam - 'devout and holy men'

Shelton

"I have discovered, over the past few months, that the computer business has very little to do with the business of designing computers."

Thus a rather disillusioned-sounding Chris Shelton, inventor originally of the Nascom design, and subsequently of his own ingenious ring-based Signet system.

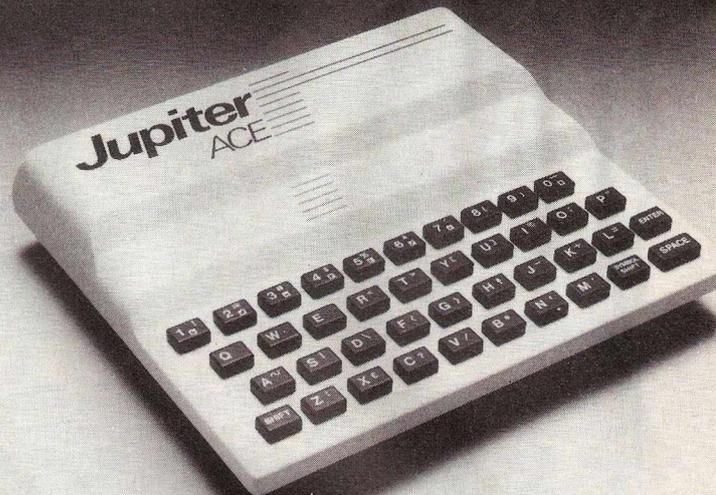
Shelton sensibly sell the Sig-Net as if it were just an ordinary CP/M system. It is in fact a uniquely well-designed multiple processor architecture (unless it one day turns out to have fundamental bugs in the design) which lets additional systems get stacked on top of each other.

Let us hope Shelton persists in his struggle to overcome the confusion of

external finance, factory organisation, marketing, lobbying and other games which get between the world and his ingenuity.



Shelton - 'ingenious'



Jupiter Ace - 'may even survive'



Oric - 'strange beast'

Rest

In the next few months, we will hear of the arrival of a series of unlikely machines.

Dragon Data, formerly known as just another bit of Mettoy, has been turned into a proper computer company, and will no doubt develop a character of its own. May be it will also develop a computer of its own, too.

Oric, a strange beast produced by the union of British Car Auctions and Tangerine, will be trying to become famous. It may succeed...only time will show whether it adapts to stardom well.

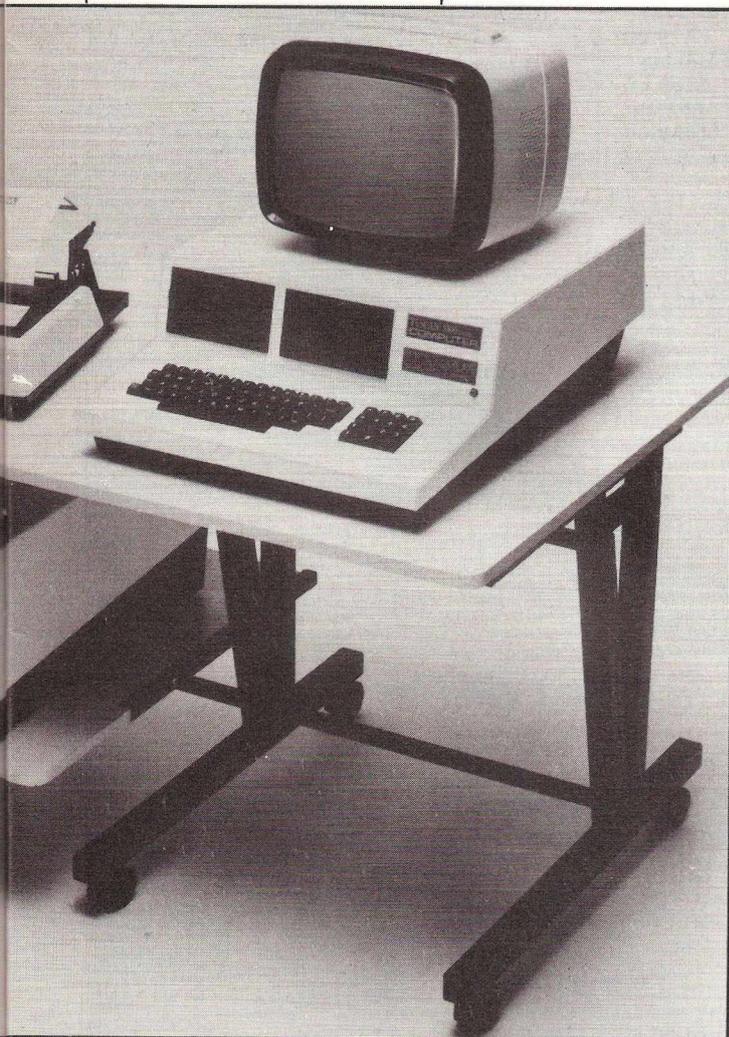
Jupiter and the Ace may even survive, although since we're discussing my

opinions for the moment, I have to be honest and admit that I will be a bit surprised if they do in their present form.

Computers, if it really does launch the Lynx, and if people really can run CP/M software on it, and if they can also put good games on it, could turn into a real business. But it's all too soon, still, to be sure.

Murphy, in his all (non)-wisdom, has decreed that the computer supplier I have forgotten to mention is exactly the one which most urgently needs to be presented to you.

No apologies are necessary for leaving that one out, of course. Murphy does control things round here.





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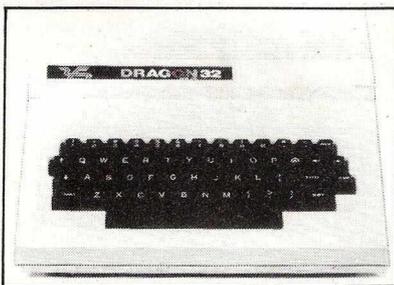
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THE NEW COMMODORE 64

The incredible new computer from Commodore comes with 64K RAM fitted! Plus 16 colours, hi-res graphics, 320 x 200 pixels, 40 columns by 25 lines, Z80 micro processor can be added — that means you can run CP/M software, 8 independently movable Sprites with collision detection, and a sound generator with 3 voices, 4 waveforms, envelope and filter to rival some dedicated music synthesisers. And all this at the most incredible price ever. (AF56L) Only £339.00

DRAGON 32



The amazing new British computer with a full-travel standard keyboard, a 16-bit microprocessor, 32K RAM fitted (expandable to 64K and later to 256K!!), 9 colours, hi-res graphics and Microsoft extended colour BASIC (the very best BASIC to learn with). It can be used with virtually any ordinary cassette recorder, it has a printer interface (Centronics-type), joysticks are available and it's incredible value for money. (AF57M) Only £199.50

THE AMAZING ATARI COMPUTERS

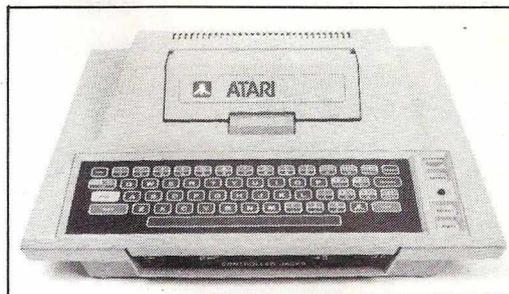
- 4 Consoles Available:**
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For full details ask for our hardware leaflet (XH54J) SAE appreciated

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An independent users' group. Four issues of the club magazine for only £3.00! Address your subscription to Ron. Issue 1 of the club magazine featured a tutorial on character set redefinition and contained a collection of demonstration and games programs and lots more. Issue 2 featured a tutorial on player/missile graphics, an article about graphics on computers, a selection of members' contributions to the program library and much more.



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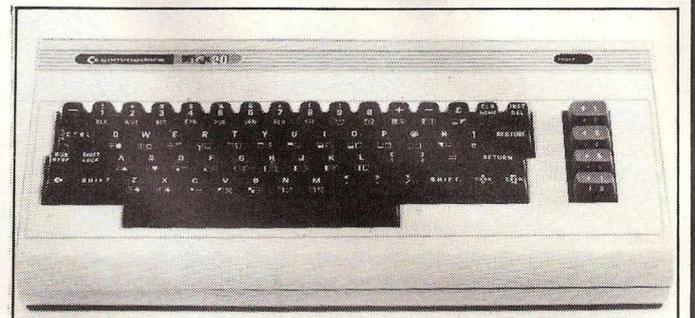
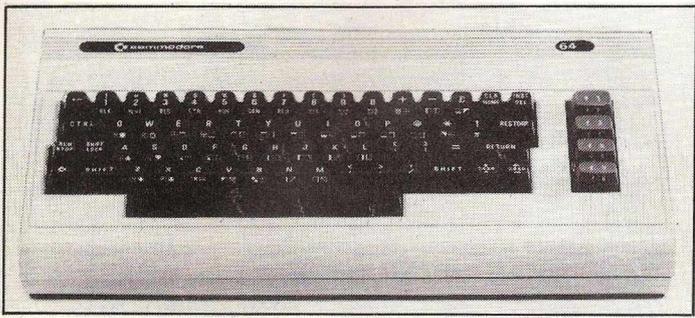
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Dragon 32 computer hardware

(Subject to approval
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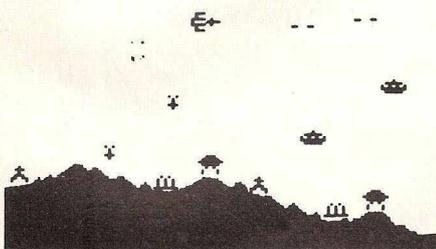
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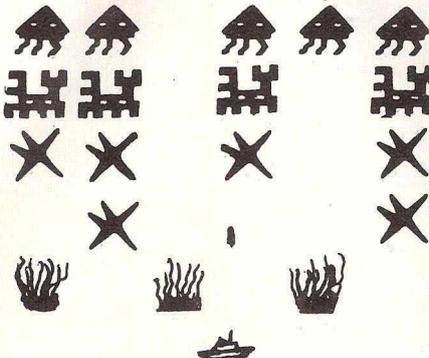
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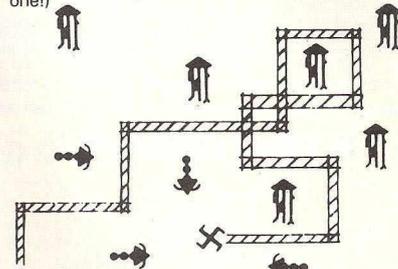
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"A real action shot of the game"

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Richard looked at me levelly as he waited for his coffee to cool. "I think you should be marooned on a desert island," he said. He continued eyeing me in a calculating sort of way. "Yes," he continued in considered tones, "that'd be a very good idea."

Now Richard Pawson is this magazine's editor so I do tend to listen with slightly more than half an ear when he speaks. And it seemed to me he'd just suggested I be stranded on some distant coral atoll.

I smiled brightly. "You know what, Dick?" I said (I always call him Dick when I want to irritate him). "It sounded just like you were saying I should be cast away on some South Sea strand."

The tiniest of furrows appeared on his otherwise smooth brow. I've always wondered how he manages to edit a monthly without looking haggard like most of his writers. Lots of fresh air and clean living presumably.

"That's exactly what I was saying, Terry!" Though apparently irked by my inability to see in a second what he'd said, he still gave every appearance of an editor warming to his theme. For a writer, that's not dramatically different to storm cones going up at Dogger Bank.

The Ever-patient Pawson!

He put on that expression he uses when he's got a senseless scribe on his hands. "We could do desert island disks, you see!" he said winningly.

"Ah, Roy Plomley and the BBC. Got it! You're thinking of starting a record review section!" I tried hard to keep the disbelief out of my voice. How did I ever come to work for this guy? He was getting more weird each month.

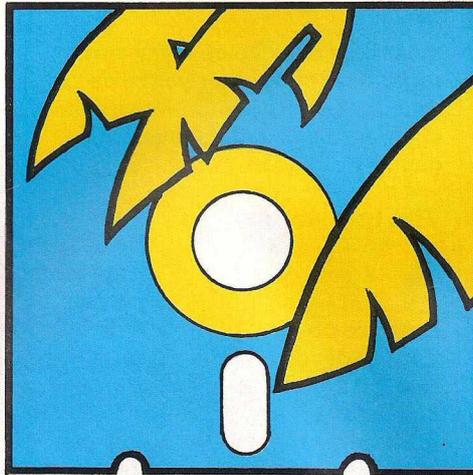
The effort Richard made to retain his balanced editor's poise was remarkable in retrospect. Maybe his warm and friendly smile slipped ever so slightly but not so's you'd notice.

"No, Terry." It seemed to me he was enunciating with great care. Maybe that was because his teeth were gritted. "If you'll just let me explain, I'm sure we'll both see what I'm driving at."

I undressed another pair of sugar lumps, dropped them in my coffee, and stirred the result with care. The spoon nearly stood up by itself. Just as well - it looked like it was going to be a long day.

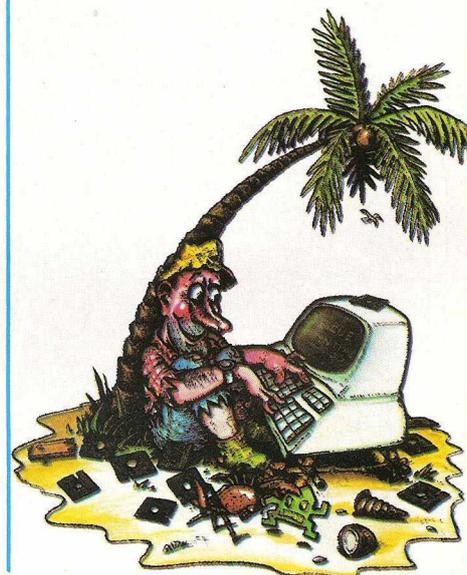
Hope, The Ancient Mariner

"What we'll do is this," he said. "We'll



DESERT ISLAND DISKS

Terry Hope, Cast as Robinson Crusoe in MicroComputer Printout's Christmas panto, describes his software choice if stuck on some sandy strand!



pretend ace Atari author Terry Hope is mysteriously marooned on a desert island somewhere. It's uninhabited and thousands of miles from civilisation. There's food and water but many months of isolation loom before rescue might arrive." Luckily Terry knew the ship was going down and managed to clutch his computer, disk drive and a dozen or more disks before seizing a spar and swimming to safety. See the scenario? A Really Rare Review of the Prized Programs Terry takes to Beat Boredom!

Richard paused for breath. I get terribly suspicious when he gets alliterative. It usually means he plans to write something himself instead of having a hack hammer it out.

"Great idea, Richard! Fantastic! I can do it, I can do it!" A thought struck me. "What about power supplies? This island won't have electricity, will it? How am I going to plug my computer...."

But he'd moved on and was already bending attentively over the proofs of Julian Allason's monthly column, changing a word here and cutting a phrase there. Perfectionist, that's what Richard is. Amongst other things.

Under a Shady Palm....

So here we are, folks, sitting cross-legged on the beach in our frayed and cut-down denims, palm fronds waving overhead, anachronistically wishing you all a merry Christmas in our January 1983 issue.

The question we're going to tackle is this: which, in our opinion, would be the perfect programs to have with you if you got cast away from months somewhere!

"Programs that won't pall" is a good criterion to use. Software that seems sensational at first sight can go stale quite quickly.

That's why I thought carefully about the choice. After all, you might just want to use my ideas for last-minute Christmas shopping (or even a New Year gift) to treat yourself or someone else! I'd hate it if there were recriminations later!

And in spreading the net wide, I've kept as many micros in mind as possible. Many of the items you'll find described here are available in several versions for different machines.

Where I know it for a fact, I've said so. If I haven't, and a program takes your fancy, it's still worth checking. A man gets out of touch on a desert island!

Where do I Begin?

So, in the words of the popular song, where do I begin? Like it or not, available software can be loosely divided into two piles. The first pile can be labelled 'games' and the other pile labelled 'the rest'.

I shouldn't stand too close to the 'games' pile – if it falls over, you'll be crushed to death! For that's a fact, is it not: the wonder of a computer in every home seems currently to be centred on games-playing.

However, I'm not, repeat not, knocking games. Far from it. In fact you'll go a long way before you find a more devoted games player!

It's just that I have this one reservation. With games being as popular as they are, every programmer and every software organisation is rushing to get on the bandwagon. That's leading to some right old rubbish jostling elbow to elbow with some brilliant material.

With that seething sea competing for your hard-earned pounds, your problem is a tough one: when you're in the dealer's shop, how do you tell if the game that looks good there won't be a crushing bore after 24 hours at home?

It's always a difficult decision, but I mentioned seething seas and that reminds me! I'd better cease this editorialising and get back to my island and my careful choice of desert disks and castaway cassettes!

Games for a Start

For obvious reasons, I'll start with games because if they're good, they'll certainly pass the time if you're marooned. 'Pass', notice, not 'waste'. A good game not only passes the time – it's also creative and constructive, whether it's a so-called 'arcade' game or another in the genre.

Some arcad games can quickly pall, but there are others that don't rapidly become numbingly familiar. Some, of course, enter the 'Arcade Hall of Fame', becoming classics as they slide slowly out of fashion.

I've chosen a number of arcade games with which I'd be happy to be cast away, but none of the classics, I fear. 'New, new, new' is the in-description for all arcade games and if I'm going to be stuck on some sandy shore I want to be sure I've got something to learn and overcome.

Which brings me to the other coral isle possibility: the non-arcade game. Here there's really only one choice for a software 'man Friday', apart from endless games of computerised chess, draughts and Othello (or Reversi, as some makers cutely call it).

The choice, my friends, would have to be 'adventure' games. And if we mention 'adventure' games, there's

again only one choice in my view, regardless of whether you're on an island or in your lounge. What's that choice? Any one of the Interlogic games from Infocom.

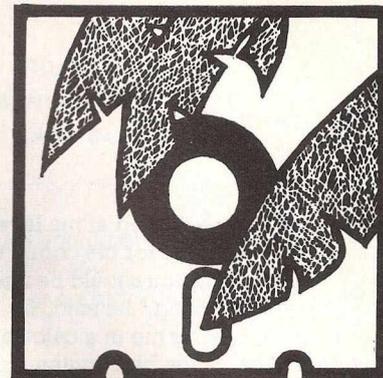
The Incredible Zork

You may or may not have heard of Zork – or any of the Zorks more correctly, for there's now a software trilogy: Zork I, Zork II and Zork III. If you have, you'll know the original Zork I was hailed in 1981 as 'the finest adventure game produced for a microcomputer'.

You'll also know Zork has a strange fascination – some sort of in-built charisma that makes it hard to end a session once you've started. Notice I say 'session', for you're not likely to complete any of the Zork games in a single sitting. Ideal for a desert island, eh?

The package for each Zork says '35 to 40 hours playing time on average'. I find that embarrassing. I've been wrestling with Zork II for weeks now and I'm about three-quarters of the way through!

This isn't the place to explain the ins and outs of computer adventure games. Be warned though – if all you ever want from your computer are hi-res graphics and spectacular action, look elsewhere. Zork gives purely verbal descriptions on your computer screen of strange and mystical places, events, happenings and people. You're in the middle of them though, and what you do affects what they do and what happens to you. And it's compulsive!



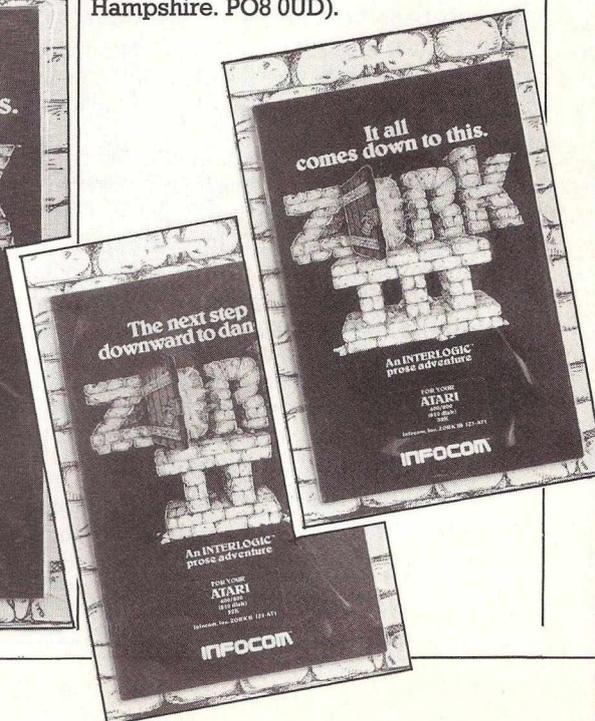
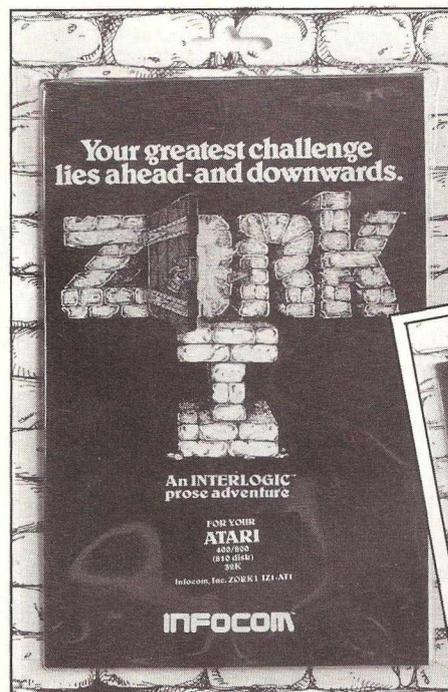
The big difference with Infocom's Interlogic games is the player's ability to type virtually anything as an instruction. You're not limited to one or two word commands. If you want to enter 'PUT THE BRICK IN THE BOX THEN THROW THE SWORD IN THE RIVER', you can!

Zork I, II and III are available for any number of micros, including Apple, Atari, the IBM PC, TRS-80, Commodore, NEC, Osborne, CP/M and DEC. You'll need an average 32K or more memory and a disk drive is essential because each Zork comes on one disk to which the computer constantly refers.

My only regret on my island is the length of time it'll take me to get in touch with the Zork users' Group. This is an organisation entirely separate from Infocom Inc, set up to help and advise stranded adventures. Such is the hypnotic power of Zork that such a group lives and flourishes!

There's now a UK off-shoot to save British Zorkers in trouble writing to the States, but I'll need to send them my cries for help sealed in a bottle and cast into the sea!

(Tip to save you writing to *MicroComputer Printout*: for non-marooned but otherwise lost UK Zork players, you can reach the UK Group at P.O. Box 12, Waterlooville, Hampshire. PO8 0UD).



DESERT ISLAND DISKS



A LOCKED DOOR. A MURDER.
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DEADLINE

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First of the INTERLOGIC™ Mystery Series from Infocom

'Deadline' and 'Starcross'
Remembering I'm going to be marooned on this pesky island (a pestilence on Pawson – doesn't he know I'm allergic to coconuts?) and time might hang heavily on my hands, I'm going to cheat shamelessly.

How? By tucking another two Infocom games inside my life-jacket, hoping the salt water won't affect them as I paddle to safety through shark-infested seas (games designers, note: you could have a concept here!) Infocom have produced only five games in two years and 'Starcross' – the most recent – just appeared. That gives you some idea of the time they spend perfecting each one!

The two non-Zork games are 'Deadline' and the aforementioned 'Starcross'. They're both 'adventure' games too, 'Deadline' being remarkable in that you're given a complete crime dossier of photographs, statements, fingerprints and artifacts, along with two game disks.

Your job? Solve the crime in the 12 simulated hours the computer gives you. You can interview all the suspects, ask any questions, go anywhere in the mansion which was the scene of the crime, and call for an analysis of anything you find. If you study the evidence supplied in the pack, do the right things and ask the right questions, you'll beat the 'Deadline'.

That's all very well, but as far as I'm concerned, I want the time I'll get on my island to give it the attention it deserves!

'Starcross' is Interlogic's first outer space 'adventure' but otherwise the style is the same: involving you directly in a fantasy world. The packaging isn't the same at all – it's the only software game I know that comes in a white flying saucer measuring 12" across! You won't miss it if you see it in your favourite dealer's shop! Having thus protected myself against several months of isolation, let's have a look at a clutch of 'arcade' games that'll challenge more than the odd moments as the sun sinks slowly in the west.

'Choplifter!' and 'Track Attack'
These are both from Broderbund Software, one of the acknowledged leaders in the American 'arcade' game market. I'd very much want to have these two games with me on my island.

They're both incredibly clever and currently available for Apple and Atari. They're on disk only and you'll need 48K of memory for 'Choplifter!', 32K for 'Track Attack'. Regardless of machine, the graphics are dazzling and the game concepts are superb.

'Choplifter!' has you flying a helicopter round a 3-D landscape, doing your best to rescue little men who've been incarcerated by baddies. Manic tanks, suicidal jets and diabolical aerial mines make your job tough, tougher, and near impossible.

The feeling of actually flying a helicopter is extraordinarily real, the poignant waves of the teeny figures as you fly off without them are heart-rending, and I rate it highly as an arcade game that's likely to be popular for a long while before graduating to the 'Hall of Fame'.

'Track Attack' is entirely different. You drive a reinforced motor car, capable of busting through train coaches loaded with gold as they chug busily round a track. Naturally this wins you the gold, and all you need to do is stop the phantom nightwatchman, who drives a beat-up old auto, from taking your loot back from your stockpile.

If you're brave (and good) you can zip through to stage 2 of the game, which has you lithely leaping from carriage to carriage, heading for the engine. If you make it without falling off and getting squished under the wheels, well done – you've reached 3! Now you drive the train, picking up gold nuggets!

'Action-packed' would be a fair description, and the disk has the pleasant bonus of actually saving the latest high score from session to session.

I've played both games endlessly and I'm not tired of them yet, so I'd certainly take them with me into isolation!

Catering for Culture: Micropainter

However, it's clear I can't sit endlessly on a beach, simply playing games to while away the time. Though, come to think of it, I don't see why not.

There are never enough hours in the day at the moment to sample all the microcomputer delights bustin' out everywhere. It'd be heaven to lounge by some lagoon, languidly loading first this game and then that.

But I'd feel guilty, I'm sure of it. Don't we all when we're enjoying ourselves! So, I need to carry some creative culture to my coral cove. My choice would be 'Micropainter' from Datasoft because - snicker, snicker - it's not only creative, it's also a lot of fun.

There are quite a few programs around now that set free the latent artist that's in us all. For my money, 'Micropainter' is one of the best. It's on disk and runs on an Apple or an Atari with 48K (how I ever manhandled all that memory up the beach I'll never know!), and with it you too can create a masterpiece.

Just the job for all those tropical sunsets I'll be enjoying!

It gives you Draw, Line and Fill features in all the colours your micro can manage, and a lot more besides. The colours can be solid or textured, for instance, and you can use single colours or a mixture of any two.

'Micropainter' has the most extraordinary 'microscope' device too, for the little fiddly bits in your creation. Touch a key and the bit of the screen the cursor's on suddenly expands to fill the entire picture, cursor and all. It's a remarkable effect, and permits some very fine touching up.

The disk comes with a number of

uncoloured pictures for practice or fun, and a stunning half-finished rendition of Einstein, made up entirely of tiny spots of colour. It must have taken weeks to do!

All in all a great program to have on a desert island where the castaway can give it the time it deserves.

Open an Arcade - We may not be Alone!

Back briefly to games. In my forward planning for this surprise Polynesian imprisonment (logic students detecting a paradox in that can go boil their heads!), I had to face the fact that I might not be the island's only human inhabitant!

Now while it should be great to have a real-life man Friday, we must be sure to get him on our side right from the word 'go'.

And what better way of doing that than ensnaring him with two genuine arcade games - games which first saw the light of day in real live arcades, only later being released for the slaving home computer market!

I've no hesitation at all about my choice: I'm talking 'Frogger' and 'Wizard of Wor'.

Miraculously, 'Frogger' runs in 16K and comes on either cassette or disk for Apple, Atari and maybe some other micros. It's Sega's arcade original, down to the last female frog, snapping crocodile, untrustworthy otter, and lurching log. It's been copied almost as often as Pac-man but nothing equals 'Frogger' itself.

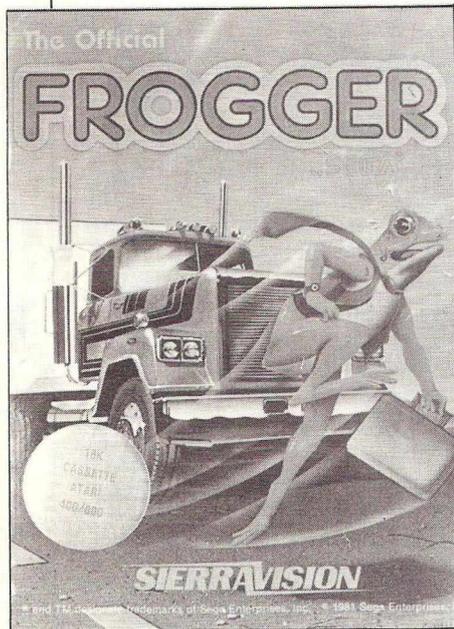
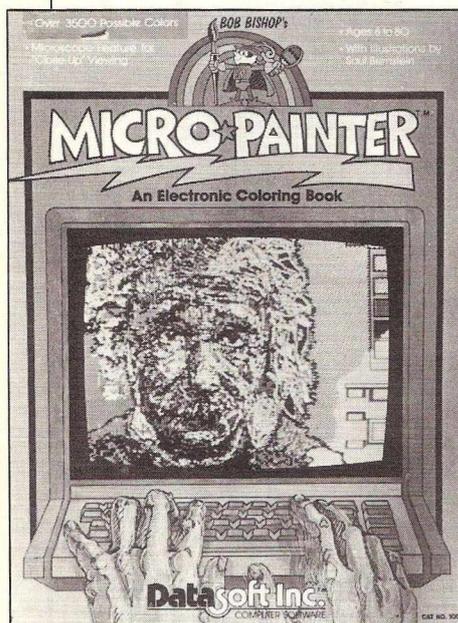
It's licensed by Sega to On-Line Systems, one of the more prolific of the home micro games producers, and is now presumably making a fortune for both corporations!



Descriptions would be pointless - there can be few who haven't seen it in their favourite arcade, pub, club, bar or any other place where more than three people regularly congregate. A true classic, still vastly popular, and a natural to ensure the allegiance of my man Friday!

'Wizard of Wor' is different altogether, though still an arcade original that's taken (and is still taking) millions of 10p pieces, quarters, yen, francs, and coins in several dozen other currencies.

It's from Midway, a very big name in pinball and electronic arcade



DESERT ISLAND DISKS

amusements, and the translation to micro is licensed to Roklan Corporation, a fast-growing name on the home game scene.

Again it's available for Apple and Atari (funny how those two names come up time and time again!), with watered-down variants that'll run on other machines.

It's almost impossible to describe, but if you can imagine a cross between an animated adventure, a complicated maze game, one of those shoot 'em up killer robot affairs, and Space Invaders played on the ground, you've got a fair picture.

Add in brilliant colour, spectacular graphics, far-out sound effects, sweaty palms as the baddies close in, and all sorts of bonuses for doing the right things at the right time, and you've got 'Wizard of Wor'.

My man Friday, assuming he's there, will be entranced. Either that or he'll run a mile at the ragged stranger's magic!

Sam - A voice to keep me company

But what if there's no man Friday? Not a single human voice to break the keening of the gulls, the sighing of the surf, and the odd 'bonk' as an over-ripe mango falls to the ground.

Never mind the mangoes - it'll be Terry that goes bonkers at the sound of silence. There's a solution though - I'll make sure my computer can chat me up!

How? By being certain that I've got SAM with me. SAM, I'm sorry to say, stands for Software Automatic Mouth but never mind the dreadful acronym - SAM talks (and very well too) with nothing but the computer's memory to help him along.

No diddy little boxes, packed with processors and perched on the side;

no difficult extra power supplies to manipulate; no loudspeakers other than the one in your TV monitor. SAM loads into your micro and does all his talking from there!

SAM's available for Apple (you'll need a plug-in card) and Atari (you'll only need the SAM disk and 24K of memory). Sorry, it's not my fault if most of the best software comes out for these two machines!

Once SAM's been loaded, his vocabulary is quite literally endless. He will say absolutely anything you want simply by typing the necessary words and pressing return.

The words can be in ordinary everyday English or, for an even better effect, you can spell your requirements out with phonemes.

SAM even comes with a generously-sized English spelling/phoneme spelling dictionary (education note: the phoneme spelling of 'xylophone' is zaylowfown' - bet you always wanted to know that!)

SAM is therefore a must on my island to make sure I'm never alone!

Getting Organised: Atari's Home Filing Manager

Now I know it sounds stupid, but I'd certainly want to have Atari's Home Filing Manager along. It's very new but now I've used it, I can't conceive of being anywhere - not even a desert island - without it.

Why? Because it's the cutest, fastest, easiest database I've ever used. Don't expect anything big and spectacular. Do expect a database that uses Atari's graphics to the full and one that's packed with very neat tricks.

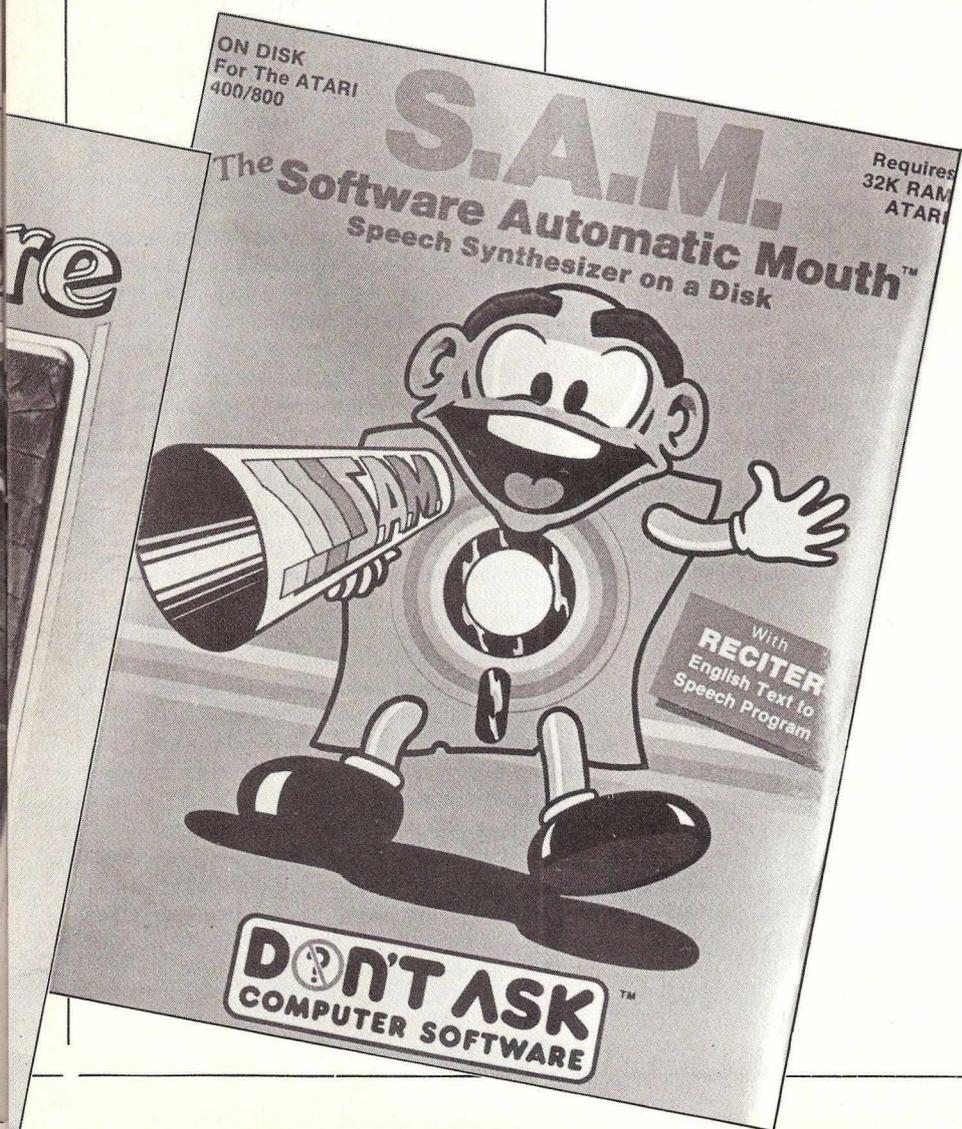
Information is stored on perfect screen facsimiles of those small filing cards we've used from time to time. You know the ones I mean - the cards that are ruled with faint blue lines? They're ruled just the same way on the screen too!

You can keep up to 700 on a single disk and find any one of them in seconds. Better, you can tell the computer to mark cards that have specified information. And what does Atari do when you give this order? It puts a hi-res graphic paper clip on the corner of each relevant card, that's what!

But what on earth would I use it for on a desert island? Don't worry, it's so useful I'd easily find something.

Cataloguing wildlife species, for instance. Or holding details of various bits and pieces washed up on the beach which I'll store in my rough old workshop. Maybe filing delicious menu recipes as I experiment with toasted turtle or marinated mango.

Actually the real reason I'd take it is that I couldn't bear to be parted from it!





DESERT ISLAND DISKS

Two ways of shooting around

I was going to stop with just one more program but then I discovered that I've already reviewed and chosen 12 wildly differing pieces of software (how's that for value for money - most reviews only cover three or four!) so one more would give me 13.

I'm not superstitious, of course, but I don't plan on playing into Richard Pawson's hands either. I still have this

sneaking suspicion that his idea of marooning me had a deeper significance that he's let on so far!

Avoiding the unlucky number therefore, let me quickly take the total to fourteen. Then I'll stop because I'll never get them through the surf to safety otherwise.

My last two choices? 'Baja Buggies' from Gamestar and 'Shooting Arcade' from Datasoft. Both are for Atari because only Atari's graphics could handle what the games require. Both run in 16K and both come on either cassette or disk. Good news, games fans!

I've chosen both because they've each been infuriating me. I seem totally incapable of achieving the higher scoring pinnacles of either, though they're both deceptively simple.

Or so it seems. Obviously I need the solitude of my island to settle down and concentrate!

'Baja Buggies' has you at the wheel of one of those sand-dune runabouts the Americans love. It's a shame, but trying one out on the beach at Blackpool would get you arrested in 5 seconds flat!

You're racing your Baja (what or where the heck is Baja?) buggy in three-dimensions, engine roaring and the road unwinding in front of you across an ochre desert. There are distant mountains which swing realistically across the screen when you round a bend, and the effect is astonishingly realistic.

There's only one snag. There are these other buggies racing with you and you start at number 90 in the field. Your mission: finish in the first six, when you'll then get to put your name on the screen.

The really annoying thing is that all my friends (the house is full of them every night!) always seem to finish second or third, but the best I've done is seventh. It must be my driving. I wonder if that's why people stay away from me on the motorway?

'Shooting Arcade' is another bane for me. It's a familiar fairground scene that you see, complete with carousel type music. Chasing across the screen from left to right and vice versa in alternate rows are shooting arcade figurines.

Bunnies, elephants, ducks, funny and sad faces, diamond targets, round targets - 'Shooting Arcade' has them all, and simultaneously! Clear the screen and you even get a funny bear that trundles back and forth, reversing every time you score.

So what's so infuriating? Simply this. Datasoft promise that if you clear the screen 10 times (which is a damn sight harder than it looks or sounds!) you'll get a 'special surprise' - spelt just like that.

In other words, they've programmed some spectacular graphic goodie to reward you if you manage the clearances. And do I know what it is? Have I ever seen what happens?

I do not and I have not. I can never seem to clear the screen more than seven or eight times before the increasing skill level beats me. I'd very much like to know what happens. Even thinking about it makes me feel I might just volunteer for a desert island!

As The Sun Sinks Slowly in The West!

There you are then, folks - my choice of the fourteen programs I'd take with me if I was going to be a castaway for some indefinite period.

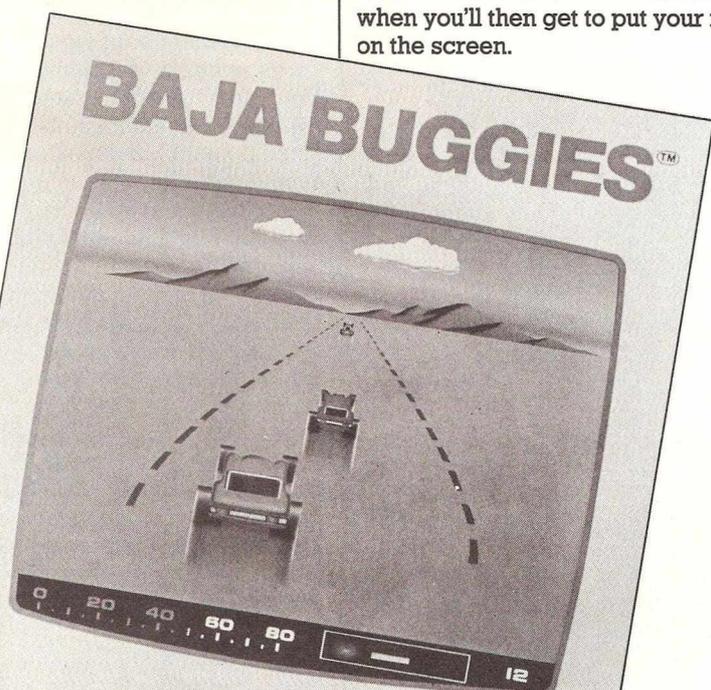
I'm terribly aware there are dozens more programs I'd like to take (and would if that miserable Richard Pawson hadn't said I could only have a handful!)

I also know my choice won't fit everyone's taste. Could it ever? You may, however, discover some previously unknown gems in this fast overview.

And if you emerge clutching just one program that you never knew existed, and it slowly becomes the current love of your life, I'll be a delighted Daniel Defoe!

Till next time, happy hacking, happy Christmas and happy New Year!

My thanks are due to Mike Devereux of Telesoft in Portsmouth, Brian Hagey of Audio Visual Offers in Hoddesdon and Chris Harwood of Softcell in Birmingham. Between them, these three supply much of the trade with software. They certainly helped me with my choice of desert island material!



FOR USE WITH THE
ATARI 400/800 HOME COMPUTERS

GAMESTAR

REW

MICRO COMPUTERS

ATARI

	Nett	V.A.T.	Total
A400 16K RAM Computer (without manuals)	173.90	26.09	199.99
AM400 16K RAM Computer (with manuals)	216.52	32.48	249.00
AM800 16K RAM Computer (with manuals)	433.91	65.09	499.00
410 Cassette	43.47	6.52	49.99
810 Disk Drive	260.00	39.00	299.00
CX853 16K RAM Expansion	56.52	8.48	65.00
Calisto 32K RAM Expansion	77.39	11.61	89.00

Application Software

Atari CX 404 Word Processor (Disk)	86.94	13.05	99.99
Atari Visicalc (Disk)	103.47	15.53	129.00
Draw Pic (Disk & Cass)	23.04	3.46	26.50
Mail List (Disk)	30.43	4.57	35.00

Entertainment Software

Caverns of Mars (Disk)	26.07	3.92	29.99
Centipede (ROM)	26.07	3.92	29.99
Star Raiders (ROM)	26.07	3.92	29.99
Music Composer (ROM)	26.07	3.92	29.99
Missile Command (ROM)	26.07	3.92	29.99
Pac Man (ROM)	26.07	3.92	29.99
Adventures 1 to 12 (Cass)	14.34	2.16	16.50
Adventure Tri Packs (Disk)	24.00	3.60	27.60
Arcade Baseball (Cass)	17.82	2.68	20.50
Player Missile Editor (Cass)	21.30	3.20	24.50
Temple of Apshei (Cass & Disk)	24.00	3.60	27.60
Star Warrior (Cass & Disk)	24.00	3.60	27.60
Apple Panic (Disk)	17.82	2.68	20.50
Crush Crumble & Chomp (Cass & Disk)	18.04	2.71	20.75
Wizard & the Princess (Disk)	19.78	2.97	22.75
Jaw Breaker (Cass & Disk)	17.82	2.68	20.50
Eastern Front (Cass & Disk)	19.56	2.94	22.50

B.B.C. MICROCOMPUTER

BBC Model A 16K RAM	Price on Application		
BBC Model B 32K RAM	Price on Application		
BBC Disk Drive	Price on Application		
BBC Printer	Price on Application		

Software

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BBC Golf	6.09	0.91	7.00
BBC Backgammon	6.96	1.04	8.00
BBC Multifile	21.74	3.26	25.00
BBC Chess	10.00	1.50	11.50

ACORN ATOM

Acorn 8K + 2K RAM Assembly	150.00	24.50	174.50
Acorn 12K + 12K RAM Assembly	250.00	39.50	289.50
Family Packs	173.00	27.00	200.00
Seikosa G.P. 80A Printer	199.00	33.00	232.00
Atom Disk Pack	299.00	44.85	343.85
Atom Colour Card	39.25	6.00	45.25

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Games Packs 1 to 11 (each)	10.00	1.50	11.50
Maths Packs 1 & 2 (each)	10.00	1.50	11.50
Soft VDU Pack	10.00	1.50	11.50
Database Inc Manual	10.00	1.50	11.50
Peeko Pack	10.00	1.50	11.50
Adventures	10.00	1.50	11.50
2K Programs 1, 2 & 3 (each)	3.91	0.59	4.50
Galaxian	6.96	1.04	8.00
"747"	6.96	1.04	8.00
Chess	7.83	1.17	9.00
Disassembler Program	3.48	0.52	4.00
Statistics	17.39	2.61	20.00

COMMODORE VIC20

	Nett	V.A.T.	Total
VIC - 20 Computer 5K RAM	155.65	23.35	179.00
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VIC Printer	200.00	30.00	230.00
VIC Single Disk Drive	344.45	51.55	396.00
VIC 3K RAM Cartridge	26.04	3.91	29.95
VIC 8K RAM Cartridge	39.09	5.86	44.95
VIC 16K RAM Cartridge	65.17	9.78	74.95
VIC Programmers Aid Cartridge	30.39	4.56	34.95
VIC Super Expander High Res	30.39	4.56	34.95

Application Software

Simpli-Calc (Disk)	21.70	3.25	24.95
Simpli-Calc (Cass)	17.35	2.60	19.95
VIC Stock Control (Cass)	17.35	2.60	19.95
VIC File (Disk)	21.70	3.25	24.95
VIC Writer (Disk)	21.70	3.25	24.95
(Cass)	17.35	2.60	19.95

Entertainment Software

Rat Race (ROM)	17.35	2.60	19.95
Gorf (Cass)	21.70	3.25	24.95
Jelly Monsters (ROM)	17.35	2.60	19.95
Sargon 2 Chess (ROM)	21.70	3.25	24.95
Rabbit Chase			
Skier			
Asteroids (Cass)	6.08	0.92	7.00
VIC Panic (Cass)	6.08	0.92	7.00
Cosmiads (Cass)	6.08	0.92	7.00
VIC Men (Cass)	6.08	0.92	7.00
Arfon Expansion Boards	85.21	12.79	98.00

TEXAS TI99/4A

TI99/4A - 16K RAM	173.04	25.96	199.00
Speech Synthesiser	82.60	12.40	95.00
80 Column Matrix Printer	347.82	52.18	400.00
Peripheral Expansion System	144.34	21.66	166.00
Disk Controller Card	122.03	22.31	140.34
32K RAM Expansion Card	176.47	26.48	202.95
Cassette Cable	8.65	1.30	9.95

Application Software

Speech Editor	15.60	2.35	17.95
Personal Record Keeping (ROM)	38.21	5.74	43.95
Personal Report Generator (ROM)	38.21	5.74	43.95
Personal Financial Aids (Cass)	7.78	1.17	8.95
Inventory (Disk)	46.04	6.91	52.95
Invoicing (Disk)	46.04	6.91	52.95
Mailing List (Disk)	46.04	6.91	52.95
Text Formatter (ROM & Disk)	46.04	6.91	52.95

Entertainment Software

TI Invaders (ROM)	16.47	2.48	18.95
Munchman (ROM)	23.43	3.52	26.95
Chess (ROM)	30.43	4.57	35.00
Soccer (ROM)	19.08	2.87	21.95
Adventure Land & Pirate (Cass/ROM)	30.43	4.57	35.00
Adventures 1 to 9 & 12 (Cass)	19.08	2.87	21.95
Adventure 10 & 11 (Joint) (Cass)	23.43	3.52	26.95
A-Maze-Ing (ROM)	19.08	2.87	21.95
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Zero Zap (ROM)	19.08	2.87	21.95
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The right tools for the job

Continuing our series in which Charles Christian looks at 'How much can you learn about business computing with a home micro?'

In last month's edition of this truly ripping journal (Hey editor, is that creepy enough – can I have my rise now?) you will of course have read the excellent – if not Booker Prize standard – article by yours sincerely discussing the concept of moving into the world of microcomputing the gentle way. That is to say by starting off with a home computer and gradually upgrading it until eventually you are effectively running a fully-fledged business system. (That is of course assuming that you were capable of reading anything after spending the preceeding weeks glued to the video ruining your eyesight by watching endless re-runs of the complete life and works of Koo Stark.)

Anyway that article stressed the point that if you were going to buy a home computer with this in mind then you needed to choose one

The ideal computer to build up your expertise on is: powerful, easily up-gradable; has a wide variety of peripherals; has a useful selection of software and ...is cheap.

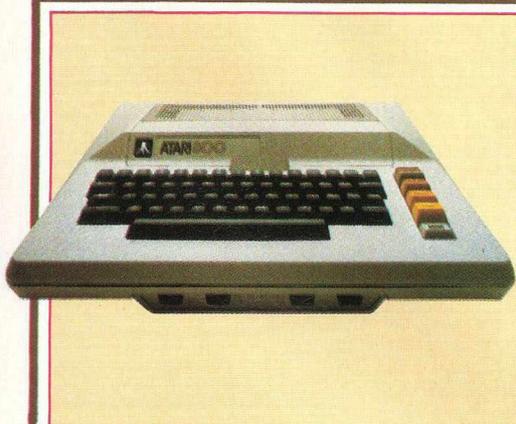
Hardware – What Hardware?

Starting first of all with the hardware side, what systems are actually available in the UK market that would be suitable for use in this sort of a project? (And by that I mean available here and now and not merely lurking over the horizon in some designer's never-never land.)

Look through the advertising pages of *MicroComputer Printout* and you will see advertisements for about 60 different microcomputer hardware systems. This sounds a frightening number but there is no need to be daunted by it, for in fact the very nature of the home-to-business concept of computing cuts down the number of systems that are appropriate or of any use.

To begin with there is, for example, a natural upper limit of around £550 to the price you need to pay, for the last thing you want is

Of the many home computers on the market, the ones most suited to possible business use are



(from left to right) Atari 800, Texas TI99/4A, and Commodore VIC...(see overleaf)

that it was actually physically possible to eventually run as a business machine. In other words you needed a hardware system that could be expanded with add on kit and, above all, you needed to be able to get your hands on a comprehensive range of business applications software. So much for the theoretical side, but just how do these sundry requirements work out in practise?

There is a natural upper limit of £550 ...and a lower limit of around £180 to the price you need to pay.

some 'all singing all dancing' system with a massive memory and integral VDU and floppy disk drives. All you need is a basic central processor 'box' and keyboard which you can plug into the back of your television set when you are not watching JR having his evil way with Sue-Ellen. This automatically cuts out such models as the Sharps, Pets, Tandys as well as the more up-market

Osbornes, Olivettis, IBMs and the Sirius.

You will also find that there is effectively a lower limit of around £150 to the type of system you choose. Some of the smaller systems lack any useful peripherals, whilst others are too dainty and fiddly to be any use in a business environment. For instance almost inevitably you will want to try your hand at word processing at some stage in your experiments and that means you must at least have a robust, full-size typewriter-like 'QWERTY' keyboard. So goodbye Sinclair ZX81 and the Jupiter Ace.

Given these parameters the leading runners in the £150-£550 price bracket, in no particular order of preference, would seem to be:

- Commodore VIC
- Atari 400
- Texas TI99/4A
- Acorn/BBC Microcomputer
- Atari 800
- Commodore 64

So what do you get for your money?

- To begin with, depending upon the model you choose, between 16K and 64K of RAM memory. Admittedly for serious business use 16K is a bit on the small side - indeed you probably cannot get by with less than 48K. However, for all of these machines you can buy add on memory packs to boost the RAM capacity. These vary in price from about £30 for a VIC 3K module up to about £125 for a 48K Atari module.

- Between 8 and 16 colours available for screen use. This means you can plug it into a domestic television set or later a special high quality monitor, and get a clear enough display for running anything from Space Invaders games to intricate text editing.

- A useful selection of interface ports so you can plug in various peripherals such as printers, light pens and disk drives, as well as 'funnies' such as joysticks and speech synthesizers.

In addition, for all the computers in my 'top six' there are available printers, which run from about £200 to literally the skies' limit; cassette recorders for cassette-based software, which start at about £50; and disk drive units costing from around £300.

Thus by the time you have expanded your original home computer to what in hardware terms is probably its maximum size and capability, depending upon the type of system you originally purchased, your total investment may have swollen from an initial £150 up to a fairly substantial £2500. So if you think there is any danger of you catching the home computing 'bug', make sure you have a word with your bank manager first.

Softly Softly Software

Whatever else you buy, if you want to do business computing you must have business software.

Currently software for this level of computer hardware is available on three different mediums: the cassette, which is just like an audio cassette; the plug-in ROM cartridge; and the floppy disk.

Cassette based software is cheap and there is still a lot of it about dating back to the 'old days' of about 5 years ago when it was the only software format available for the early Pets and Apples. However for serious business use it is painfully slow and you will waste a great deal of your time just sitting around twiddling your thumbs whilst waiting for programs to load and files to be located.

Plug-in cartridges are far quicker and more convenient to use than cassettes, but they are also more expensive. Their main drawback however is that, because they are in a permanent format (ROM modules are sometimes called 'firmware', in other words, a software program encapsulated in hardware), they are of no use if you need to keep records, as the data you input into the computer's internal memory cannot be transferred to and stored on a cartridge. The result is that it will all be lost forever once you switch off the computer at the end of the day. Thus, although ROM programs are perfectly satisfactory for

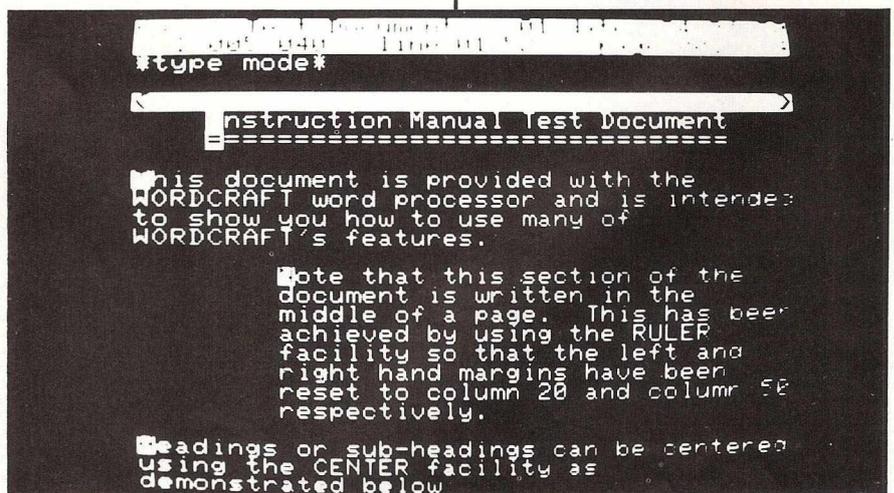
**Word processing's
value, and hence it's
popularity, stems from
two reasons.....**

When selecting software then, not only must you consider the type of program you want but also the application for which you intend to use it and whether the medium upon which it is available will suit your requirements.

As to the types of software you opt for, in the UK alone there are literally thousands of different programs currently available covering every application imaginable, and a lot more besides. Although whether you will be able to find a specific program available in a format that will run on your particular home computing system is a different matter. (Here Commodore with their '64' would seem to have stolen the edge on their rivals as a second processor option gives the 64 the ability to support the CP/M operating system, which most major business software programs now employ.)

But enough of this rambling, although it is nice to imagine that within weeks you will be controlling the destinies of major corporations from the keyboard of your own computer, in reality your software requirements are likely to be far more modest. Indeed your needs will probably be satisfied by four types of program:

- Word Processing
- Financial Planning
- Database Management
- General Accounting



This screen-shot shows WORDCRAFT - a word processing package written for business micros and now available for the VIC-20 home computer.

relatively simple applications - such as straightforward text processing or producing predefined sets of statistics - for anything more elaborate where you need to keep files of data that will be regularly updated and processed, you must have a floppy disk-based software system. Unfortunately floppy disk programs tend to be costly and, of course, you have to buy the disk drive unit as well.

Word Processing

Of the four, word processing packages seem to be about the most popular - both from the point of view of the users who buy them and the multitude of software companies who write them. Word processing's value, and hence its popularity, stems from two reasons.

Firstly it is a useful application to have, as it means that instead of typing and retyping drafts of documents directly onto the paper,

HOME TO BUSINESS

the text can be entered into a computer and hours, days or weeks later it can be retrieved, edited into its final form, via the VDU, before any number of top copies are printed off for distribution.

As such word processing holds a considerable appeal for business and professional offices, for example, those of solicitors, where long and complicated documents, such as contracts and conveyances, may go through many stages of redrafting – entailing various amendments, deletions, substitutions and re-arrangements of layout – before a final version is approved.

Another use to which word processing can be employed is in the production of standard form letters. There, instead of having to individually type out hundreds of identical letters by hand – a task guaranteed to drive any typist completely out of their mind – you can simply run the word processing program and 'top and tail' the letters as appropriate. Even this chore can be eliminated if the word processing is run in conjunction with some form of indexed mailing list. And for the small business that doesn't even run to a typist it means that anyone can master a few standard quotations and letters without too much difficulty.

The second benefit of having word processing as your first application program is that it is relatively simple to get results from it. Within a matter of hours you can master its intricacies and start producing finished text. These 'quick' results may go a long way towards helping breakdown the 'mystique' of computing and in turn build up your confidence to start tackling more ambitious applications projects.

programs are also popular with the hobbyist-turning-business-computer-user. With the aid of this type of program it is possible to produce what is effectively an electronic spreadsheet detailing all your items of expenditure over a given timescale and how their fluctuations interrelate to each other. Thus, by changing one set of parameters you can calculate its influence upon all the others.

To use a simple, if not altogether hackneyed example, if the price of the raw materials you use in your business increases by 2% you can trace its effect right the way through the financial structure of the business, from increased production costs through to increased sales price, reduced customer demand, reduced profits, increased bank overdraft charges, less big fat luncheons for the Board and so on until you are thoroughly depressed. Other than the fact that it involves a considerable amount of effort to get the logic right upon which you build your model, the main drawback with financial planning programs is that they inevitably need a lot of processor memory to run on.

...the main drawback
with financial planning
programs is that they
inevitably need a lot
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to run on.



'Database' is a jargon word for programs that replace card-index or other filing systems. For more information see the feature in our November 1982 issue.



... (from left to right) Atari 400, Acorn/BBC, Microcomputer and Commodore 64.

Two points to remember, however, if you are going to go for this type of application in a big way, you must have a floppy disk system and a decent – and consequently pricey – printer.

Financial Planning

For a similar reason (i.e. you can get results relatively quickly), financial planning – sometimes called 'modelling' or 'what if'

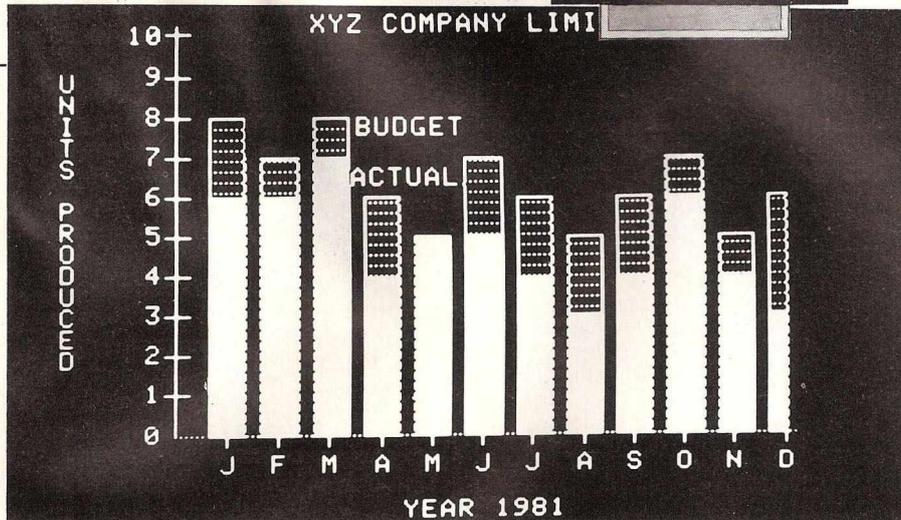
Database Management

If you dutifully read your copy of this magazine from cover to cover every month, you should know everything there is to know about databases thanks to a highly comprehensive article in the November '82 edition. If however you did not see that edition (and if not, why not?) the whole concept of database management can best be understood if you think of it as an electronic filing cabinet

containing a vast amount of information combined with a super-efficient index system to help you find it all again.

Two points however must immediately be borne in mind: a database management system takes up a lot of central processor memory space – so you need a big computer; and you must have a positive library of floppy disks or even a Winchester hard disk system to store all the data on. Thus it is possibly

HOME TO BUSINESS



Some financial planning packages can produce bar-charts and graphs on the screen or printer to show the results clearly.

For any business, one thing you must have is an efficient book-keeping system – try some form of general accounting software.

going to be beyond the capabilities of a lot of the systems we have been talking about.

Still, don't despair, there are a number of so-called database management programs on the market for micros which, although they are really only file management systems, will at least enable you to get a taste of the concept, create reports and perform some useful applications – such as producing mailing lists. And if your experiences at Christmas were as bad as mine – the perennial problem of trying to remember whether you had sent Auntie Min a greetings card, and if so, had it gone to her new address – its worth investing in a database for this facility alone.

General Accounting

For any business, one thing you must have is an efficient book-keeping system and for this reason it could be a good move for you to try some form of general accounting software.

This is another area where the user is faced with a wide choice of programs covering everything from 'integrated' systems that can virtually replace your manual ledgers and even generate trial nominal balance sheets and profit and loss accounts; to much more modest affairs that can only tackle single specific tasks such as payroll management or petty cash ledgers.

Again you obviously need to have a big, disk system for the more elaborate applications, but this is one area where there is still a lot of relatively cheap, albeit slower, cassette based software to be had. Thereby opening up possibilities for those of you whose bank balances have not yet recovered sufficiently from the Christmas blowout to be able to afford to lash out on a disk drive.

Odds 'n' sods

Besides these 'Big Four' of the software world (on a totally irrelevant note 'The Big Four' by the way, for those of you with any culture running in your veins, is the title of a thriller by Agatha Christie), there are also a whole range of specialist software programs to be had covering everything from aquarium maintenance to zodiac charts. Because however a lot of these applications are aimed at fairly narrow markets, the software tends to be written to run only on specific hardware systems. Even for applications of such general appeal as accountants 'incomplete records' or solicitors accounting, although all the various software packages all perform the same task, very few are actually transferable from one hardware system to another.

It may well therefore be that even if there is a software program in existence to perform some rarefied task that appeals to you, it may not be available in a version or format to run on your particular home computer. Consequently if you do have a specific application ultimately in mind, it may be an idea if you almost 'put the cart before the horse' and go for a system you know from the outset can support such a program.

If you do have a specific application in mind, it may be an idea to go for the system which you know can support such a program...otherwise it may not be available to run on your particular home computer.

Dull Boy?

"All work and no play makes Jack a dull boy" is the saying 'they' always used to tell you at school as an excuse for making you do something gruesome like cross-country runs in the middle of winter. But to some extent this is true and you do need a break from routine work if you are going to keep your mind fresh. And this is where home computing can really come into its own, for when you want a rest from business software there is an endlessly growing range of entertainment and video games programs available for you to use instead.

Indeed it is a sad fact of life that the more you pay for a computer, the less fun it becomes. The rationale behind this apparently being that if you are paying out £6000 for a computer system, you are obviously a respectable businessman – maybe even belong to the 'executive class' and are no longer entertained by such childish things as PacMan.

The more you pay for a computer, the less fun it becomes.

Weighing It All Up

Taking into account all the various factors discussed so far in this article, the ideal home computer to build up your expertise is one that is: powerful, easily up-gradable; has a wide variety of peripherals; has a useful selection of software and... is cheap.

As well as these physical factors there is also, of course, the general question of availability, for ideally you want a system that if anything goes wrong, you can at least take it back to the shop you bought it from or get an engineer round to repair it (this is one distinct disadvantage of ever buying anything by mail order.) But, whilst this presents no problem to people living in the south-eastern corner of the country, where there is plenty of choice with literally dozens of shops selling a wide range of both hardware and software. It is a well known fact that civilization ceases once you go north beyond Potters Bar and that if you have the misfortune to live in some misbegotten place like Auchtermuchty, the deciding factor could well be the type of equipment McTavish's Stores have in stock at the time.

Postscript

Thanks to those kind men in Slough (crawl, crawl) a version of the Commodore 64 has just arrived on my doorstep. (Well to be correct the Editor delivered it – I suppose he has to justify his existence somehow).

First impressions, after mastering the art of switching it on, are good and that it looks as if it justifies its maker's claim that it is very little to pay for a big 64K memory. But how does it work out in practice?

Hopefully, I shall know that by the time I come to write next month's exciting instalment in this series, by which time I will have also come to grips with word processing on it.

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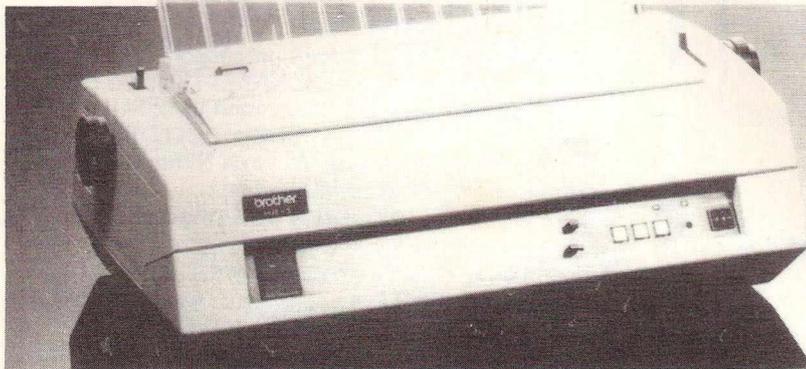
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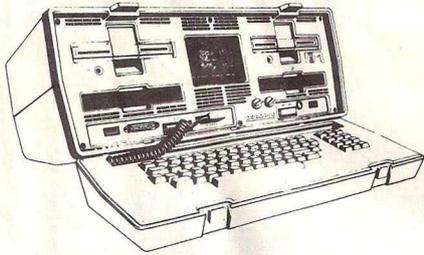
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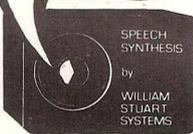
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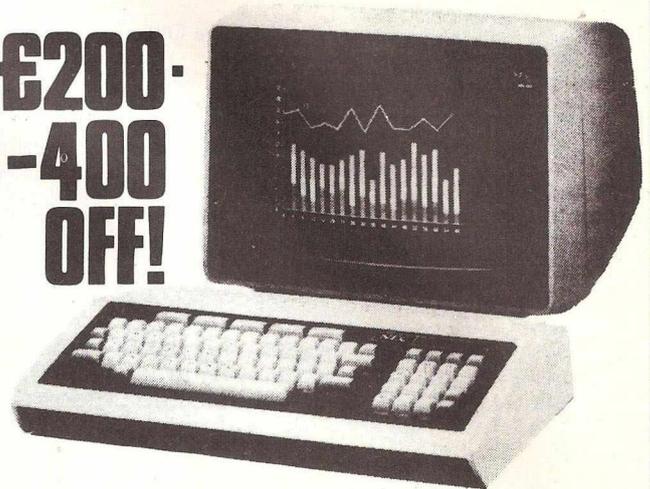
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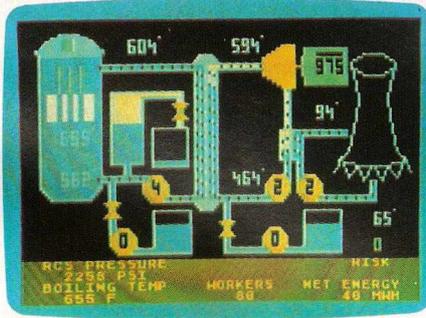
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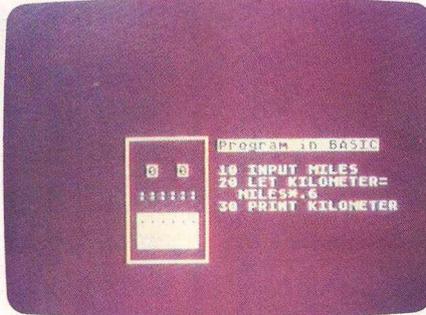
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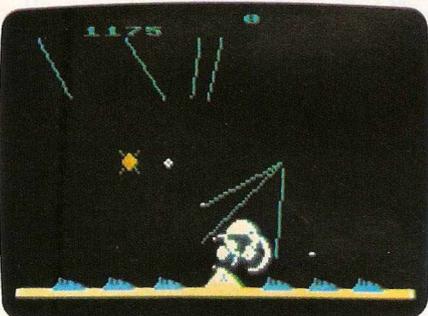
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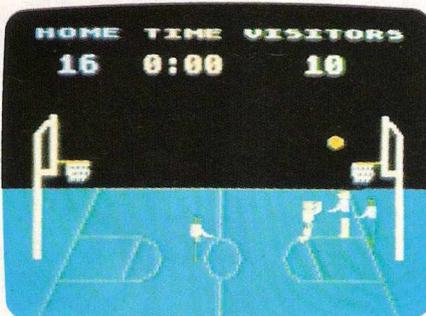
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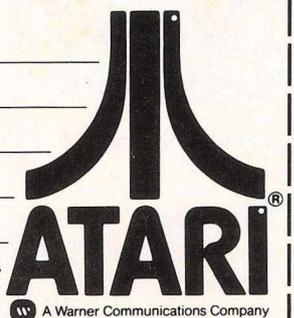
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LOW COST WORD PROCESSORS

**What
you
get
for
your
money**

**By Kevin Viney
(Chairman
North Kent ACC)**

Introduction

People who have used an advanced and dedicated word processor such as the AES and Wordplex systems should be prepared to wipe the smirk off their faces when considering the title of this article. For under £150, wordprocessors (WPs) are available that will give these specialised machines and the likes of Wordstar, Magic Wand etc, a real run for their money.

You might like to ponder, though, on why it is that your secretary has just turned up her nose at the prospect of a replacement for her typewriter. Unlike you, she will probably not make a mistake in the typical letter you give her; she will work fast and find that the keyboard you have offered her will feel different, look different and may even bleep at her! A WP may only be of real benefit to her when there is repetitive work or standard letter work involved – applicable only to some offices.

However, the microcomputer and printer owner whose keyboard performance is more enthusiastic than skilful (that's us two fingered mortals), is likely to spend more time using a WP than playing PacMan. Speed, quality of presentation and the ability to change a document will encourage us to write and the purpose of the next few paragraphs is to show what can be achieved at a modest price.

Hardware requirements

If you haven't yet bought your microcomputer and are considering the possibility of writing letters, stop! Might the program you buy be limited by the hardware? Suppose, as with the VIC 20 for instance, the screen is only 23 columns wide – you might be unhappy with the proportion of visible text. Or maybe as on a 16K Tandy model 1, very little memory is left once the program is loaded. Memory expansion, albeit at extra cost, may get round this problem though, while using your screen as a moving window on a large area of text may partly solve a small physical screen width. Get a demonstration, and try the machine out yourself, before parting with your hard-earned cash.

If it's not too late, think before you rush out and buy that cheap thermal printer. What sort of print quality is or will be in the future acceptable? Only the better

matrix machines (such as the ESPON MX80) produce correspondence output that's acceptable and no-one should write their job application on anything other than a printer which produces a solid font (daisywheel, thimble and golfball) – even a manual typewriter is better than a matrix!

The WP you choose ought to be capable of making best use of that printer. Check that the software is capable of condensing, enhancing or emphasising text or at the very least capable of being programmed to do so if necessary.

A few WPs can save their programs on disk or tape (Easyscript and View for example) – check that your program won't have to be changed when you move on to new forms of storage.

Features

All WPs can store, retrieve and manipulate text. How easily, how fast and at what price this is achieved may vary quite dramatically. Most of us might reasonably think that you get what you pay for, but consider the economy of scale that a large manufacturer makes when say 50,000 word processors are sold on a popular machine. Typical specifications are these:

General

- 1) A proper training manual/audio cassette tutorial for beginners.
- 2) An explanation of the hardware required and limitations that stem from this.
- 3) A backup copy of the disk/cassette in case one gets lost or corrupted, even eaten by the dog.
- 4) A quick reference guide – preferably on a separate card as a summary.
- 5) A comprehensive index – many are often a pure afterthought.
- 6) Full error message capability – not error numbers that the inconvenienced user has to look up for further explanation.

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Essential command and control aspects

- 1) Direct input of text with words that are wrapped around the edge of the screen automatically moved to the next line. A 'RETURN' or 'ENTER' need only be pressed to signify the end of a paragraph or a blank line.
- 2) Format instructions (for example to fix the text width) should preferably be in the form of embedded characters in the text. A WP that allows you only to fix this once for the document (like Scriptsit) is inflexible. Instructions to right justify, set margins, auto linefeed, set page/text length, auto page number are essential. Most WPs will also allow headers and footers to be sent and some link on to a specified file on the disk for printing. Note that the latter partly offsets the disadvantage of a small memory size.
- 3) Characters and lines (preferably words and sentences too) should be capable of being inserted or deleted. Blocks of text will need to be transferred, copied or swapped.
- 4) The screen must be capable of right/left/up/down scrolling – at high speed if necessary.
- 5) A status line to remind you what line and column number you're on, display tab stops and modes should also be visible and unambiguous.
- 6) A Find and Search/Replace facility must be present with the option of using these commands on Globally linked files.

3	Klystrons	6000.29
12	elbow joints	997.13

becomes...

3	Klystrons	6000.29
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- 7) The setting of tab stops is particularly important where very wide text but small screen widths are involved. Check that at least 132 columns are permitted.
- 8) A file merging capability is essential with the ability to produce standard forms/letters from a data file fast becoming a luxury one can't do without.

- 9) The WP should automatically align the decimal point if required eg:

Simply use decimal mode and an appropriate tab stop to produce the above.

- 10) A cassette or disk operating system should allow the user to load, store and delete files, view the directory and copy or rename files. If a menu is used to set up various parameters, the former should be able to be displayed at any stage without destroying text.
- 11) Finally, the cursor has to be able to move easily around the screen and more importantly text. Movements to text boundaries – like end of text, paragraphs or specific line numbers.

Advanced Options

A serious WP contains at least 80% of the above commands and may set you back as little as £25.00 but for a surprisingly small additional outlay a sophisticated set of options can be offered. Listed below are the further commands available on the new Commodore 64 WP (Easyscript) which

will make users of software costing 5-10 times as much green with envy.

- 1) Text width up to 240 columns – necessary on 15 pitch (15 characters per inch) letter quality printers.
- 2) Options for CBM, standard and Epson printers with IEEE, parallel, and software programmable RS232C ports.
- 3) 30,400 character storage capability.
- 4) Preview and format to video plus fast pan in any direction.
- 5) Easy merging of files created under BASIC or using ASCII.
- 6) Special alignment of header/footer position.
- 7) Margin release and forced space capability.
- 8) Even-white spacing on Spinwriter printers.

Easyscript also allows one to send special control characters to your printer eg. bold, shadow, emphasise etc, as well as permitting secondary addresses to be output on the IEEE bus. Complicated escape sequences can also be easily used.

When a command is sent to straighten the right hand side of text, ie right justify, the program often inserts a whole number of extra spaces in the line like this piece of text.

A much tidier way of doing this, as shown here, is to spread the spaces between words evenly. For personal letters though, stick to a ragged right hand edge. In the case of Tandy's SUPERSRIPTSIT, proportional spacing can be used from the software itself. Here a character only occupies a certain width – narrow with the letter 'i' but wide with the letter 'w':

This form of control however looks slightly odd with standard character sets and the user will probably find that a proportionally spaced daisywheel (italic here) coupled with a printer that automatically does this preferable.

WORD PROCESSORS

Comments in text and instructions interrupt printer can be given while selected pages can easily be diverted to the screen/printer in cut sheet or continuous mode at will.

Pitch and form advance can be altered, capitals can be locked and soft hyphenation (the automatic splitting of a word only if necessary) accommodated. Superscripts, subscripts and change to red ribbon can also be performed.

A particularly interesting feature is the setting of vertical and numeric tab stops. With the former, any vertical point in the 764 lines of text may be marked and later moved to. Numerals within text are treated similarly. All tabs can be saved with the text by adding a 'x' to file name.

Files can be automatically filled from other data (eg: names and addresses) held on disk with options to fill or overwrite the contents of specially marked blocks. Output to a printer can be offset by a given number of columns and each page can be vertically positioned within the sheet. A tone is also sent (but may be disabled) if an error is encountered.

One of the most exciting additions to come with this program and the only one to fall within the £150 limit, even with the WP, is the spelling checker (for users who own a CBM disk drive). A main

dictionary containing 31,000 words on disk in compressed form can be checked against text in memory. After only a few seconds, 'Easyspell' – as it is called – will display:

total number of words
total number of distinct words
average word length
number of sentences/paragraphs

One is then presented with all 'suspect' words in reverse video and given the option of editing, ignoring or learning them. A user dictionary to store your own specialised words is included and will be searched at the same time as the main dictionary. It can also be merged with the latter. Crossword fanatics are also catered for. Suppose one wished to find all 6 letter words with 'blank' 'blank' 'F' 'something' in them then, amongst other things the program would come up with 'coffee' – just like the TV advert!

Note: 'Easyscript' is marketed by Commodore for the '64, 500 and 700 series computers. The program is available for other (older) Commodore hardware as 'Superscript' from Precision Software, priced at £250. Similarly, 'Superspell' is the older brother of 'Easyspell'.

Conclusions

Word processors could be easily the most important and frequently used piece of software in your library. Look carefully at your present and future individual requirements before rushing out on impulse. Father Christmas might bring that new disk drive or printer.

The Atari, CBM and Tandy are all serious contenders in this market but if you are thinking of buying a new machine consider the package for the 64K Commodore seriously – it is undoubtedly the cheapest and the most comprehensive WP ever offered on a machine under £400.

SUPERSCRIPTSIT probably scores with the very useful help command, however, and will soon be available on model 1 machines by the time this article is printed. The Tandy and Atari machines have some of the best documentation reviewed and include with their packages a combination of audio/program cassettes for the beginner. The colour Tandy and VIC20 machines seem to have some hardware limitations but both machines are cheap and in widescale use and owners are unlikely to be left far behind – in short, every home, office and business should have one.

Word Processor	Micro	Media	Features	Ease of Use	Documentation	Price
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A ZX81 version of the well known game.

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Played on a 4x4x4 board, this is a game for the brain. It is very hard to beat the computer at it. 7 of the 8 games are in machine code, because this is much faster than Basic. (Some of these games were previously available from J. Steadman).

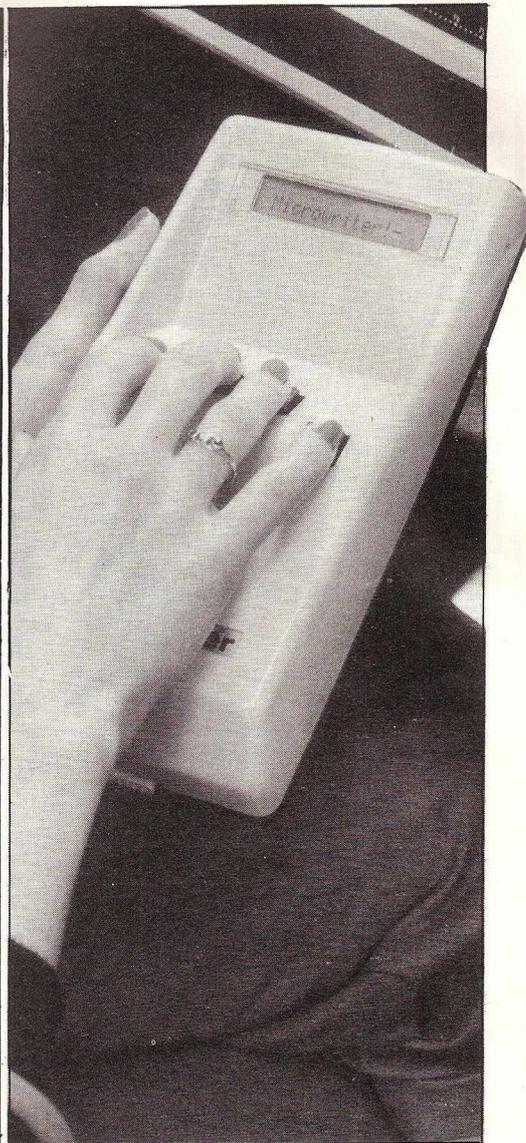
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LOW-COST WORD PROCESSORS

Richard 'Fingers' Pawson plays Microwriter



typing on a QWERTY keyboard. The now famous six button keyboard which forms part of the Microwriter's company logo, was fully patented – and it is the inventor's intention to incorporate this device into products other than Microwriter itself. In the intervening period, the Microwriter product has been developed, improved, and sold in limited quantities, but not actively marketed until a few months ago. However, the product has received a great deal of publicity on television and in the press. This has resulted in a number of comments and labels from 'the great white hope of British invention', to 'the product that has been launched a dozen times and still hasn't found a market'.

Three markets

One of the main problems in evaluating the Microwriter is that it really encompasses three different markets: first it is an alternative to the QWERTY keyboard for people who can't type, or feel that sitting in front of a keyboard does not befit their status; second, it is a low-cost word processor; and third, it is portable. I found myself using all three of those characteristics – but different users will view the product in different ways.

To the newcomer, the most frightening aspect of Microwriting must be the thought of having to learn all those combinations of the six keys necessary to produce the letters of the alphabet, numbers and punctuation. A separate panel in this article explains the principles of operation, but I will briefly explain my own experiences of learning.

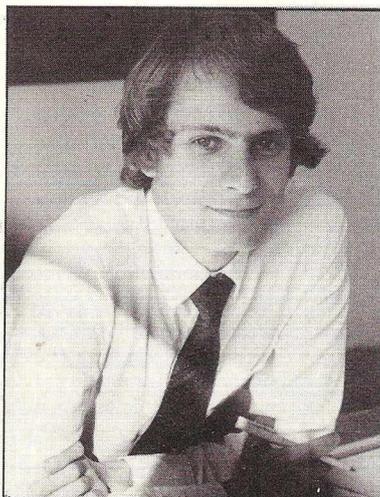
I first acquired the Microwriter on a Wednesday afternoon. Taking it home that evening, I sat down with a glass of wine in one hand, the Microwriter in the other and the instruction manual propped up in front of me. Twenty-five minutes later, I was able to produce every letter of the alphabet without having to look at the reference cards.

The documentation, it must be said, is excellent – of a far higher standard of writing and presentation than is usually found in the microcomputer marketplace. There is a 'New users guide' – which is both informal and chatty without being patronising (a difficult line to define). Then there is

The fact that this article was written entirely on a Microwriter, should be the best testimonial as to the ease with which it can be mastered.

I have to admit to approaching this review with a great deal of scepticism. Having completed the exercise, I have to say that I am now completely sold on the product, but every bit as sceptical of the marketing. To explain this rather obscure statement, it is necessary to look at the background to this unusual product.

The concept of Microwriting was first invented by Cy Enfield several years ago. Cy's intention was to produce a device that would provide a serious alternative to two-handed





Learning to use Microwriter

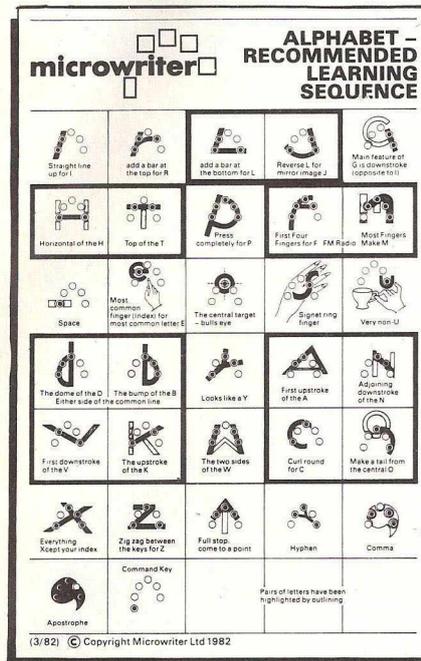
This diagram is reproduced from Microwriter's documentation, and shows the learning sequence which is more fully explained in the manual. The point to realise is that the combinations aren't meant to *look* like the letters, but that the symbols shown here are mnemonics – aids to memory – and they really do work.

The sixth key on the Microwriter's pad is a command button, and when used in combination with others, produces all the sophisticated text editing features, plus the commands for sending a document to the printer.

Like the various shift keys on a computer keyboard, Microwriter has additional keyboard modes for producing upper case, digits and punctuation.

The hardware

The basic Microwriter costs £485 plus VAT, which includes a carrying case, mains transformer to recharge the batteries (you get about 30 hours keyboard use between changes). In addition, there are cables to connect to a cassette recorder for storing documents,



and any RS232 printer.

Microwriter comes with 8K of usable memory, which equates to just over one thousand words of English prose. There is room on the Printed Circuit Board inside for additional capacity, but none has yet been announced.

A very sophisticated communications operating system has been incorporated, and by means of a Menu Setting System, the output from the Microwriter can be modified to cope with all the special attributes of your daisywheel or dot-matrix printer.

If you will be generating most of your text in the office, the Monitor/TV interface is a worthwhile investment at around £100 – assuming you can get access to a monitor or TV of course.

Instead of printing direct to a printer, I used a very clever little suite of programs developed by ABMS Computer Services (0273 24953), which interfaces the Microwriter to a Sirius Microcomputer. Text can thus be downloaded onto disk files, for further treatment by Wordstar as desired. The package costs £125, or free if you buy the Microwriter and Sirius from ABMS!

a 'General systems manual' – which contains all the technical information for advanced users and buffs. Finally, the manufacturers have thoughtfully included a whole series of colourful handy reference cards with all the combinations and commands. But I must get back to the plot.

Instructive

Spending an hour here and there over the course of the next few days I found that I quickly got the hang of punctuation and the simpler editing commands – for correcting my many mistakes. By this stage I was beginning to get a 'feel' for it, with words like 'the' forming a natural rhythm, without the need to think about the individual keystrokes. As with a full keyboard (and I should explain that I can't type full fingered) I found that I instinctively know when I have pressed the wrong combination of keys and can perform the backspace and correct functions without looking at the display. This means that it is perfectly possible to use the Microwriter in situations

where one hand (and maybe your vision and concentration) is tied up with other things such as laboratory equipment.

Which leads me on to another broad generalisation which Microwriter won't like: it is my considered opinion that the Microwriter does not work so well for writing that involves a great deal of thought. Let me qualify this. If I am writing a straightforward business letter, I am quite happy to use a dictation machine. If my train of thought is interrupted, I can quickly back track using the rewind key, and then continue. If, however, I am writing a really important letter I find it essential to write the letter out in longhand in order to get a feel of the prose I am writing.

Dictation Machine

The Microwriter is in many respects analagous to the dictation machine – the editing commands allow you to review what has been written, but the limited 14 character display makes it primarily a 'one-way' text input device. These criticisms are in part

overcome by the addition of the TV Monitor interface. I say "in part" because when writing an article or other long screed I like to draw up an outline or structure on paper and then fill that structure in, when writing the final copy. Microwriters, as with almost all word processors cannot cope with this, and so one is forced to switch from handwriting to Microwriting.

As time progresses, most users could overtake their handwriting speed. In that intervening period however, it requires a great deal of self-discipline to practise at one's slow speed rather than take the easy option of having someone else type the document for you.

Likes

In conclusion then, I was particularly impressed with the ease with which the basic alphabet could be learned – and the considerable care which has obviously gone into choosing the key combinations. The same goes for the various forms of documentation included with the product.

WORD PROCESSORS

Does Denis Norden really use a Microwriter?

"I've given up writing and suggest you do the same" reads the microwriter advertisement. But is it really true?

The answer, it would seem is a definite YES – a refreshing change from many of the bogus product endorsements engineered by advertising agencies. When I phoned the celebrated scriptwriter, I must admit to being taken aback at his sheer enthusiasm for the product.

"Oh, I'm very evangelistic," he says, "because really it's changed my life. I've never been able to type properly, and for someone who spends the best part of his life at the desk, writing TV and radio scripts – that's some handicap! In fact, watching me at a keyboard is rather like watching Captain Hook trying to manipulate Rubik's Cube!"

Denis Norden first encountered the Microwriter nearly two years ago, long before it was being actively marketed, through an existing friendship with the

inventor – Cy Enfield.

"Initially what put me off the idea was the belief that you can't take up a new manual skill after the age of premature greyness, but after only two month's use I could better my typing speed of several decades' experience."

Installed in his office, Denis now has one Microwriter – complete with a small monitor screen, a Pearlcorer dictation machine for storing text, and a Ricoh printer.

"I am an object of some wonder in the office – visitors are wheeled in to watch

me at work on the Microwriter. So far I have managed to convert two other scriptwriters."

The first complete TV script to be written using his Microwriter was the highly-acclaimed 'It'll be alright on the night', since when he hasn't used the typewriters. "An added bonus has been confidentiality – once recorded on tape my work isn't susceptible to prying eyes!"

Hasn't he had any disasters with it? "Oh, certainly, but as with teeth and children, only ever on bank holidays!"

The ability to keep several distinct documents in memory at once (even when the power is switched off - which happens automatically if left unattended for more than a few minutes to save batteries) was particularly useful. It meant that in addition to writing articles and letters, I could keep sets of notes – such as the constantly changing list of people I have to call.

Dislikes

My main grudges concerned the display and editing features. The 14 character display may have been innovative when the Microwriter was introduced, but today it represents poor use of available technology. When reviewing text, the words move jerkily. These problems are partly alleviated by using the Monitor interface – though the extensive editing commands are not really designed with this in mind, and the flashing cursor cannot be moved about with the same ease as on a microcomputer.

Conclusions

I liked the Microwriter – but I feel it is definitely overpriced. With proper production control the device could



be cost-engineered down to around two hundred pounds. Unfortunately, the company still seem determined to keep a low profile. Until they start to take a more aggressive marketing

stance, and move the installed base dramatically up from the current 1200, the product won't take off, and the price won't fall. If you're the pioneering type, buy one now.

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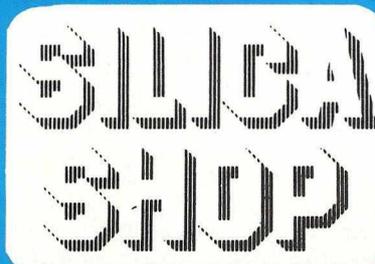
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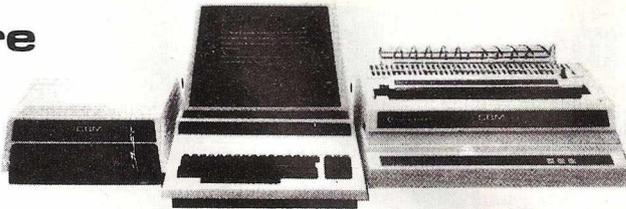
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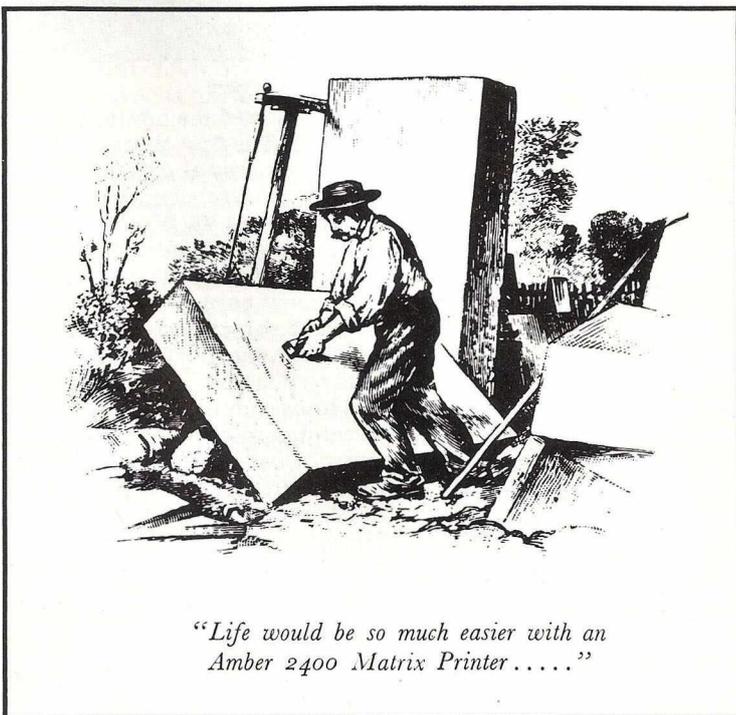
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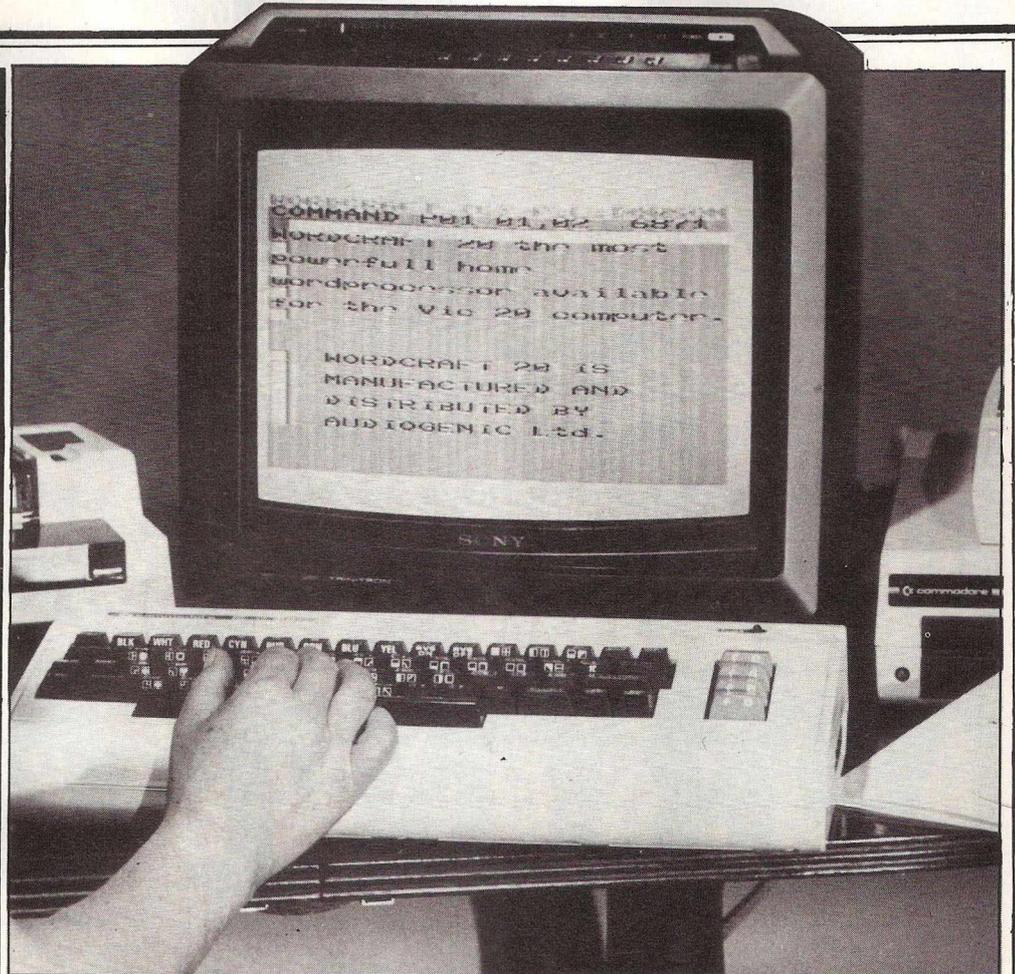
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LOW COST WORD PROCESSORS

**James
Woudhuysen
sums
up
Wordcraft**



Am I strange? (*See photo - Ed*) This is the question that has been nagging me over the past two months. Two months ago, *MicroComputer Printout* editor, Richard Pawson, kindly lent me his Vic 20, a Wordcraft cartridge, a Commodore tape player and a Vic 1515 printer. I wanted to believe that — particularly once I'd followed his advice and substituted a Datarite 3500 printer for the Vic 1515 — this system would up my productivity as a journalist enormously. Instead, I have to report that I've wasted days, yes, *days*, trying to get the whole rig operational. I've written much less than I would on a normal typewriter, and my wife is confirmed in her view that word processors will do my work rate and our marriage no good. At times, I've become so exasperated that I've started to wonder whether the faults really have been with the hardware or with me. Am I going crazy? Judge, dear reader, for yourself.

Only connect

Richard showed me how to wire the system up. The first thing that struck me is how messy and unintelligible the wiring is. Prettily packaged in a shop window, a Vic 20 doesn't reveal that you have to have a big black transformer between it and the mains, nor that you need a coffin-shaped junction box between it and your TV (I used a Panasonic Quintrix for my display), nor that you'll have two more lines coming out of the board if you want storage and hard copy output as well. Then there's the fact that the Din sockets at the back of the Vic 20 aren't labelled 'Display' and 'Printer' either. Lastly, plugging the tape player and the Wordcraft cartridge into the 'edge-connectors' at the back isn't easy.

Conclusion 1: unless you've put aside a special room to process words in (unlikely, if you're using your TV as a display), or unless you've got mains

sockets in all the right places, you're going to have to wire your system up from scratch each time you use it and then spend a lot of time tripping over a whole mesh of unsightly cables.

Conclusion 2: for the first-time user (and such a category must embrace many Vic buyers, plus many of the friends they lend their machines to), the Vic apparatus is hard to set up.

I must add that computer, cassette and printer all look out of place in any modern living room. They are finished in a distinctly unappealing grey and brown, and have tacky stick-on bronze labels on them. Indeed, the lettering and general aesthetics on them is more reminiscent of the untechnological fifties than the computerised eighties.

In terms, too, of ease of operation, the Vic 1515 is a disaster. Feeding the paper through by hand to get it started is incredibly fiddly: there is virtually no gap between casing and platten to put your fingers in and pull the first sheet through. On Richard's model, in addition, the head jammed frequently and the feed went wrong every so often. To get the thing to print, I further found that I had to push the head to the left hand margin twice between commencing each run. This he assures me does not happen with later models.

Because of the wire management problems I encountered with the system, I tried a number of different layout configurations. Richard said he found holding the computer on his lap convenient, and so did I; but the heat given out through the slats at the bottom tends to be a bit disconcerting...

Manual mania

Now to the instruction manual *Wordcraft 20 for the Vic*. Written by M. J. Lake and distributed by Audiogenic of Reading, it is a booklet that breaks nearly every rule about manuals you could think of (*for an approach to writing manuals that makes sense, see my previous article in the December issue*). There is a colour illustration of a quill pen on the cover, but there are no diagrams of what a Wordcraft screen looks like inside; there's just text, which makes

sections like 'Screen layout' particularly difficult to understand. The next thing you come to in the manual is the photocopies and stapled-in erratum slip. And the next after that? A whole page about copyright for Wordcraft and the manual, plus the information that it was set using Wordcraft 80 (software I am unfamiliar with, but which does not inspire confidence given the errors already announced). Then, and only then, do the Contents appear. They aren't bad, but as soon as they're done with you get a page titled 'Additional commands' – before the 'Introduction'.

Four paragraphs into the Introduction, which provides a reasonably sensible guide to what word processing is, you meet your first exclamation mark. This kind of chumminess does not go down well after wiring hassles and a growing suspicion that the manual is going to be a bummer. Eight paragraphs into the manual you meet a spelling error so crass it is unbelievable:

'Commands are those facilities that effect the whole document'. 'Effect' not 'affect'. Geddit?

Things aren't going well. Then, in the vital but ridiculously short (two thirds of a page) section entitled 'Hardware required and installation', there are two paragraphs which act as harbingers of the mayhem to come. They read:

Now, I have to admit that I don't consider myself very stupid. I even have a Physics degree and can just about master what a RAM is and how it differs from a ROM. But even now, two months into D-I-Y word processing, I still don't know what a Parallel (Centronics compatible) Printer is. I'm still a bit baffled by the phrase 'user port'. And my eyes still glaze over when I see the quaint term RS232C (aand its abbreviated but no less opaque form RS232).

But let me tell you about Appendix 3. This has what is called a 'Pin-out' for Parallel Printers in it. It says "The cable can be used to print to such a printer from a normal BASIC program". (How a cable can print at all, let alone to a printer, escapes me). There is a reference to 'ASCII values' – something which comes up in the main body of the manual but is not

explained there either. To its credit, Appendix B gives the phone number of Stack, the people who make RS232C adapters: this is nice. Because the manual fails to give the phone number of Wordcraft or, for that matter, Audiogenic. You then learn that you can run Wordcraft on printers which work at a number of different baud rates. This I can grasp, but I still don't know what a baud is.

All right. You get the picture. The manual is written for cognoscenti, not for the average ignoramus in the street. I won't say much more about it, except to draw attention to the things it leaves out. Often, when it refers to procedures involving disk drives, it fails to mention what happens with tapes. In the section on Wordcraft 'Commands', it fails to mention that reformatting text from a 23-character column width to, say a 75-character one can sometimes be impossible because it takes up too much memory to perform the operation (nor does it mention that reformatting to a smaller width, say 65, can allow you to scrape through. It fails to mention that, in contrast to reformatting widths, both Justification and the Wordcraft 'Control' that orders a new page to be started, show results only on the printed page, not on the screen. And so on.

Screen and board

Switch the Vic on and the 'start-up' screen appears. This allows you to tell the system which kind of printer you are using, whether it has automatic line and form feed, etc. Provided you know the answer to these questions (which isn't always the case), you can enter the appropriate values. Then, by pressing 'f1', the top function key in a row of four set next to the alphanumeric keyboard, you can go directly on to a screen that's ready to take words on it.

This all makes sense, though you can spend several happy minutes choosing the colours for the background, text and other functions on your TV screen. Gradually, you get into the habit of entering 'w,23' in the Command mode so as to make your text fall within the maximum 23-column width. I'd say that working in

LOW COST

23-columns is OK, but that I'm certainly lusting after the Commodore 64, which I'm told can handle 40-columns: as a journalist, I find it hard to follow a train of thought properly on a 23-column, 15-line screen. Such a format only allows me to look at 60-words, or three sentences at a time (and, since my paragraphs tend to be a bit longer than those in *The Sun*, that means I can only look at fractions of paragraphs, not whole ones, which is annoying).

Gradually, too, you get into the habit of using certain other Commands. You also learn about the dedicated keys and about the Controls. Now, I'll discuss Commands in a moment. For the present, let me observe that though the dedicated key and Control systems have their points they could be improved -- and hopefully will be when the Commodore 64 and its word processing software, *Easyscript*, become fully available. Here are some examples:

Cursor control is a hassle. There is an 'up/down' key and a 'left/right' one too: but depressing them only moves you down and to the right. To move up or to the left you have to press the 'Shift' key too. Particularly for going left, which one does frequently to insert words or make corrections, this operation is time consuming.

The key that allows you to delete and insert text has a similar Shift problem about it, but another one too -- it's right next to the one that takes you back to the top of the page you're on (the page, too, not the screen). As a result, you frequently find yourself in another place when all you wanted to do was rub a few characters out. Furthermore, when you depress the key continuously, the pace at which it opens up new space or deletes new characters, seems to vary. This ensures that you can rub out more text than you wanted to with ease. The pace seems to vary quite a lot -- giving paranoids the impression that the Vic is 'judging' what it is deleting!

Parts of the keyboard appear just silly, if only because Wordcraft doesn't exactly dovetail with the Vic. The key that puts you into

Command mode is labelled 'RUN STOP'. The key with the Commodore logo turns out to be the one that puts you into Control mode -- though there's another one labelled 'CTRL'. In addition, there are separate keys for colons and semi-colons, which seems an idiosyncrasy all the Vic's own; and, what's more, there seems little reason to use functions 'f8' and 'f8', since these involve performing shift operations on function keys 'f5' and 'f7' -- which makes the two routines just as time-consuming as those they are intended to short-cut.

There's no Control that gives automatic paragraph indentation. Is this a lot to ask?

Though you can remove a 'make a new line' Control, you can't remove a 'make a new page' one.

The removal of controls seems inordinately difficult -- and certainly harder than the placing of them.

Search and destroy

On, as promised, to Commands. The point about Commands is that they relate to storing and printing text. All I can say about them is this: unless you follow what the instruction manual says to the letter, it is enormously easy to search fruitlessly for documents you have succeeded in storing and to destroy documents that you're in the process of trying to store. It is also enormously easy to misdirect the printer; to fail to get the printer off and running, and indeed in instructing the printer to print -- to lose your cursor altogether.

I won't bore you with the details. But the routines for storing and printing are far from idiot-proof yet; idiot or not, there is nothing more irritating than having literal dexterity on the screen but losing it on tape, or being unable to turn it into hard copy.

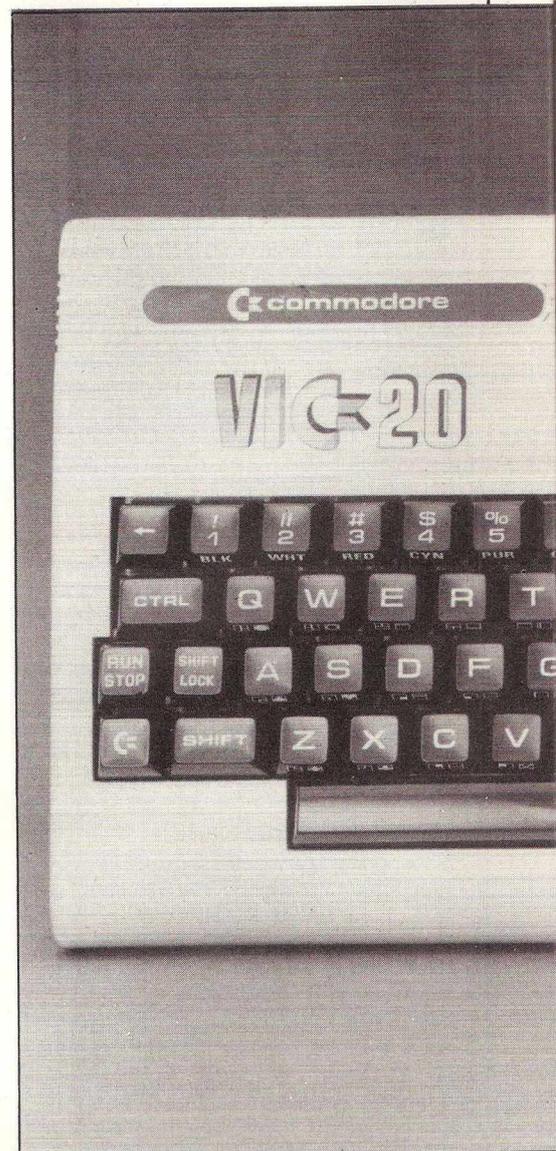
Furthermore, on the odd occasion that the system tells you have made an error, it fails to indicate what the error is -- still less how to avoid it in the future. Obviously, this would demand much more sophisticated software, but still...

All this said, I should in fairness note that the Commands, plus the dedicated keys and Controls on the screen, are pretty powerful. I still

haven't got to know all of them, but facilities to merge pages of documents held on tape into text on screen, to move blocks of text, to look for particular words and exchange them with others, to highlight text and so on are very useful.

A proper printer

Once I'd mastered wiring the system up, lost a few precious documents and gained some familiarity with the software, I came upon a major -- and still unsurmounted -- hurdle. To



WORD PROCESSORS

present copy to a high-calibre editor like Richard, you can't really make do with a Vic 1515 printer. You have to use thin, punched computer paper and the dot-matrix printing is often poor. The letters 'g' and 'p' in particular, are printed without descenders. So for proper journalism, and for decent letter writing too, you need a more upmarket printer.

Datarite, a smallish and newish company founded by American ex-journalist George Zygmund, supplies the kind of machine that makes sense.

Its 3500 printer is a converted Olivetti Praxis 35 typewriter and retails for about £500. The problem? The problem is that, as I discovered to my cost, the wiring between Vic and the RS232 Stack interface you'll need, inside said interface and between it and the 3500 – that wiring has to be just right. Indeed, *Datarite* spends a lot of its time responding to queries by users of Vic and other micros on just this subject.

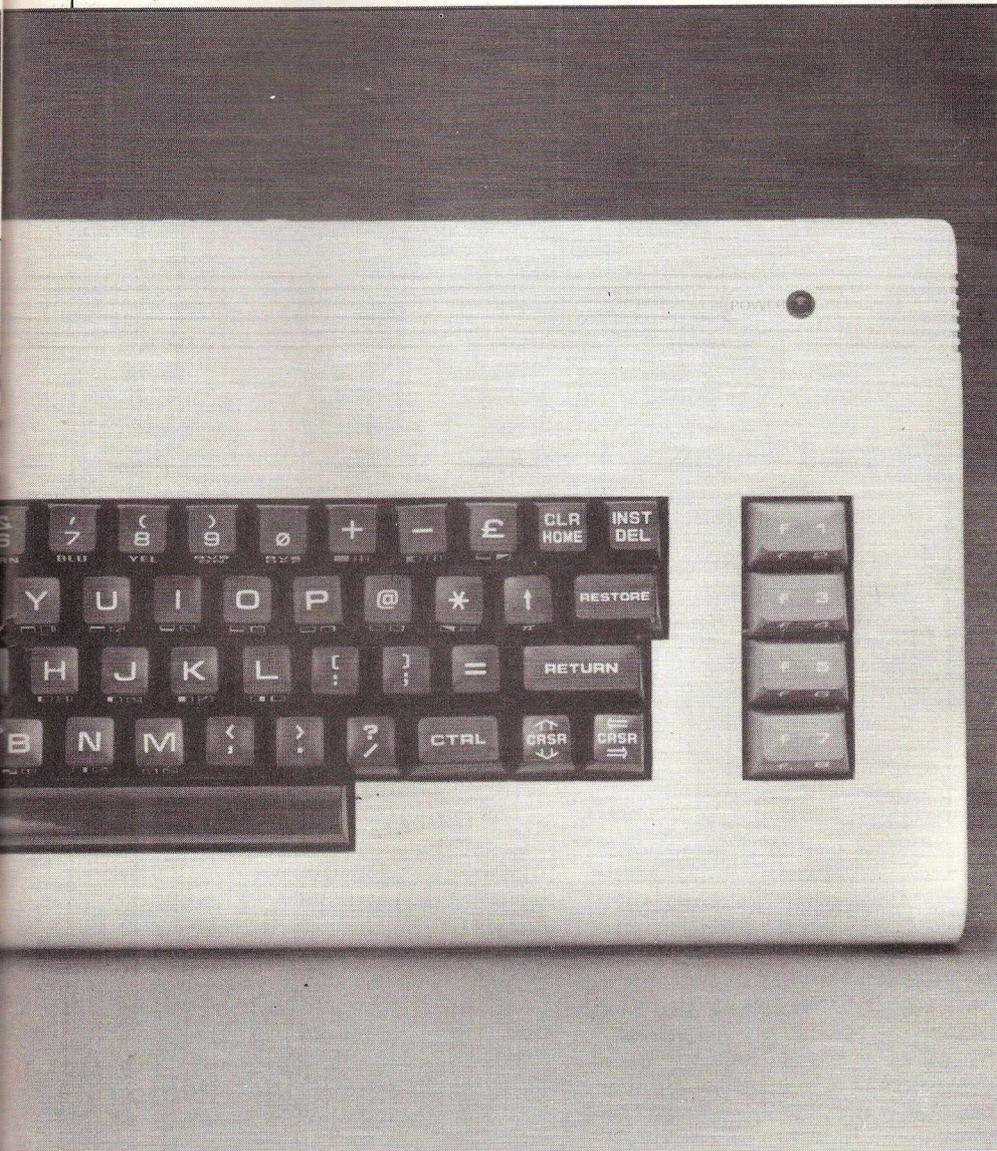
No matter how I tried, I couldn't get my Vic to drive my 3500 (and this

wasn't the fault of the *Datarite* manual, which, though far from perfect, made *Wordcraft 20 for the Vic* look worse than ever). So eventually, in the pouring rain, I hitch-hiked and took the tube all the way from Clapham Common, South London, to Chadwell Heath, Essex, carrying a weighty 3500 in one hand and the Vic in the other. Chadwell Heath is where *Datarite* is based and, very kindly (and not, I was assured, because I was a journalist, but because I was a customer "like anybody else"), one of the company's young and energetic staff picked me up from the station and press ganged his colleagues into spending a day establishing that I had a duff Stack interface.

Since that dreaded episode, *Datarite* has sent off the guilty component to Stack for replacement. But I am still without a kosher printer. I have tasted of the tree of word processing knowledge, but cannot fully act upon what I've learned – which is frustrating. I have been letting my correspondence, and my freelance articles, pile up for weeks in the hopes that I would be fully operational on the morrow. But I am not. My wife tells me to go back to simple typewriting, but I feel this is demeaning. My life has changed. Strange or not, crazy or sane, I have certainly experienced The Fall.

Conclusion

And that's the point. I am determined to see the whole thing through, get the rig working, write more articles on it and so earn enough money to buy one of my own. With the Vic costing less than £200, and the player and interface being £50 each or so, I can become a whole lot more professional for about £750. In practice, I'll probably buy a Commodore 64 (say, £300); this, with the 3500, will take me over the £1000 mark – but I now feel that's a small price to pay. The only thing I'd ask is that shoe-string word processor, hardware and software specialists have a word with me first before they hit the unsuspecting world with their wares. A word about ware, a word about manuals, a word about consumer psychology... a word, in short, about using words themselves.



LOW:WORD COST:PROCESSORS

Julian Allason tries out Sony's Typecorder



A chill wind blew through the office when all the typos in last month's *Hotline* column came to light. It was clear enough to your magnanimous correspondent where the fault lay. The typesetter had gone to sleep on the job. For some reason this view was not shared by any of my esteemed co-workers, and my artistic hand writing duly became the scapegoat.

This month, in place of the usual masterpiece of calligraphy, our wide-awake typesetters have received immaculate typescript generated on the *Typecorder* briefcaseable word processor loaned to me by those

awfully nice Sony people.

Its arrival presaged the treat in store: "With the compliments of Mr James Bond, sir," exclaimed the flunkey thrusting the elegantly wrapped package into my hands. Sony's one and only *Typecorder* had been delivered hot from the very studios where Mr. Roger Moore has been exercising his photogenic charm upon sundry semi-clad scrubbers (*Editor's note to typesetter: substitute 'starlets' for scrubbers*). Mr. Moore had not, it seemed, succeeded in exercising the tiny machine's full capabilities for fear of damage to his manicure. That apart, it would

probably otherwise have been the star of the film.

—Leaving aside the obvious image enhancement aspect, the *Typecorder* promises to prove itself as a very functional mini — or should that be micro? — word processor. Much of this review has been generated in railway carriages and hansom cabs, and one memorable interview with the lovely Katina took place in the back of a Birmingham taxi. All, as I say, typed via the full alphanumeric keyboard and 40 character LCD display into the *Typecorder's* 1800 character (about 300 words or one full page of A4) memory. Not a lot, I hear you mutter, and whilst I agree that Sony could certainly afford to be more generous with its RAM, and may well be by May when they launch it here, they don't *have* to be.

The system has been designed so that after a page's worth of text has been typed in, you save it onto tape, which takes about half a minute. The process is repeated for subsequent pages until the document is complete.

It can be edited at any stage by reloading the page in question, monekying about with it to correct the, ahem, typos and spelling errors prior to re-recording the corrected text.

Returning to the bosom of your family, or possibly your secretary, you plug the *Typecorder* into its equally diminutive printer and print it all out. It is worth saying that the print quality is excellent, comparable to most daisywheels, although the technology employed is actually ??

The *Typecorder* can also be used as a dictating machine, and as a useful bugging device if left on when you have a business meeting to stretch your legs or whatever, for a few minutes. It can be quite revealing to discover what your colleagues *really* think of you.

Disadvantages

It seems to me that the *Typecorder* suffers from three drawbacks. The first is the limited size of the screen display. A typical line of typewriting across an A4 page is between 60 and 80 characters in length. The *Typecorder* can handle this without difficulty, except that only 40

characters can be displayed at a time. Sony previously considered the possibility of scrolling along the display and rejected it in favour of a split line. So, you type the 41st character, the screen clears and the word you are in the middle of wraps around to the beginning of the display. It's not a major drawback, and you get used to it fairly quickly. Nonetheless, it constitutes a minor irritation which could be, and perhaps will be, resolved now that LCD's which are capable of resolving 80 characters are appearing.

For correspondence purposes the ideal must be a screen that can show the whole of an A4 page. At present only the more expensive dedicated word processors and microcomputers have this facility. It seems to me that four or five lines is the minimum necessary for true word processing. Sony themselves scrupulously avoid using this phrase and refer to a 'limited text editing facility', which seems fair enough.

The other limitation, which will be felt most acutely by those familiar with floppy disk based word processors, relates to the sequential nature of the tape storage. To locate a particular page, you would normally have to fast forward through the tape on a trial and error basis. For much of the time this isn't necessary, as you would routinely proceed sequentially, printing out the first page first, and then the second, and so on.

The simple answer would be to add more memory, possibly of the non-volatile variety that remembers text even when switched 'off'. However, I suspect that Sony have another solution to the problem in mind, in the shape of their 3½" floppy disk drive. These are available now; indeed Hewlett-Packard have just bought a quarter of a million of the critters which would appear to fit nicely into the *Typecorder* design. The only immediate difficulty I foresee would be the strain it would place on the rechargeable nickel cadmium batteries that currently provide power for three or four hours continuous use. I doubt the problem is insoluble for a company employing 700 scientists in their electronic research division.

Advantages

It really works. You genuinely can use it to type in places where work is normally considered impossible. I even managed to write part of this report in a night club, which is admittedly taking matters too far. It is small. And light. And the keyboard is a pleasure to use. And it is the only computer ever to have passed the ultimate Allason test: you don't need to read the manual before using it!

If Sony want their *Typecorder* back, they'll have to send the goon squad to collect it.

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Interfaces: Direct to Sony Compact Printer, Series 35 word processors and Sony Modem. Via Communication/Printer unit to most letter quality printers.

Accessories supplied: Earphone, communication cable; microcassette tape; head cleaning set.

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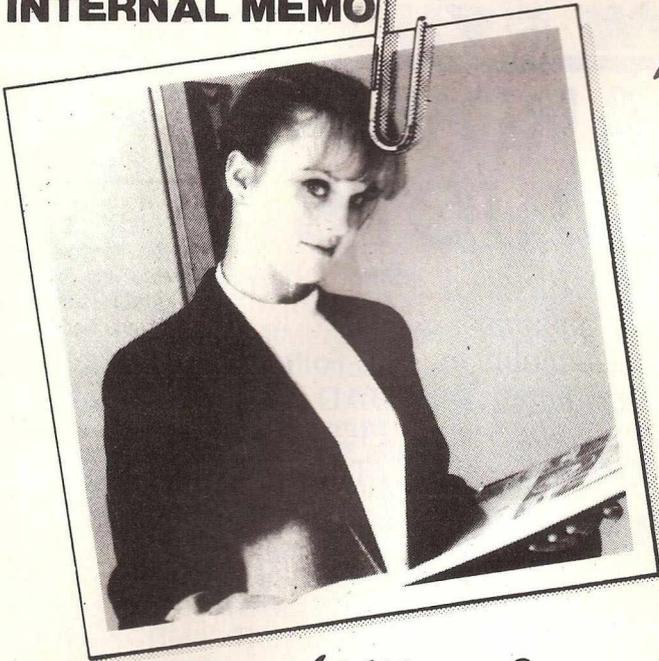
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INTERNAL MEMO



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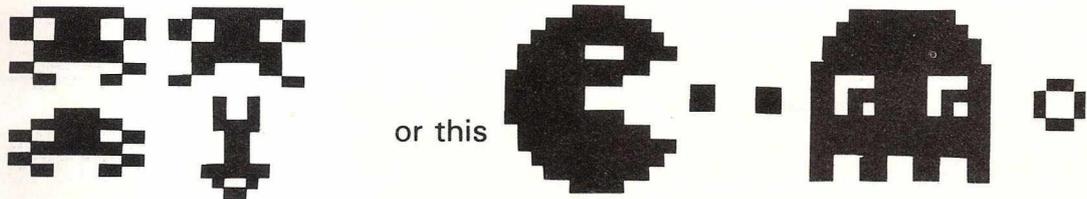
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CRITICAL PATH ANALYSIS

There are many techniques available these days to help industry plan, co-ordinate and control large projects. One such technique, widely used, is Network Planning using Critical Path Analysis. Network Planning is at its most useful when the project is one that requires the control and co-ordination of a multiplicity of concurrent activities, all leading to the same goal.

This article cannot hope to do justice to such a large and sophisticated subject; for an in-depth coverage, I suggest you pay a visit to your local bookshop or library where you are certain to obtain any one of a number of excellent books on the subject. However, in order to give the reader a reasonable understanding of what the program is doing, I will first touch on some of the fundamental concepts of Critical Path Analysis.

Network Chart

A Network Chart is simply a series of lines connected up, each line representing one activity within the total project. The position of the lines shows the logical order in which the activities are to be carried out. The flow of activities is always from left to right. Figure 1 is an example, albeit a very simple one, of a network chart.

Care must be exercised when drawing up the network since it is the basis of all that follows. Three simple rules should be observed when considering the position of each activity within the network:-

- 1 What activities *must precede and be finished* before this one can start?
- 2 What activities *must follow* this one?
- 3 What activities can be carried out *concurrently* with this one?

Events

Events (also called milestones or nodes) are those points which connect up activities. Each activity always starts and ends at an event. Each event has a number so each activity has a pair of numbers which uniquely identify that activity. *Architect's plans* in Figure 1 starts at event 3 and finishes at event 5, so is uniquely referred to as activity 3-5.

As the direction of the network flow is from left to right, the numbering of events should reflect this.

ACTIVITIES

Each activity normally lasts for a specific length of time, estimated by the designer of the network. The exception to this is when it is necessary to insert a *dummy activity* in the network in order to preserve the logic of the whole. For example, two or more activities might have the same logical start and finish points and to ensure they each have a unique number and position in the network, dummy activities (usually shown by a dotted line) have to be included in the network. Dummy activities do not consume time or resources. Activity 3-4 in the example has been included to separate and distinguish between Architect's plans and Solicitor's search, both of which start at event 3 and end at event 5.

Certain activities can consume time without consuming resources; waiting for a cement floor to dry is one example.

Event Times

Each activity is given an estimated amount of time for its completion. The number in the boxes at Figure 1 represents the length of time, in days, of the respective activity (the program also assumes days to be the base unit of time). As you can see, certain activities run parallel to, and overlap, others. The first step in the analysis is to calculate the *earliest* and *latest* times at which each event can take place.

Earliest Event Time (ET)

The ET is the earliest time at which the event can start. Event 1 (or which ever number your series starts at) is assigned an ET of 1. Some systems prefer to start at day zero but I have found the output from the program to be more readily comprehensible if we start at day 1.

The ET of all subsequent events is calculated by taking the duration of the longest path from the start event up to the beginning of the event in question. In our example, the longest path to activity 5 is 1-2 and 2-5 giving 20 days (the alternatives of 1-2-3-5 and 1-2-3-4-5 give 16 and 14 days respectively). Activity 5 therefore starts on day 21. You must bear in mind that a start time always occurs in the morning of the day and the finish time always takes place in the evening of the day e.g. activity 1-2 starts in the morning of day 1 and ends on the evening of day 5.

Latest Event Time (LT)

The completion of the project should not be delayed beyond its earliest completion time. It follows that the latest start time for the final event must be the same as the earliest start time for this event. Working backwards from the final event, the latest start time for an event is the latest time of the succeeding event less the duration of the shortest path from the event under consideration to the final event. Thus, in

Network for opening a Guest House

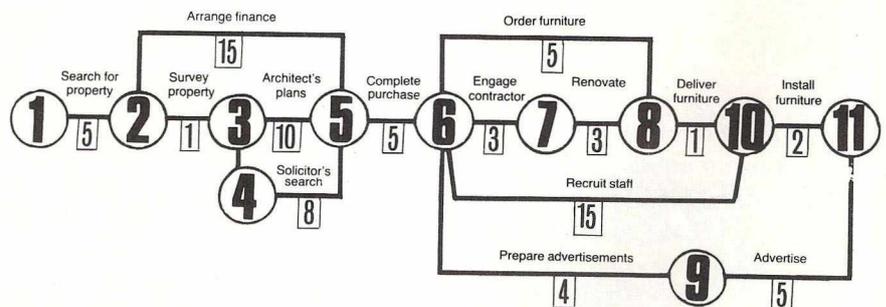


Figure 1

our example, the latest start time for event 11 has been calculated as 43 (path 1-2-5-6-10-11) so event 10 has an LT of 41 (43 less 2) and event 8 has an LT of 40 (41 less 1).

Slack Time

Having determined an ET and LT for each event, we can calculate the slack time for each event by deducting the ET from the LT. Those events which have no slack time, that is those where the ET and LT are the same, are called Critical Events as they have no spare time between the earliest and latest times at which they can start. Figure 2 shows the results of the calculations based on our example.

Critical Path

The longest path, in duration, from the start event to the terminal event is known as the Critical Path since it is this path which determines the length of the entire project. Making this path shorter or longer will bring forward or put back the project completion date respectively. Shortening the duration of activities which are not critical will not effect the length of the project as a whole, although lengthening them might well do so.

Event Table

EVENT	ET	LT	SLACK
1	1	1	0
2	6	6	0
3	7	11	4
4	7	13	6
5	21	21	0
6	26	26	0
7	29	37	8
8	32	40	8
9	30	38	8
10	41	41	0
11	43	43	0

Figure 2

Activity Times

For each activity, we can calculate 4 times:- Earliest Start Time, Latest Start Time, Earliest Finish Time and Latest Finish Time.

1. Earliest Start Time (EST)

The earliest time an activity can start is the Earliest Time (ET) of the immediately preceding event. In the example, the EST of activity 2-5 is 6 since the ET of event 2 is 6.

2. Earliest Finish Time (EFT)

This is calculated by adding the duration of the activity to the EST. Thus the EFT of activity 2-5 is 20 (start on the morning of day 6, duration is 15 days, therefore finish on the evening of day 20). The largest EFT is the earliest day on which the project can be completed.

3. Latest Finish Time (LFT)

The latest finish time is the evening before the latest time (LT) of the event terminating that activity. For example, the LFT of activity 6-7 is 36.

4. Latest Start Time (LST)

The latest starting time is the duration back from the activity's latest finish time (LFT). Thus the LST of activity 6-7 is 34 (start on morning of day 34, duration 3 days, finish on evening of day 36).

Activity Free Float (FF)

The free float of an activity is the amount of time by which it can be delayed without delaying any succeeding activities. The FF is the difference between the EFT of the activity and the EST of the activity immediately following. Activity 6-8's FF is 1 (EFT of activity 6-8 is evening of 30, EST of activity 8-10 is morning of day 32, therefore 1 day spare).

Activity Total Float(TF)

The total float of an activity is the amount of time by which it can be delayed without delaying any succeeding activities. The TF is the difference between the EFT of the activity and the LST of the activity immediately following. Activity 6-8's TF is 1 (EFT of activity 6-8 is evening of day 30, LST of activity 8-10 is morning of day 32, therefore 1 day spare).

Resources

Resources, often in the form of labour, can be estimated and allocated to each activity.

Activity Table

	DUR	EST	EFT	LST	LFT	TF	FF
1-2	5	1	5	1	5	0	0
2-3	1	6	6	10	10	4	0
2-5	15	6	20	6	20	0	0
3-4	0	7	7	13	13	6	0
3-5	10	7	16	11	20	4	4
4-5	8	7	14	13	20	6	6
5-6	5	21	25	21	25	0	0
6-7	3	26	28	34	36	8	0
6-8	5	26	30	35	39	9	1
6-9	4	26	29	34	37	8	0
6-10	15	26	40	26	40	0	0
7-8	3	29	31	37	39	8	0
8-10	1	32	32	40	40	8	8
9-11	5	30	34	38	42	8	8
10-11	2	41	42	41	42	0	0

Figure 3

CRITICAL PATH ANALYSIS

Analysis

With all the above figures, we now have sufficient information to be able to carry out a reasonable job of planning and controlling our project. The Network Chart will show the Critical Path and can be tested and amended to examine the effects of extending or shortening various activities. The Critical Path is likely to change with such amendments and the user can determine and plan for these effects on the project. Indeed, it can also reveal whether the project has any real hope of being completed within the given parameters.

The spread and loading of resources (labour) can be studied for peaks, troughs, excessive demands on a limited supply or over allocation on an activity which could safely be lengthened if less labour were allocated to it. The resources can be manipulated across the project to see the various effects and decide on the best use of them.

Critical Path Analysis is of real benefit to a project as it enables the project manager to forecast, identify, co-ordinate, control and plan for any changes in the critical, sub-critical and other activities within the project, and to perform these functions in a methodical, simple, fast and effective manner.

THE PROGRAM

The program gives you the facility to build up data on a network, to analyse it in different ways, to amend so as to test out assumptions, and to save it on disk. The program menu offers 10 options, each of which is now dealt with in turn.

Build a Network

This option, and those that follow, assume you have drawn up your network chart. It requests you to enter the total of event nodes and the total number of activities, including dummy activities. Normally, the latter (activities) are more numerous than the former (events) unless you have what is virtually a straight line network (and you are unlikely to need critical path analysis if it is!). The start event number is usually allocated the number 1 but the program allows you to have any number as the start. This can be useful if you have a number of sub-projects which you wish to handle separately.

For each activity, the program requires you to enter a descriptive name, the event number immediately preceding it and the event number immediately following it. These two numbers are then used as the unique number to reference that activity.

At the same time, the program assembles a precedence table in order to know exactly where each activity fits in the network. Activities can be entered in any order as the program will sort them into ascending activity order when all activities have been entered. In case you lose track of what the previous activity was that you entered, the program keeps this on screen to remind you.

When all activities are entered, the program checks to make sure there is an activity for each event. If not, it reports an error and automatically restarts the program back at the menu. If all is well, the activities are sorted by activity number (e.g. 1-2, 2-3, etc) and you are invited to enter a start date for the first event. If you choose to do so, you will always be given the option of having your information displayed by either dates or day numbers (the program assumes days to be the unit of time). The date facility calculates all forward dates and allows for leap years. If you do not require a start date, all displays will be in a number-of-days format only.

For each activity, the program will then display the activity name and number and ask you to enter the duration of that activity. A zero duration is acceptable (remember those dummy activities). It will also ask you to enter the total of resource units needed for that activity. Again, zero is perfectly acceptable (remember the drying cement). Having completed these entries, your network is now in the computer's memory. The program can now go on to swiftly calculate all the event early and late start times, all the early and late start and finish times of the activities, and the consequent critical path. Appropriate messages are flashed on the screen while it does this (a matter of seconds for our example network). The program then returns you to the menu.

Display Event Table

You may display the event table in any of 4 orders: by event number, by earliest time, by latest time or by slack. It can also be displayed using the date format (e.g. 22/12/82) – assuming you allocated a start date – or by days (e.g. 14). The event table shows the earliest date (or day number) on which each event can start, the latest date and the amount of slack.

Display Activity Table

You can display the activity in any one of 9 sorted orders: by activity number, duration, resource, earliest start time, earliest finish time, latest start time, latest finish time, total float or free float. All the above fields will appear on the display.

Because of the limitations of screen width (the program was written using a 40 column PET), certain restrictions have been introduced. If you choose to display using number-of-days format, you will be asked whether you want duration or resources shown – there is not enough room to show both as well as all the other info. If you have selected the date format, the display will include both duration and resources, but only three activities will be shown at a time. In both cases, the program keeps a check of how much information has been placed on the screen and will stop to allow you to 'turn the page' at appropriate times. The activity number of any critical path activity is displayed in reverse video.

Display Activity Barchart

The display will show a stylised barchart for each 30 days of the project. Critical activities have their activity numbers shown in reverse and their duration on the barchart is represented by asterisks. Non-critical activities are shown as 'greater than' signs. The barchart is particularly useful for being able to see the various overlap of activities in a graphic form.

Display Critical Path

This option will allow you to see the activity names and numbers, the duration and the latest start times of all activities on the critical path. Again, date or days format may be requested.

Display Resource Histogram

All resources used on the project will be displayed in the form of a histogram, total resources (up to 20 units) by days, thus enabling the user to see precisely where the peaks and troughs fall (vitaly important if there is only a limited amount of resource available at any given time) and to determine what action to take to smooth out the loading.

Amend The Data

This facility gives real power to the user as it enables him to make changes to the network and to see immediately the effects this has on the whole project. It gives the ability to use the 'what if' approach. Although the facility is limited in that it does not allow you to insert, delete or re-order activities, it does allow the amending of duration of an activity and the resources attached to that activity. The user can thus shuffle the resources, by lengthening or shortening activity times, and can then return to the other options to see what effects these changes have had. If you want to preserve the original network,

PROGRAM SUMMARY

20-70	Routine to convert total number of days into day, month and year format. Placed at the beginning to make the program run fast since this routine accessed frequently.
75-180	Obtain basic details of network. Convert preceding and following event number into single activity number by multiplying preceding event by 1000 and adding following event e.g. activity 1-2 held as 1002.
185-230	Check and sort the activities into activity number order.
235-290	Obtain starting date and convert to total number of days from January 1972
295-335	Obtain duration and resource of each activity
340-420	Calculate early and late event start times by scanning forwards and backwards through the arrays.
425-450	Calculate event slack time and critical path
455-490	Calculate, for each activity, early and late start and finish times, total and free float.
495-605	Amend network subroutine.
610-670	Sort event table.
675-725	Display event table.
730-820	Sort activity table.
825-960	Display activity table by date or number of days.
965-1020	Display critical path.
1025-1110	Display activity barchart. The simple graphics in lines 1065 and 1070 may be replaced with minus signs if you do not have graphics on your micro.
1115-1175	Display resource histogram. You may replace the asterisk and greater-than symbols with your own choice.
1180-1255	Call or save a network on disk. You will need to replace some of this with your own micro's disk commands. The CHR\$(13) in the save code is peculiar to PETs with pre-BASIC 4.
1260-1380	Exit program and menu routines.
1385-1400	Pause until user presses the space key.
1405-1450	Initialise variables. Array size set when user enters total events and activities (lines 1470-1480).
1455-1460	Checks number of lines on screen and calls pause routine.
1465-1480	DIMension arrays.
1485-1510	Choice of date or days routine.

The reverse heart symbol is Clear Screen. Reverse S is Home cursor.

The program text occupies 11k – this will expand in proportion to the size of the network being entered.

MAJOR VARIABLES

TE	Total number of events
TA	Total number of activities
AC\$(TA)	Name of each activity
ET(TE,3)	For each event:- Occurrence 1 is earliest start time. Occurrence 2 is latest start time. Occurrence 3 is slack time.
AD(TA,10)	For each activity:- Occurrence 1 is activity number. (e.g. 7011 = 7-11). Occurrence 2 critical path indicator (1 if critical, 0 if not). Occurrence 3 duration. Occurrence 4 earliest start time. Occurrence 5 earliest finish time. Occurrence 6 latest start time. Occurrence 7 latest finish time. Occurrence 8 total float. Occurrence 9 free float. Occurrence 10 resources.
PT(TE,TE)	Precedence table. If looked at as PT (row, column) then Row represents following event. Col represents preceding event. The array element is set to 1 where row and column coincide (e.g. activity 6-8 means PT(8,6) set to 1).
SR(TA)	Sort array. Rather than re-sort the large AD array, whenever an activity sort is required, this array, each element of which contains a pointer to one of the AD rows, is sorted instead. Thus if after a sort, SR(1) = 5 and SR(2) = 28 then when printing the activity table, AD(5) would be printed first, followed by AD(28), etc. When sorting, the relevant elements of AD are compared but instead of swapping around these elements plus the other 9 in the appropriate rows of AD, the SR elements containing the pointers to those two AD rows are swapped instead. If you have a large number of secondary (or higher) dimensioned elements, it is faster to exchange pointers than to keep moving the actual array round.
SD	Set to 1 if a starting date requested, 0 otherwise.
TD	Start date converted to total number of days from 1.1.72.
SB	The number to be added to each activity number if the user has elected to have a starting event number higher than 1.
NW	Set to 1 if network present in memory, zero otherwise.
D1\$	In 12 pairs of numbers, days in each month of a non-leap year.
D2\$	In 12 pairs of numbers, days in each month of a leap year.
D3\$	In 12 pairs of numbers, total days (aggregated) at each month in the year.

CRITICAL PATH ANALYSIS

you will have to write it to disk (by using the SAVE) option before applying any amendments to the network. When all changes have been entered, the program automatically recalculates the times of the whole network. In addition, the amend option also allows you to change the start date of the project at any time.

Save To/Call From Disk

These options allow you to save any new or amended networks on disk and to call them back up when you require them. The program has some in-built safety devices: you cannot call up a network if you have previously created or called up one in this run - you will need to exit (perhaps first saving the network to disk) and then re-run the program. This is to prevent you accidentally overwriting any network already stored in memory. Similarly, when you use the other options, the program will display an error message if no network has previously been called up or created.

Exit The Program

Selecting this option will cause the program to prompt you with an 'Are you sure?' message. Pressing any other letter than 'Y' will return you to the menu.

The best way to become familiar with the program is by entering data based on the example network. Then, when conversant with the facilities, you can start to use it in a real-life situation. The program could be improved by the addition of hard copy (i.e. printed paper listings) - this should be quite easy to implement given the documentation covering this program. I think any business manager will find the use of Critical Path Analysis a valuable tool in the world of project management.

```
5 REM*** CRITICAL PATH ANALYSIS ***
10 REM*** BOB CHAPPELL 16/10/82 ***
15 GOSUB1410:GOTO1290
20 REM*** CONVERT DAYS INTO DATE ***
25 D3=A1:YN=INT(DN/A2):DN=ND-(YN*A2)-INT((YN+A3)/A4):IFDN<0GOTO35
30 YN=YN-A7:DN=DN+A2:IFINT((YN/A4)=YN/A4)THENDN=DN+A7
35 D1=0:IFINT((YN/A4)=YN/A4)THEND1=A7
40 D2=VAL(MID$(D3#,D3,A3)):IFD2>A5THEND2=D2+D1
45 IFDN<D2THEND3=D3-A3:GOTO40
50 L=LEN(STR$(DN-D2))
55 PRINTRIGHT$(D3+RIGHT$(STR$(DN-D2)+"/",L),A3);
60 L=LEN(STR$(D3+A8)/A3)
65 PRINTRIGHT$(D3+RIGHT$(STR$(D3+A8)/A3)+"/",L),A3);
70 PRINTRIGHT$(STR$(YN+A6),A8):;RETURN
75 REM*** BUILD NETWORK ***
80 PRINT"Q3 BUILD THE NETWORK "
85 PRINT:PRINT"INCLUDING ANY DUMMY NODES,"
90 PRINT:PRINT"WHAT IS THE TOTAL NUMBER OF":PRINT:INPUT"EVENT NODES":A#
95 TE=VAL(A#):IFTE<3GOTO85
100 PRINT:PRINT"INCLUDING ANY DUMMY ACTIVITIES,"
105 PRINT:PRINT"WHAT IS THE TOTAL NUMBER OF":PRINT:INPUT"ACTIVITIES":A#
110 TA=VAL(A#):IFTA<1GOTO105
115 PRINT:PRINT:INPUT"WHAT IS THE START EVENT NUMBER":A#
120 SE=VAL(A#)-1:IFSB<0GOTO115
125 GOSUB1470
130 FORJ=1TOTA:PRINT"ENTER THE NAME OF THE ACTIVITY AND THE
135 PRINT:PRINT"EVENT NUMBERS WHICH IMMEDIATELY PRECEDE
140 PRINT:PRINT"AND FOLLOW IT.":IFJ=1GOTO155
145 PRINT:PRINT"LAST ACTIVITY ENTERED WAS
150 PRINT:PRINTC+SB;"-";R+SB;" ";AC$(J-1)
155 PRINT:PRINT:INPUT"ACTIVITY NAME":AC$(J)
160 PRINT:PRINT:INPUT"PRECEDING EVENT NUMBER":A#:C=VAL(A#)-SB
165 IFC<0ORC<1ORC>TE-1THENPRINT"INVALID NUMBER":GOTO160
170 PRINT:INPUT" FOLLOWING EVENT NUMBER":A#:R=VAL(A#)-SB
175 IFR<0ORR<2ORR>TEORR=CTHENPRINT"INVALID COMBINATION":GOTO160
180 PT(R,C)=1:AD(J,1)=C*1000+R:NEXTJ
185 REM*** CHECK FOR MISSING EVENTS ***
190 PRINT"Q4 CHECKING ":Y=0:FORC=1TOTE-1:X=0:FORR=2TOTE:IFPT(R,C)=1THENX=1
195 NEXTR:IFX=0THENY=1:PRINT:PRINT"NO ACTIVITY STARTING AT EVENT":C+SB
200 NEXTC:IFY=1THENPRINT:PRINT"THE PROGRAM WILL BE RESTARTED":GOSUB1390:RUN
205 REM*** SORT BY ACTIVITY NO ***
210 PRINT"Q5 SORTING ":FORJ=1TOTA-1:FORK=J+1TOTA
215 IFAD(J,1)<AD(K,1)GOTO230
220 A=AD(J,1):AD(K,1)=AD(J,1):AD(J,1)=A
225 A#=AC$(J):AC$(J)=AC$(K):AC$(K)=A#
230 NEXTK,J:GOSUB240:GOTO300
235 REM*** START DATE ***
240 PRINT"Q6 STARTING DATE":PRINT:PRINT
245 PRINT:PRINT"ENTER THE PROJECT START DATE (DDMMYY)"
250 PRINT:PRINT"TYPE * IF NONE REQUIRED"
255 SD=0:PRINT:PRINT:INPUT"START DATE":SD#:IFSD#="*"THENS0=1:GOTO290
260 D=VAL(LEFT$(SD#,2)):M=VAL(MID$(SD#,3,2)):Y=VAL(RIGHT$(SD#,2))
265 IFM<10ORM>12ORY<72ORY>99ORC<10RD<31THENPRINT:PRINT"INVALID DATE":GOTO255
270 Y=Y+1900:IFINT((Y/4)=Y/4)THEND1=D2
275 Y=Y-1900:IFD<VAL(MID$(D1#,M*2-1,2))THENPRINT:PRINT"INVALID DATE":GOTO255
280 TD=D+(Y-72)*365+INT((Y-69)/4)+VAL(MID$(D3#,3,M-2,3))
285 IFD<2AND(1900+Y)/4=INT((1900+Y)/4)THENTD=TD+1
290 RETURN
295 REM*** DURATION AND RESOURCE ***
300 FORJ=1TOTA:PRINT"Q7 ACTIVITY DURATION AND RESOURCES ":PRINT
305 PRINT:PRINT"ENTER THE DURATION OF THE ACTIVITY.":PRINT
310 F=INT(AD(J,1)/1000):T=AD(J,1)-F*1000+SB:F=F+SB
315 PRINTF;" ";T;" ";AC$(J)
320 PRINT:INPUT"NO. OF DAYS":A#:A=VAL(A#):IFAC<0GOTO320
325 AD(J,3)=A:PRINT:PRINT"ENTER THE RESOURCE UNITS ALLOCATED."
330 PRINT:INPUT"UNITS":A#:A=VAL(A#):IFAC<0GOTO330
335 AD(J,4)=A:NEXTJ
340 REM*** EVENT EARLIEST START TIMES ***
345 PRINT"Q8 CALCULATING EVENT EARLIEST START TIMES "
350 FORJ=1TOTE:IFORK=1TOD:ET(J,K)=0:NEXTK,J:ET(1,1)=1:FORR=2TOTE:FORC=1TOTE-1
355 IFPT(R,C)=0GOTO375
360 AN=C*1000+R:FORJ=1TOTA:IFAD(J,1)<ANGOTO370
365 IFAD(J,3)+ET(C,1)>ET(R,1)THENET(R,1)=AD(J,3)+ET(C,1)
370 NEXTJ
375 NEXTC,R
380 REM*** EVENT LATEST START TIMES ***
385 PRINT"Q9 CALCULATING EVENT LATEST START TIMES "
390 ET(TE,2)=ET(TE,1):FORR=TET02STEP-1:FORC=TE-1T01STEP-1
395 IFPT(R,C)=0GOTO420
400 AN=C*1000+R:FORJ=1TOTA:IFAD(J,1)<ANGOTO415
405 IFET(C,2)=0THENET(C,2)=ET(R,2)-AD(J,3):GOTO415
410 IFET(R,2)-AD(J,3)<ET(C,2)THENET(C,2)=ET(R,2)-AD(J,3)
415 NEXTJ
420 NEXTC,R
425 REM*** SLACK TIME ***
430 FORJ=1TOTE:ET(J,3)=ET(J,2)-ET(J,1):NEXTJ
435 REM*** CRITICAL PATH ***
440 FORJ=1TOTA:AD(J,2)=0:F=INT(AD(J,1)/1000):T=AD(J,1)-F*1000
445 IFET(F,3)=0ANDET(T,3)=0ANDET(T,1)-ET(F,3)=AD(J,3)THENAD(J,2)=1
450 NEXTJ
455 REM*** ACTIVITY START/FINISH/FLOAT ***
460 PRINT"Q10 CALCULATING ACTIVITY TIMES "
465 FORJ=1TOTA:F=INT(AD(J,1)/1000):T=AD(J,1)-F*1000
470 AD(J,4)=ET(F,1):AD(J,5)=AD(J,4)+AD(J,3)-1
475 AD(J,7)=ET(T,2)-1+AD(J,6)+AD(J,7)-AD(J,3)+1
480 AD(J,8)=AD(J,7)-AD(J,5):AD(J,9)=ET(T,1)-AD(J,5)-1
485 IFAD(J,3)=0THENAD(J,5)=AD(J,4):AD(J,7)=AD(J,6)
490 NEXTJ:GOTO1290
495 REM*** AMEND DATA ***
500 PRINT"Q11 THE(14):"Q2 AMEND DATA "
```

```
505 PRINT:PRINT"1. AMEND AN ACTIVITY
510 PRINT:PRINT"2. AMEND THE STARTING DATE ":PRINT
515 PRINT:INPUT"WHICH NUMBER";A#:A=VAL(A#):IFA<10RA:2GOTO515
520 IFA=1GOTO530
525 GOSUB240:GOTO345
530 PRINT"Q";TAB(7);"2 AMEND ACTIVITY "
535 PRINT:PRINT"ENTER ACTIVITY NUMBER (E.G. 1-5)
540 PRINT:PRINT"ENTER * TO RETURN TO MENU.":Z=0
545 PRINT:INPUT"ACTIVITY";A#:L=LEN(A#)
550 IFA#="*":GOTO345
555 PRINT:FORJ=1TOL:IFMID$(A#,J,1)<>"-":GOTO565
560 C=(VAL(LEFT$(A#,J-1))-SB)*1000:P=VAL(RIGHT$(A#,L-J))-SB:K=C+R:J=L:Z=1
565 NEXTJ:IFZ=0GOTO580
570 Z=0:FORJ=1TOTA:IFK=AD(J,1)THENZ=1:K=J:J=TA
575 NEXTJ
580 IFZ=0THENPRINT"NO SUCH NUMBER":FORJ=1T02000:NEXT:GOTO530
585 PRINT:PRINT"CURRENT DURATION IS ":AD(K,3)
590 PRINT:INPUT"NEW DURATION IS":A#:A=VAL(A#):IFA<0GOTO590
595 AD(K,3)=A:PRINT:PRINT"CURRENT RESOURCE IS ":AD(K,10)
600 PRINT:INPUT"NEW RESOURCE IS":A#:A=VAL(A#):IFA<0GOTO600
605 AD(K,10)=A:GOTO530
610 REM*** SORT EVENT TABLE ***
615 PRINT"Q";TAB(12);"2 EVENT TABLE "
620 PRINT:PRINT"IN ASCENDING ORDER OF:-
625 PRINT:PRINTTAB(10);"1. EVENT
630 PRINT:PRINTTAB(10);"2. EARLIEST TIME
635 PRINT:PRINTTAB(10);"3. LATEST TIME
640 PRINT:PRINTTAB(10);"4. SLACK":PRINT
645 PRINT:INPUT"ORDER NUMBER";A#:S=VAL(A#):IFS<10RS:4GOTO645
650 FORJ=1TOTE:SR(J)=J:NEXTJ:IFS=1GOTO675
655 PRINT"Q";SORTING EVENTS "":S=S-1:FORJ=1TOTE-1:FORK=J+1TOTE
660 IFET(SR(J),S)<ET(SR(K),S)GOTO670
665 A=SR(J):SR(J)=SR(K):SR(K)=A
670 NEXTK,J
675 PRINT"Q";TAB(12);"2 EVENT TABLE ":GOSUB1490
680 REM*** DISPLAY EVENT TABLE ***
685 Z=0:LN=0:FORJ=1TOTE:LN=LN+1:IFLN>16THENGOSUB1460
690 IFZ=0THENPRINT"Q";TAB(12);"2 EVENT TABLE ":PRINT
695 IFZ=0THENPRINT"EVENT ET LT SLACK":PRINTLN#:Z=1
700 K=SR(J):PRINTK+SB:TAB(10);:IFN=1THENGOSUB175:GOTO710
705 PRINTET(K,1):TAB(21);ET(K,2):TAB(32);ET(K,3)
710 NEXT:PRINTLN#:PRINT:GOSUB1390:GOTO1290
715 ND=ET(K,1)+TD-1:GOSUB25
720 ND=ET(K,2)+TD-1:PRINTTAB(21);:GOSUB25:PRINTTAB(32);ET(K,3):RETURN
725 ND=ET(K,3)+TD-1:PRINTTAB(30);GOSUB25:PRINT:RETURN
730 REM*** SORT ACTIVITY TABLE ***
735 PRINT"Q";TAB(12);"2 ACTIVITY TABLE ":PRINT
740 PRINT:PRINT"IN ASCENDING ORDER OF:-
745 PRINT:PRINTTAB(10);"1. ACTIVITY
750 PRINT:PRINTTAB(10);"2. DURATION
755 PRINT:PRINTTAB(10);"3. EARLIEST START TIME
760 PRINT:PRINTTAB(10);"4. EARLIEST FINISH TIME
765 PRINT:PRINTTAB(10);"5. LATEST START TIME
770 PRINT:PRINTTAB(10);"6. LATEST FINISH TIME
775 PRINT:PRINTTAB(10);"7. TOTAL FLOAT
780 PRINT:PRINTTAB(10);"8. FREE FLOAT
785 PRINT:PRINTTAB(10);"9. RESOURCES":PRINT
790 PRINT:INPUT"ORDER NUMBER";A#:S=VAL(A#):IFS<10RS:9GOTO790
795 S=S+1:IFS=2THENS=1
800 PRINT"Q";SORTING ACTIVITIES "":FORJ=1TOTA:SR(J)=J:NEXTJ:IFS=1GOTO825
805 FORJ=1TOTE-1:FORK=J+1TOTA
810 IFAD(SR(J),S)<AD(SR(K),S)GOTO820
815 A=SR(J):SR(J)=SR(K):SR(K)=A
820 NEXTK,J
825 PRINT"Q";TAB(12);"2 ACTIVITY TABLE ":GOSUB1490:IFN=1GOTO910
830 PRINT:PRINT"YOU CAN DISPLAY EITHER:":PRINT:PRINT"1. DURATION
835 PRINT:PRINT" OR":PRINT:PRINT"2. RESOURCES":PRINT
840 PRINT:INPUT"WHICH NUMBER";A#:A=VAL(A#):IFA<10RA:2GOTO840
845 CH=3:XS="DUR":IFA=2THENCH=10:XS="RES"
850 REM*** DISPLAY ACTIVITIES BY UNIT ***
855 Z=0:LN=0:FORJ=1TOTA:P=SR(J):F=INT(AD(P,1)/1000):T=AD(P,1)-F*1000+SB
860 F=F+SB:B#MID$(STR$(F),2)+ "-" +MID$(STR$(T),2)
865 LN=LN+1:IFLN>16THENGOSUB1460
870 IFZ=0THENPRINT"Q";TAB(12);"2 ACTIVITY TABLE ":PRINT
875 IFZ=0THENPRINT"ACTIV "":XS=" EST EFT LST LFT TF FF":PRINTLN#
880 IFAD(P,2)=1THENPRINT"2";B#;"":GOTO880
885 PRINTB#;
890 PRINTTAB(6);STR$(AD(P,CH));
895 Z=1:FORK=4T09:PRINTTAB(2);STR$(AD(P,K));
900 Z=2+5:NEXTK:PRINT:NEXTJ:PRINTLN#:GOSUB1390:GOTO1290
905 REM*** DISPLAY ACTIVITIES BY DATE ***
910 FORJ=1TOSTEPS:PRINT"Q";TAB(12);"2 ACTIVITY TABLE ":PRINT:PRINT:PRINTLN#
915 PRINT"DUR":PRINT:PRINT"EST":PRINT:PRINT"EFT":PRINT:PRINT"LST":PRINT
920 PRINT"LFT":PRINT:PRINT"TF":PRINT:PRINT"FF":PRINT:PRINT"RES"
925 Y=9:X=6:FORK=0T02:IFJ<K:THENK=2:GOTO960
930 P=SR(J+K):F=INT(AD(P,1)/1000):T=AD(P,1)-F*1000+SB
935 F=F+SB:A#MID$(STR$(F),2)+ "-" +MID$(STR$(T),2)
940 PRINT"2":PRINT:PRINTTAB(6);:IFAD(P,2)=1THENPRINT"2";
945 PRINTA#:PRINT:PRINTTAB(6);AD(P,3):PRINT
950 FORZ=4T07:ND=AD(P,2)+TD-1:PRINTTAB(6);:GOSUB25:PRINT:PRINT:NEXTZ
955 FORZ=8T010:PRINTTAB(6);AD(P,2):PRINT:NEXTZ
960 X=X+10:Y=Y+10:NEXTK:PRINT:GOSUB1390:NEXTJ:GOTO1290
965 REM*** DISPLAY CRITICAL PATH ***
970 PRINT"Q";TAB(10);"2 CRITICAL PATH "
975 GOSUB1490:Z=0:LN=0:FORJ=1TOTA:LN=LN+1:IFLN>16THENGOSUB1460
980 IFZ=0THENPRINT"Q";TAB(10);"2 CRITICAL PATH "
985 IFZ=0THENPRINT:PRINT"NUMBER ACTIVITY DUR LST":PRINTLN#:Z=1
990 IFAD(J,2)=0GOTO1020
995 F=INT(AD(J,1)/1000):T=AD(J,1)-F*1000+SB:F=F+SB
1000 A#MID$(STR$(F),2)+ "-" +MID$(STR$(T),2)
```

```
1005 PRINTA#:TAB(8);AC$(J):TAB(23);AD(J,3):TAB(30);:IFN=1GOTO1015
1010 PRINTAD(J,6):GOTO1020
1015 ND=AD(J,6)+TD-1:GOSUB25:PRINT
1020 NEXTJ:GOSUB1390:GOTO1290
1025 REM*** ACTIVITY BARCHART ***
1030 FORJ=1TOTE:TE,2)-1STEP30:J3=J1+29
1035 Z=0:LN=0:FORJ=1TOTA:F=INT(AD(J,1)/1000):T=AD(J,1)-F*1000+SB
1040 F=F+SB:B#MID$(STR$(F),2)+ "-" +MID$(STR$(T),2)
1045 LN=LN+1:IFLN>16THENGOSUB1460
1050 IFZ=0GOTO1075
1055 Y=10:PRINT"ACT "":J1:TAB(Y):J1+4;:FORJ2=9T029STEPS:Y=Y+5
1060 PRINTTAB(Y):J2+J1;:NEXTJ2:PRINT
1065 PRINT"-----":FORJ2=4T024STEPS
1070 PRINT"-----":NEXTJ2:PRINT:Z=1
1075 IFAD(J,2)=1THENPRINT"2";B#;"":GOTO1085
1080 PRINTB#;
1085 IF(AD(J,4)<J1ANDAD(J,5)<J1)OR(AD(J,4)>J3ANDAD(J,5)>J3)GOTO1110
1090 A#="":IFAD(J,2)=1THENA#="*"
1095 PRINTTAB(7);:FORK=J1T0J3:IFK<AD(J,4)OR(AD(J,5)THENPRINT"
1100 PRINTA#;
1105 NEXTK
1110 PRINT:NEXTJ:GOSUB1390:NEXTJ1:GOTO1290
1115 REM*** DISPLAY RESOURCE HISTOGRAM ***
1120 J2=ET(TE,2)-1:FORJ=1T0J2STEPS:PRINT"Q";"2 RESOURCE HISTOGR
1125 FORK=20T010STEP-5:PRINT" "":K:PRINT:PRINT:PRINT:NEXTK
1130 PRINT" 5":PRINT:PRINT:PRINT:PRINT
1135 X=8:FORK=J+4T0J+29STEPS:PRINTMID$(RS#,K,1):NEXTK
1140 PRINT:PRINTTAB(14);"D A T E "
1145 PRINT"2":FORK=1T09:PRINT:PRINTMID$(RS#,K,1):NEXTK
1150 J3=J+29:Z=5:FORJ1=J1T0J3:IFJ1>J2THENJ1=J3:GOTO1175
1155 X=0:PRINT"2"
1160 FORK=1TOTA:IFJ1>AD(K,4)ANDJ1<AD(K,5)THENX=X+AD(K,10)
1165 NEXTK:FORK=20T01STEP-1:PRINTTAB(2);:IFK<XTHENPRINT"*";
1170 PRINT:NEXTK:Z=2+1
1175 NEXTJ1:GOSUB1390:NEXTJ1:GOTO1290
1180 REM*** LOAD OLD NETWORK ***
1185 INPUT"Q";NETWORK NAME";NN#:NN#="0:" +NN#"+,SEQ,READ"
1190 INPUT#5,TE:INPUT#5,TA:GOSUB1470 :OPEN5,8,5,NN#
1195 FORJ=1TOTE:FORK=1T03:INPUT#5,ET(J,K):NEXTK,J
1200 FORJ=1TOTE:FORK=1TOTE:INPUT#5,PT(J,K):NEXTK,J
1205 FORJ=1TOTA:FORK=1T010:INPUT#5,AD(J,K):NEXTK,J
1210 FORJ=1TOTA:INPUT#5,AC$(J):NEXTJ:INPUT#5,SB:INPUT#5,SD
1215 CLOSE5:GOTO1290
1220 REM*** SAVE THIS NETWORK ***
1225 INPUT"Q";NETWORK NAME";NN#:NN#="0:" +NN#"+,SEQ,WRITE"
1230 INPUT#5,TE:CR#:PRINT#5,TA:CR#: :OPEN5,8,5,NN#
1235 FORJ=1TOTE:FORK=1T03:PRINT#5,ET(J,K):CR#:NEXTK,J
1240 FORJ=1TOTE:FORK=1TOTE:PRINT#5,PT(J,K):CR#:NEXTK,J
1245 FORJ=1TOTA:FORK=1T010:PRINT#5,AD(J,K):CR#:NEXTK,J
1250 FORJ=1TOTA:PRINT#5,AC$(J):CR#:NEXTJ:PRINT#5,SB:CR#:
1255 PRINT#5,SD:CR#:PRINT#5,TD:CLOSE5:GOTO1290
1260 REM*** EXIT PROGRAM ***
1265 PRINT"Q";ARE YOU SURE YOU WISH TO STOP?
1270 GETA:IFA#="*":GOTO1270
1275 IFA#<>"Y":GOTO1290
1280 PRINT"END OF RUN":END
1285 REM*** MENU *****
1290 PRINT"Q";TAB(7);"2 OPTIONS "
1295 PRINT:PRINT"0. BUILD A NETWORK
1300 PRINT:PRINT"1. AMEND THE DATA
1305 PRINT:PRINT"2. DISPLAY EVENT TABLE
1310 PRINT:PRINT"3. DISPLAY ACTIVITY TABLE
1315 PRINT:PRINT"4. DISPLAY ACTIVITY BARCHART
1320 PRINT:PRINT"5. DISPLAY CRITICAL PATH
1325 PRINT:PRINT"6. DISPLAY RESOURCE HISTOGRAM
1330 PRINT:PRINT"7. CALL UP A NETWORK FROM DISK
1335 PRINT:PRINT"8. SAVE A NETWORK TO DISK
1340 PRINT:PRINT"9. EXIT THE PROGRAM
1345 PRINT:INPUT"WHICH NUMBER";A#
1350 A=VAL(A#):IFA<0RA:9GOTO1290
1355 IF(A=0RA=7)ANDNN=1GOTO1370
1360 IF(A<0ANDRA<7)ORA=8)ANDNN=0GOTO1375
1365 NN=1:GOTO1380
1370 PRINT"Q";NETWORK ALREADY IN MEMORY ":GOSUB1390:GOTO1290
1375 PRINT"Q";NO NETWORK IN MEMORY ":GOSUB1390:GOTO1290
1380 ONA+1GOTO080,500,615,735,1030,970,1120,1185,1225,1265
1385 REM*** PAUSE ***
1390 PRINT:PRINT:PRINTTAB(8);"2 PRESS SPACE TO CONTINUE "
1395 GETA#:IFA#<>" "":GOTO1395
1400 RETURN
1405 REM*** INITIALISE ***
1410 LN#="*****" :RS#="RESOURCES"
1415 D1#="312931303130313130313031"
1420 D2#="312931303130313130313031"
1425 D3#="000031059090120151181212243273304334":TF#="":FF#="+"
1430 J=0:K=0:D1=0:D2=0:D3=0:YN=0:ND=0:DN=0:TD=0
1435 A1=34:A2=365:A3=3:A4=4:A5=31:A6=72:A7=1:A8=2
1440 C=0:R=0:X=0:A=0:D=0:M=0:Y=0:SD=0:F=0:T=0:S=0:P=0:AN=0
1445 SB=0:TA=0:TE=0:LN=0:NN=0:N=0
1450 A#="":B#="":D#="":S#="":D#="":CR#="CHR$(13):RETURN
1455 REM*** SCREEN LINE TALLY ***
1460 GOSUB1390:LN=1:Z=0:RETURN
1465 REM*** DIMENSION ***
1470 DIMAC$(TA),PT$(TE),AD$(TA,10),ET$(TE,3)
1475 Z=TE:IFTA>TETHENZ=TA
1480 DIMSR(2):RETURN
1485 REM*** DATE CHOICE ***
1490 IFSD=1THENS=2:GOTO1510
1495 PRINT:PRINT:PRINT"DISPLAY TIMES IN: 1. DATE FORMAT
1500 PRINT:PRINTTAB(20);"2. NUMBER OF DAYS":PRINT
1505 PRINT:INPUT"WHICH NUMBER";A#:A=VAL(A#):IFN<10R:2GOTO1505
1510 RETURN
```

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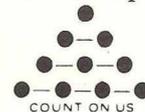
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FUTURE LOOK

In the five years that microcomputers have existed, they have changed dramatically in both design and function. So what will they be like in ten or twenty year's time. Gazing into his crystal ball, Humphrey Walwyn discovered that the industry will still be dominated by personalities.

Looking into the future is never easy. It's made harder by the thought that the future all too rapidly becomes the present and Science Fiction becomes Science Fact.

Forecasting a month ahead is difficult enough, but taking an informed stab at what life may be like in the year 1992 is probably no more accurate than a row of crystal balls. It all depends what mood you're in...

Gloomy futurists will paint grey pictures of 40% unemployment and civil strife as the silicon dream becomes a reality. Computer converts will always point out that humans are considerably more adaptable than machines and that there will always be a place for intelligent creativity. Total optimists will portray homes full of inter-active 'easy-living' computer systems and a nation dedicated to wondrous hours of leisure and pleasure. Pessimists, on the other hand, would say that 'spare time' doesn't always mean 'happy time' and that silicon inter-activity can easily breed human in-activity giving rise to a race of boringly insular individuals. Real pessimists take an even more negative view since they believe there won't be anyone around at all by the end of the century. This is not a constructive argument since you can't even talk about the future if it's not going to be there.



The truth, like all things, is more likely a mixture of the deepest gloom and the brightest smiles...a compound forecast of success and failure with the world muddling along very much as it has done over the last two thousand years. By and large, optimists understand computerology *and* its limitations but pessimists – who aren't into computers – think there are NO limits to the new technology and so fear the worst. Ignorance breeds suspicion. All prediction depends on subject guesswork and therefore forecasts depend on who the forecaster is and – more important – what he/she chooses to see.

Being a computer person, I know that ROM is not a misprint for the capital of Italy and RAM doesn't do naughty things to sheep. I also know that memory is far from being unlimited...to place the entire contents of the Bible onto disk would take up considerably more space than the size of the Bible itself.

I am, however, also a writer and this gives me a warped detachment born of many hours of late-night communion with a cynical typewriter.

Here then is my look into silicon futures. I make no great claims for accuracy (you will have to wait ten years before you know if I'm wrong), but it's as valid as trying to guess the winner of the 3.30 at Aintree. If you mention *all* the race horses then, even though most will lose, one of them is bound to win.

FUTURE LOOK

1990

Foreign News

Natural resources continue to be stretched to their limits. The price of petrol discourages car sales, the price of iron and steel stops nearly all manufacturing and the growing scarcity of wood pulp forces the closure of yet more newspapers and magazines as the cost of paper and newsprint becomes prohibitive. To keep afloat, heavy engineering turns to high technology. Datsun, Toyota and Honda start assembling micro-computers, Consolidated Steel builds racks of office shelving as well as the body-casings for the new generation of PET computers and the International Herald Tribune is digitalised and broadcast by satellite to every country.

In some American states, money is now outlawed as being un-hygienic and a carrier of germs. All transactions are by credit card and cheque. The storage of all financial DATA in the world's banks leads to a massive rise in computer fraud. Millions of dollars vanish overnight from U.S. Government accounts only to re-surface in quietly re-numbered Swiss accounts. A 15-year old computer freak in Chicago, whose house is 'on line' to the central DATA storage, is arrested in Brazil after calmly transferring half the U.S. defence budget to his own account. The World Bank now regularly spends 10 per cent of its turn-over on a large anti-computer crime organisation.

The 1990 World Cup finals are cancelled owing to political boycotts, aggressive crowds and terrorist threats. Simulated matches using

micro-graphics are broadcast around the world on TV. The quality of the picture – as well as the soccer – is so good that it is decided to repeat the idea in 1994.

A chess computer is runner-up to the Russian world champion.

Home News

One half of all homes in the U.K. are now connected to cable TV and interactive computers. To ease the 'rush-hour' congestion and save the enormous cost of transporting anyone or anything from A to B, all secretarial work in the nationalised industries is carried out at home. Every morning at nine o'clock, thousands of home typists report for work by switching on their V.D.U.s and receiving their instructions over the cable. 'Keep fit' classes and social clubs spring up in every community as householders feel increasingly cut off and bored. Most people now only work a four day week. The problem of organising everyone's spare time is taken up by the Government who introduce the D.O.L.E. the Department Of Leisure and Entertainment. Un-employment figures are now re-adjusted to incorporate the millions of part time workers. Owing to the severe shortage of jobs, 'moonlighting' becomes an offence.

A Sinclair machine writes the winning song for the Eurovision Song contest. It subsequently transpires that Eurovision songs have always been written by machines, so nobody is alarmed. A new



'The problem of organising everyone's spare time is taken up by ...D.O.L.E. (the Department of Leisure and Entertainment)'.

mathematical TV quiz show becomes all the rage. The question is set, all the home computers are put 'on line' and the first programmed solution to arrive back over the wire at the TV studio wins the top prize of a 'dummy keyboard'. This gimmick is the 'in thing' in 1990. It doesn't actually DO anything. It's simply a portable typewriter keyboard with all working parts removed. Computer addicts rattle their fingers across the keys to ease nervous hours of late-night programming tensions.

Leisure, Technology and People

Chuck Puddle sets up a new computer firm – Greyhound – taking all his previous PET and SIRIUS staff with him. Theft of trained computer personnel is now a major problem and industrial transfer fees, considerably in excess of sums paid to Manchester United wingers, are given for top programmers and hardware designers.

There are now so many rival enterprises in Cambridge (all of them set up by ex-Sinclair and ex-Acorn personnel) that an entire industrial estate 'Silicon City' has been given over to new technology. In recognition of his services over the years as a supplier of trained computer executives, Clive Sinclair joins the Government 'Think Tank' to advise on educational technology. Sir Chris Curry launches a new firm – OAK Systems ('...out of Acorns come greater things etc.') – to include a chain of 'on-line' restaurants and wine-bars for 'the discerning micro owner'. Deliveries of the BBC Model B machine are still awaited shortly.

New products on the market include:

- The Commodore 256K portable.
- The Osborne 'Office in a briefcase' micro.
- The Sony 32K Ram wrist watch.

Plans are unveiled for the 'APPLE 6'. However the APPLE 2 continues to sell well and Steve Wozniak (the creator of APPLE) opens a chain of health food shops.

FUTURE LOOK

2000

Foreign News

The Japanese computer hardware invasion forces the West to take drastic action. A price war develops as Oriental high quality silicon finally hits the shops. Sinclair halves the price of each micro while Acorn-Oak gives a free telly away with each computer. 'Datsun New-Tek' answers by announcing that all their micros come free when you buy their software. Commodore replies by giving away a free disk-drive, printer AND computer whenever you purchase software for the new PET 10101 series. This move succeeds in halting the Eastern tide for about a month until 'Honda Processors' return to the attack with the offer of a free motor-bike, 2 weeks holiday in down-town Tokyo and a free washing machine PLUS all micro-computer equipment if you purchase the new Honda word-processing package.

The fact is that there are simply too many machines available so hardware prices plummet while software (which is PEOPLE intensive) costs more and more to produce.

The ultimate 'coup-de-chip' is delivered by the now threatened traditional Japanese leisure industries. Messrs Sony, Hitachi, Akai, Sanyo and National form a collective enterprise called J.A.V.A. (Japanese Audio Visual Association) and together launch the revolutionary MEGA 2 - Two megabytes of thumb-nail sized RAM - which is given away free to any purchaser of the new Barry Manilow video-disc. Atari now owns

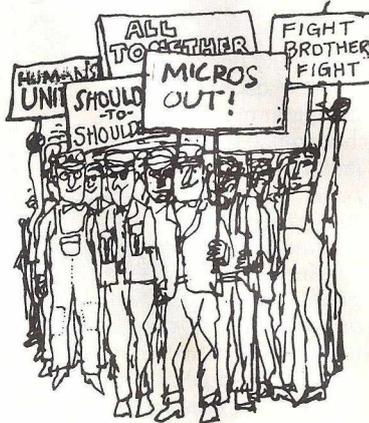
half of London, Toyota buys up Swansea and Barry Manilow owns Holland.

The World Bank is replaced by a chip. The Soviet chess grandmaster defeats the latest generation of chess computers only to be disqualified since he has a J.A.V.A. MEGA 2 transplanted in his ear. Olympic athletes are randomly tested for silicon implantation. Mr. Manilow's vocal tracts are removed and replaced by a 'Diginote' #21 series vocal computer.

Home News (for 2000)

The great cable TV explosion comes to a sudden end when the portable micro-wave link becomes available. This has the wonderful advantage of enabling users to be 'on-line' wherever they are and people are no longer forced to sit at home to do all their shopping. You no longer have to stay tied to your living room to keep in contact with the outside world. It also has the disadvantages of individuals being permanently available to bank managers, tax men and tiresome friends. The new 'in' gift is a set of rechargeable batteries. A more acceptable present is a 'micro-wave jammer' to blot out unwelcome incoming links.

An Osborne machine succeeds in cracking the mechanics of musical appeal. The same micro regularly appears on 'Top of the Pops' ...by itself. 'Iluv Ossie' T-shirts and stickers are sold in W.H. Smith. Musicians, increasingly deprived of opportunities, give concerts in aid of R.A.S.H. (Rock Against Silicon Hardware).



'Pressure groups are springing up everywhere in revolt against the Silicon Invasion'.

Pressure groups are springing up everywhere in revolt against the silicon invasion. P.A.N.T. (People Against New Technology) joins forces with P.A.R. (People Are Real) to form S.I.N. (Silicon Is Nasty). Computer bashing is prevalent. Hammers and pickaxes are flung at VDUs as unemployment continues to rise. Jaws XII is now available on signet ring video.

A Honda 512K portable wins the Miss World title. Feminism is replaced by Humanism. The Equal Opportunities Commission now spends most of its time dealing with 'people versus machines'.

Leisure, Technology and People (2000)

Since the bottom appears to be dropping out of the hardware market, only computer programmers now command the top fees. In the U.S., Chuck Peddle opens up a new software plant - Soft Dog - staffed by the previous PET, SIRIUS and GREYHOUND employees. Commodore's massive

resources enables Jack Tramiel to employ all micro-wave linked customers as part-time programmers. All over the world people are doing it...typing away in trains, airplanes and buses as they try to compete for software contracts. The strain of being constantly 'on-line' is beginning to tell...rest homes for incurable programmers are organised without a single computer in sight. Micro 'No Go' areas are set up.

In the UK, Clive Sinclair enters politics, Adam Osborne buys up Fleet Street and Sir Chris Curry purchases Barry Manilow.

A survey shows that programmers with the best potential are aged between 12 and 16. The educational system is revamped to enable children to spend four years writing computer programmes. At the age of 17, they then go back to school to learn to prepare for unemployment.

The only growth area is Leisure. Trying to keep millions of bored and frustrated people happy is a constant worry to the Government. Movies, music and melodrama are run and repeated over the airwaves in stereo, quad, sensurround, omnivision and feelievision. But, no matter what is transmitted, there's a limit to what the eyes and ears can take.

In California, Steve Wozniak organises R.A.C. (Rock Against Computers) and thousands of people join protest marches. Computer shops are looted, software books are burnt and super-glue is poured into computerized vending machines.

FUTURE LOOK

2010

This is the decade of the great 'techno-crash'. The market is flooded with computers and software. People everywhere re-discover the art of conversation and the delight of reading books. Investment



'People everywhere rediscover...the delight of reading books'.

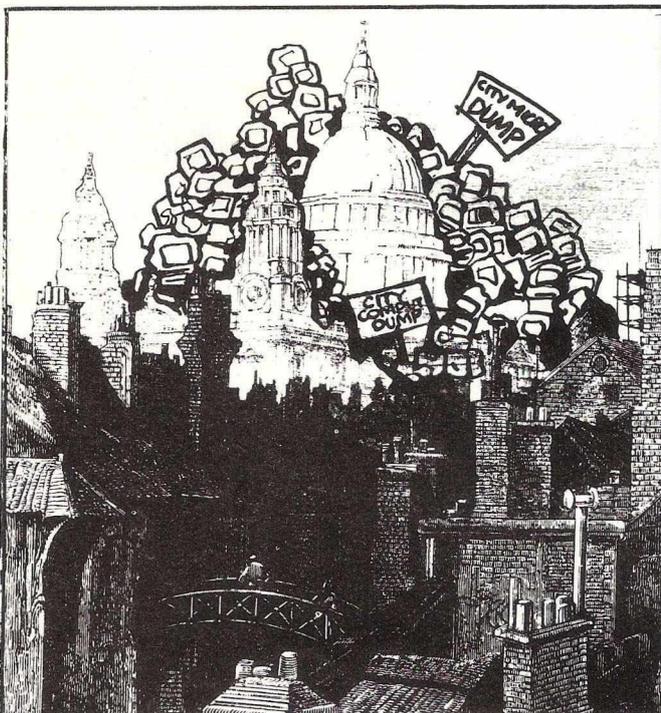
in new technology virtually ceases as micro-reaction sets in. Wall Street crashes, The London Stock Exchange becomes a bingo hall and throw-away computer junk yards spring up in London parks.

The Japanese industries turn in desperation to book

'The London Stock Exchange becomes a bingo hall and throw-away computer junk yards spring up in London parks'.

publishing but their experience in writing computer manuals proves inadequate for the task. Japan's economy falls in ruins. The shock wave ripples around the world causing civil insurrection, revolution and strife as people re-establish the 'old order'. Governments come to power pledged to ban silicon. 'Low technology' centres are set up in city areas to train people in basket weaving, candle making, pottery and woodwork.

Messrs Sinclair, Curry et al write books of memoirs on the 'great silicon collapse'. Chuck Peddle (Always a survivor) sets up a publishing empire. His previous employees are despatched around the world to sell books about household pets. Somewhere in a Californian garage, Mr. Wozniak has discovered a new and cheap way of recycling paper....



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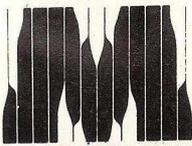
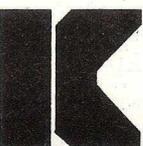
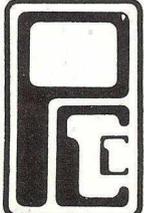
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ENHANCING PET BASIC

Dave Wardill and Dave Barrett
continue their series – adding new
keywords to PET's BASIC.

This month, we have a miscellany of ideas for you. With them you will be able to continue beefing up your PET with all the commands it ought to have.

Cursor Control

The first one of interest is a simple routine for positioning the cursor anywhere on the screen, without bothering with programming tricks like this.

```
100 R$="( thirty-nine cursor right presses)"
110 D$="( twenty-three cursor down presses)"
.
.
500 R=22:D=15:REM MOVE TO COLUMN 22, ROW 15
510 M$=LEFT$(R$,R)+LEFT$(D$,D)
520 PRINTM$;
```

That positions the cursor, but isn't it a rigmarole?
That has exactly the same effect as the BASIC listing.

Listing

Here is an Assembler listing which you can type in for yourself. We have given it in a form suitable for a PET with BASIC 4, with a small screen. Versions for other PETs work in exactly the same way, and we have included a HEX dump for other owners to type in.

```
.. 033A 20 F5 BE JSR $BEF5 ;CHECK FOR A COMMA
.. 033D 20 D4 C8 JSR $CBDA ;GET A BYTE PARAMETER AND KEEP IT IN X
.. 0340 E0 18 CFX C$18 ;COMPARE IT WITH 24 (NO OF ROWS)
.. 0342 90 03 BCD $0347 ;IF OK, CARRY ON
.. 0344 4C 00 BF JMP $BF00 ;'SYNTAX ERROR'
.. 0347 86 D8 STX $D8
.. 0349 20 F5 BE JSR $BEF5 ;CHECK FOR THE SECOND COMMA
.. 034C 20 D4 C8 JSR $CBDA ;GET THE NEXT BYTE PARAMETER
.. 034F E0 28 CFX F$28 ;COMPARE IT WITH 40 (NO OF COLUMNS)
.. 0351 B0 F1 BCS $344
.. 0353 86 C6 STX $C6
.. 0355 20 71 E0 JMP $E071
.. 0358 60 RTS
```

HEX dumps

Here are the HEX dumps for various versions of the PET.

FAT SCREEN, BASIC 4

```
.. 033A 20 F5 BE 20 D4 C8 E0 18
.. 0342 90 03 4C 00 BF 86 D8 20
.. 034A F5 BE 20 D4 C8 E0 28 B0
.. 0352 F1 86 C6 20 71 E0 60
```

THIN SCREEN, BASIC 4

```
.. 033A 20 F5 BE 20 D4 C8 E0 18
.. 0342 90 03 4C 00 BF 86 D8 20
.. 034A F5 BE 20 D4 C8 E0 28 B0
.. 0352 F1 86 C6 20 7F E0 60
```

80 COLUMN BASIC 4

```
.. 033A 20 F5 BE 20 D4 C8 E0 18
.. 0342 90 03 4C 00 BF 86 E0 20
.. 034A F5 BE 20 D4 C8 E0 50 B0
.. 0352 F1 86 E2 20 5F E0 60
```

BASIC 3

```
.. 033A 20 FB CD 20 78 D6 E0 18
.. 0342 90 03 4C 03 CE 86 D8 20
.. 034A FB CD 20 78 D6 E0 28 B0
.. 0352 F1 86 C6 20 5D E2 60
```

How to use it

The dump you will have typed in by now is residing in the second cassette buffer. To use it at any time, just include this line in your program.

```
250 SYS $26,22,15
```

You can, of course, change the numbers 22 and 15 to the position on the screen where you want to place the cursor. When calculating the position, assume that the origin (0,0) is at the top left of the screen.

It is a good idea not to choose to place the cursor below row 23, as accidental scrolling can take place – or it would if the routine allowed it.

Printing To An Epson

When we were talking to Richard Pawson the other day, he was asking whether we had put any new routines into our NEW BASIC chip. Well, we have, as a matter of fact – about a dozen.

"What new words have you used," he enquired.

Enthusiastically, we rattled off a list, and he listened politely. When we mentioned 'EPSON#', however, we were allowed to go no further.

"Do you mean that you have a Machine Code routine which lets the PET work properly with an Epson printer, without all the confusions which occur between upper and lower case, and graphics characters?" When we admitted that this was indeed the case, his delight was evident.

Write it up, we were told. This will reduce Tommy's correspondence by half, and free him for all sorts of other, more productive tasks. (He is currently engaged in building a 64 bit, 10Mbyte computer from an old Sinclair ZX80 and a ball of steel wool, and your enquiries were slowing him up.)

No sooner said than done. Here is a hex dump which you can type in directly, using the PET monitor. For those of you who aren't sure how to do this, see the box at the end of the article.

This time, in defiance of our normal practice, we have no Assembler listing to show you. This is because the routine is so similar to the original 'PRINT#' that all we did was dump it from the PET's ROM and make the few necessary changes for it to drive an Epson printer. If we had wanted to, we could have altered and returned the original chip, but we felt that not everyone would want to do that. Also, we use a Commodore printer as well, and that wouldn't have worked then, would it?

Here is the routine. Remember to cut off the top of memory before you use it, or all the messages you are printing will get jumbled up with the machine code.

In order to use it, all you need to do is:

1. OPEN4,4
2. Use 'SYS32000' in place of 'PRINT#'

So, PRINT# X,N\$(A,P

is replaced by SYS32000 x,N\$(A),P

It is probably still best to print out things like control characters with the old PRINT# statement, to avoid any unexpected quirks, just to be on the safe side. Otherwise, this routine will work every time. Easy, isn't it?

```

"
..: 7300 20 F5 BE 20 09 73 4C B4
..: 7308 BB 20 D4 C8 F0 05 A9 2C
..: 7310 20 F7 BE 08 20 C9 FF 86
..: 7318 10 28 4C 23 73 20 9B 73
..: 7320 20 76 00 F0 35 F0 43 C9
..: 7328 A3 F0 4D C9 A6 18 F0 48
..: 7330 C9 2C F0 37 C9 3B F0 55
..: 7338 20 98 BD 24 07 30 DE 20
..: 7340 93 CF 20 B0 C5 20 9B 73
..: 7348 20 B5 73 D0 D3 A9 00 9D
..: 7350 00 02 A2 FF A0 01 A5 10
..: 7358 D0 10 A9 0D 20 C1 73 A5
..: 7360 10 10 05 A9 0A 20 C1 73
..: 7368 49 FF 60 A5 C6 38 E9 0A
..: 7370 B0 FC 49 FF 69 01 D0 10
..: 7378 08 20 D1 C8 C9 29 D0 6D
..: 7380 28 B0 06 8A E5 C6 90 05
..: 7388 AA E8 CA D0 06 20 70 00
..: 7390 4C 25 73 20 B5 73 D0 F2
..: 7398 20 B0 C5 20 B8 C7 AA A0
..: 73A0 00 E8 CA F0 C5 B1 1F 20
..: 73A8 C1 73 C8 C9 0D D0 F3 20
..: 73B0 68 73 4C A2 73 A5 10 F0
..: 73B8 03 A9 20 2C A9 1D 2C A9
..: 73C0 3F C9 A0 F0 04 C9 60 D0
..: 73C8 02 A9 20 C9 6C D0 02 A9
..: 73D0 2C C9 41 90 12 C9 5B B0
..: 73D8 04 09 20 D0 0A C9 C1 90
..: 73E0 06 C9 DB B0 02 29 7F 20
..: 73E8 D2 FF 29 FF 60 4C 00 BF
"

```

(CODE HEX DUMP)

To load the machine code, go into the monitor by typing 'SYS 1024'

You will get a display which looks like this

```

PC  IRQ  SR  AC  XR  YR  SP
0401 E455 32 04 5E 00 F8

```

or similar. If you don't get the 'E455' however, you have an old PET and this routine will not work.

Type M 7D00 7E00

and you will get a display of the current contents of that part of memory. (If you have a smaller memory PET, use 3D00 3E00 instead, together with 'SYS15624' instead of 'SYS32000'.)

Type in each line so it looks like the HEX dump. Remember to use 'RETURN' at the end of each line, just as you would in BASIC.

When this is done, save it before trying to run it. You may have made a typing error in it somewhere, and you don't want to crash and have to type it in again.

Save it by typing this

```

.S "O:EPSON",08,7D00,7E00

```

When it is saved, go back to BASIC by typing 'X' followed by return. Poke down the top of memory by entering

```

POKE53,112:POKE52,0

```

Then comes the big moment. Type 'SYS32000', followed by the message you want to print. If all is well, it should appear on your printer. Correctly.

Happy printing!

Sort Add-On

We have had two phone calls about a bug in our SORT routine. Apparently two users of the routine had found that everything went wrong after they had used the SORT, and all the elements of their arrays had become scrambled.

One of the calls was from Johannesburg. (What's your phone bill like, Barry? It took our secretary about ten minutes to find one of us!)

What was happening was this. The routine worked perfectly, until memory became so cluttered that the garbage routine was triggered. This tidied up memory all right, and scrambled the array pointers the SORT routine had so carelessly redirected.

Barry, having a tidy mind, had forced a garbage collect after using SORT, before the next segment of his program. Oops!

The other call was from Nick Marcopoulos of Dataview. Not content with a mere phone call, Nick took the trouble to follow up by sending us a fix, for which we are most grateful. So here it is.

Add this to the sort routine

The line in our Assembler listing

```
2420      RTS          ;DONE!
```

should be replaced with this extra piece of code, after the rest of the lines had been renumbered to allow for this insertion.

```
2420      ;DONE!
2430      ;SORT IS COMPLETE
2440      ;
2450      LDA FLAG1    ;STRING OR REAL?
2460      BEQ DONE    ;IF REAL THEN WE ARE FINISHED.
2470 FIX   LDY £#2    ;IF STRING, FIX STRING
```

POINTERS

```
2480      LDA (VAR1),Y ;GET HIGH BYTE OF FORWARD PTR
2490      STA VAR2+1   ;SAVE IT
2500      DEY
2510      LDA (VAR1),Y ;GET LOW BYTE OF FORWARD PTR
2520      STA VAR2     ;SAVE IT
2530      DEY
2540      LDA (VAR1),Y ;GET STRING LENGTH
2550      TAY         ;PREPARE TO ACCESS BACKWARD
```

PTR

```
2560      LDA VAR1     ;GET LOW BYTE OF BACKWARD PTR
2570      STA (VAR2),Y ;AND SAVE IT!
2580      INC VAR2     ;BUMP UTILITY POINTER BY 1
2590      BNE NOINC
2600      INC VAR2+1
2610 NOINC LDA VAR1+1 ;GET HIGH BYTE OF BACKWARD
```

PTR

```
2620      STA (VAR2),Y ;AND SAVE IT
2630      ;
2640      DEC ARASIZ   ;ANY MORE STRINGS TO BE FIXED?
2650      BNE NEXT
2660      LDA ARASIZ+1
2670      BEQ DONE
2680      DEC ARASIZ+1
2690      ;NOT FINISHED YET -
                ;ADVANCE STRING POINTER BY 3
2700 NEXT   CLC
2710      LDA £#03
2720      ADC VAR1
2730      STA VAR1
2740      BCC FIX     ;GO AND FIX NEEEXT ELEMENT
2750      INC VAR1+1
2760      JMP FIX
2770 DONE   RTS
```

Thanks, Nick!

Incidentally, it is worth mentioning that a lot of people have asked whether they could get a copy of our original routines on disk, so they don't have to type all the hex dumps in. For all the one-finger typists, therefore, we are pleased to say that we have put a dump of all our routines on disk (including a few that have not been published anywhere). These are available from Dave Barrett, 2 East View, Kimblesworth, Chester-le-Street, Durham. He charges £10 for a disk with all the routines on, or £8 for a cassette. If you don't like typing hex dumps, why not get in touch.

Next Month

Next month, we will write a simple Diary program in BASIC which will keep a list of appointments for you.

Then we will write it again using the words which have appeared in our series of articles. This will show you again how these words can be used to simplify programming to the point where you can concentrate on what the program is meant to do, rather than worrying about programming technique.

See you next month!

OOPS!

Seek Hex Dump

Apologies to readers who searched in vain for the hex dump of the SEEK command developed in last month's issue. Herewith the correct version.

```
?
-
.: 7200 20 F5 BE 20 2B C1 A5 07
.: 7208 D0 03 4C 00 BF A0 02 B1
.: 7210 44 99 16 00 88 10 F8 A4
.: 7218 16 D0 01 60 A9 49 20 F7
.: 7220 BE A9 4E 20 F7 BE 20 2B
.: 7228 C1 A5 07 F0 DD A0 04 B1
.: 7230 5C C9 01 D0 D5 C8 B1 5C
.: 7238 85 1C C8 B1 5C 85 1D A5
.: 7240 61 A6 62 85 12 86 11 A0
.: 7248 02 B1 44 99 19 00 88 10
.: 7250 F8 A4 19 F0 42 A4 16 C4
.: 7258 19 D0 06 A9 00 85 21 F0
.: 7260 09 B0 34 38 A5 19 E5 16
.: 7268 85 21 A0 00 B1 17 29 7F
.: 7270 C9 3F F0 16 48 98 18 65
.: 7278 21 A8 B1 1A 29 7F 85 03
.: 7280 68 C5 03 D0 0C 98 38 E5
.: 7288 21 A8 C8 C4 16 D0 DD F0
.: 7290 2F C6 21 A5 21 10 D3 E6
.: 7298 12 D0 02 E6 11 A5 11 C5
.: 72A0 1C D0 0E A5 12 C5 1D 90
.: 72A8 08 A9 FF 85 11 85 12 D0
.: 72B0 0F 18 A9 03 65 44 85 44
.: 72B8 A9 00 65 45 85 45 90 87
.: 72C0 A9 D0 85 42 A9 CC 85 43
.: 72C8 20 87 C1 A0 00 A5 11 91
.: 72D0 44 A5 12 C8 91 44 60 AA
.: 72D8 AA AA AA AA AA AA AA AA
.: 72E0 AA AA AA AA AA AA AA AA
-
?
?
?
-
```

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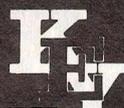
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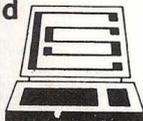
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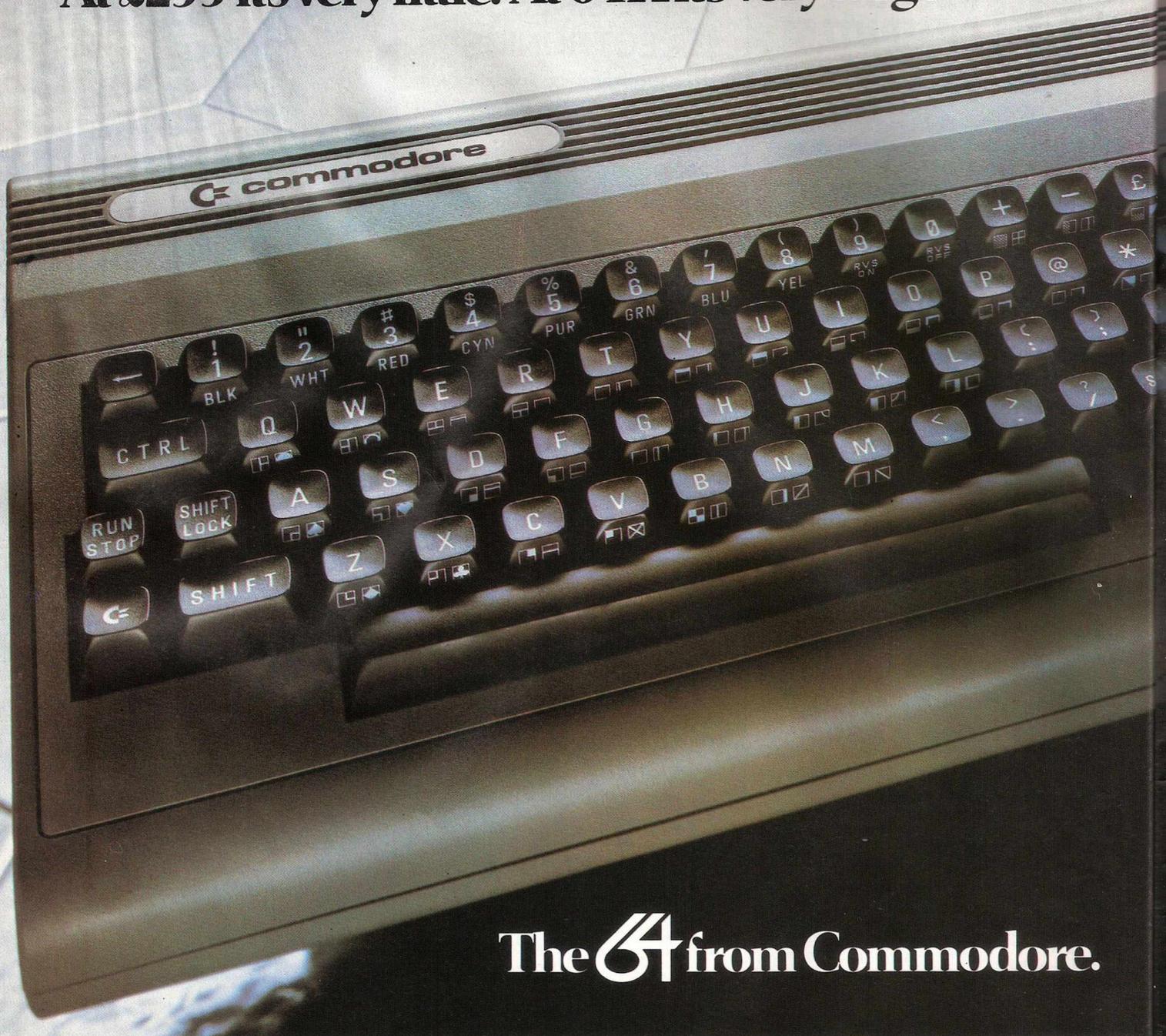
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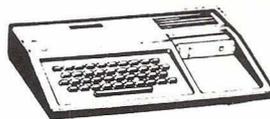
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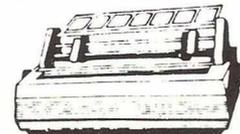
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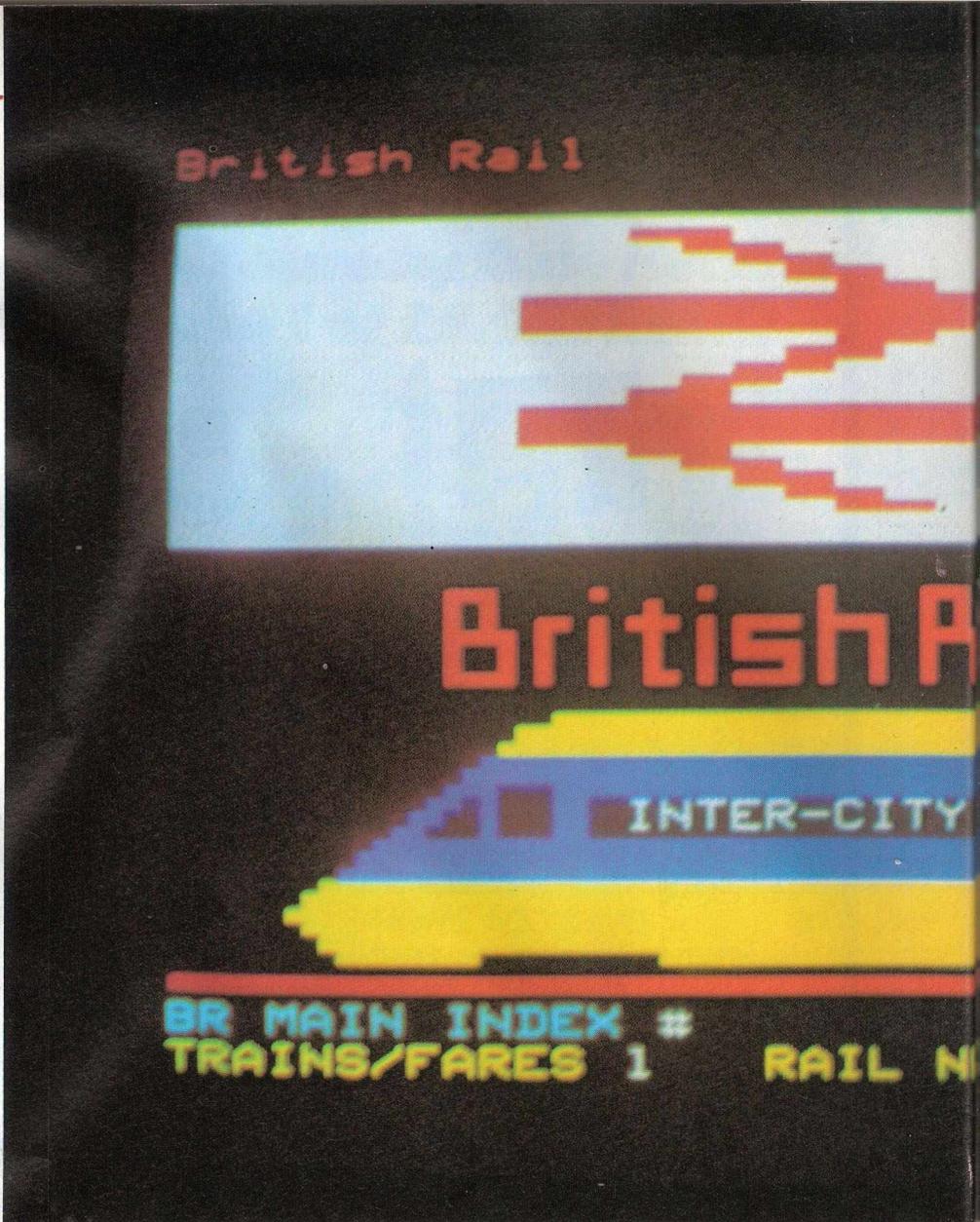
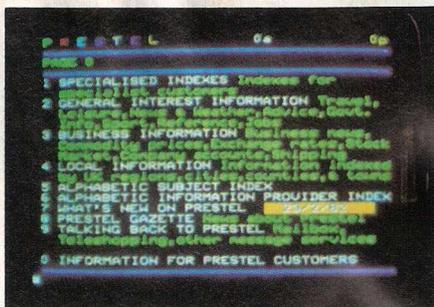
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Though slow to get off the ground, PRESTEL is a unique concept in providing up-to-date information. Shown here are some screen shots showing the typical layouts for indexes and pages produced by the many 'information providers'.

It was one of those dark damp afternoons when London feels like Moscow. My instructions were cryptic. 'Be at Telephone House at 3p.m. Your contact is Shupak.' That was it. Not much to go on.

'Emergency vehicles only' said the sign. It seemed a good place to park. Rain streamed steadily down the walls of the anonymous stone building. Some of it found its way down my neck.

A pair of expressionless grey eyes regarded me uninterestedly from within. Through the greenish tinge of the armoured glass, I could make out the security post, and beyond it a bare hall lit by a single naked bulb. After a lengthy examination of papers and fingernails, I was admitted.

'Today's Special: Canelloni Royale 19p' read the notice taped to the elevator door. It looked as if it had been there a long time. For more than a minute the lift hauled itself up towards

the fifth floor. As the door wheezed open I could make out the trim figure of a young woman waiting in the gloom.

"Hello, I am Shupak."

The keyboard looked out of place on the heavy civil service issue desk, in that high ceiling office; Sue Shupak even more so. "We are determined to create a service that will really appeal to the hobbyist" she smiled, patting the colour monitor affectionately. The colour graphics reflected dully off the grey gloss paint on the walls.

Never having met a civil servant who sat on desks before, not one who was young and female anyway, I guess I must have betrayed surprise. "Oh yes, it is the hobbyists we are after", she smiled, crossing her legs, "they are the activists in the market. Getting them involved gets the word about".

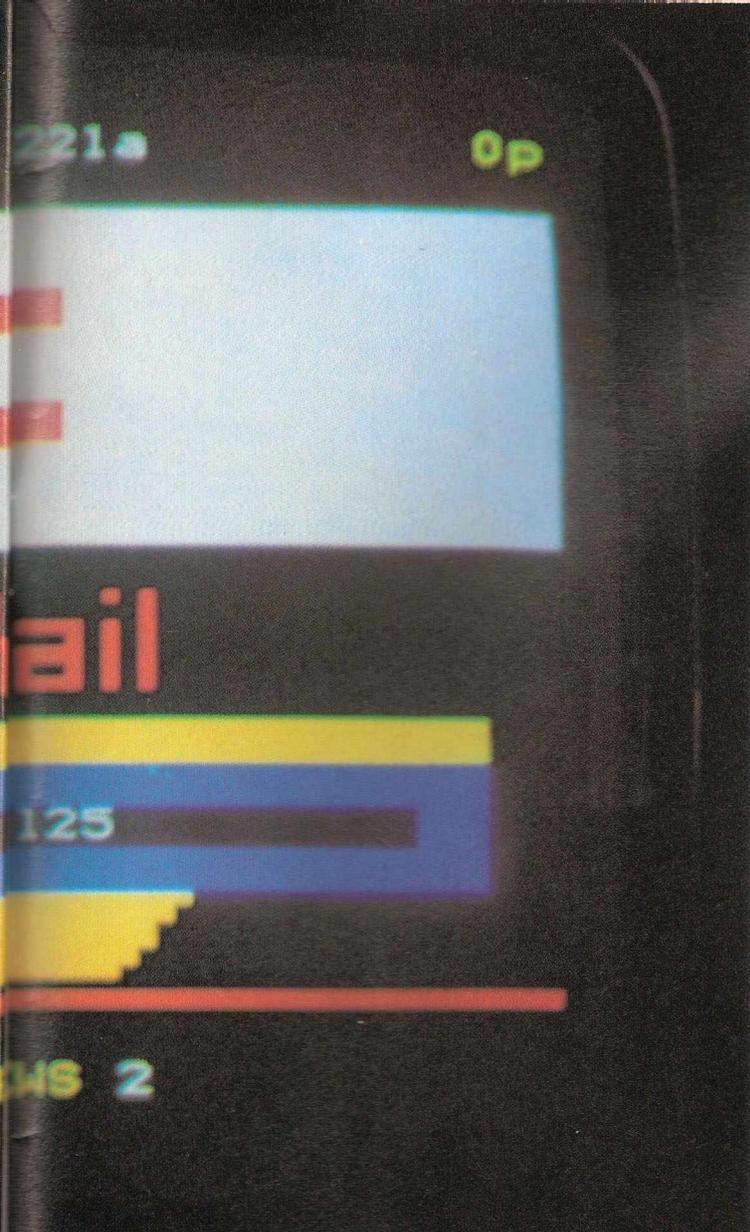
It seemed British Telecom had struck a deal. With a shadowy group known as the Consortium. Its front man was one Richard Hease. Suddenly I began to get the picture.

The project was codenamed *MicroNet 800*. Its purpose: to lure personal computer users into Prestel. A bold enough plan, but would it work? "Of course it will", said Sue. There was an edge to her voice. "We are going to make access very cheap. And you won't find hardware any cheaper than the adaptors we will be offering, I mean, than the Consortium will be offering", she added hurriedly.

They say I was born with a sceptical expression, but there was no holding her now.

"Look, by joining *MicroNet* you get access to a lot of software, which you can download onto your computer, and to the full Prestel service".

To my way of thinking there is good software and bad software. I hoped this software was good. She must have caught my drift because her long fingers flashed over the keyboard. The screen offered a choice of programs: biorythms, space paranoids and something called *Worzel*. I shook my head.



What is Prestel?

A network of computers storing a wide range of information that can be accessed by telephone from a specially adapted TV set or Microcomputer. The sort of information you might look up on Prestel could include

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British Rail 221714011a Op
Reading - London 27/28/82
Monday to Friday

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Dep	Arr	Dep	Arr	Dep	Arr
0325	0412	0807	0821	1016	1111
0330	0417	0812	0826	1021	1116
0335	0422	0817	0831	1026	1121
0340	0427	0822	0836	1031	1126
0345	0432	0827	0841	1036	1131
0350	0437	0832	0846	1041	1136
0355	0442	0837	0851	1046	1141
0400	0447	0842	0856	1051	1146
0405	0452	0847	0901	1056	1151
0410	0457	0852	0906	1101	1156
0415	0502	0857	0911	1106	1201
0420	0507	0902	0916	1111	1206
0425	0512	0907	0921	1116	1211
0430	0517	0912	0926	1121	1216
0435	0522	0917	0931	1126	1221
0440	0527	0922	0936	1131	1226
0445	0532	0927	0941	1136	1231
0450	0537	0932	0946	1141	1236
0455	0542	0937	0951	1146	1241
0500	0547	0942	0956	1151	1246
0505	0552	0947	1001	1156	1251
0510	0557	0952	1006	1201	1256
0515	0602	0957	1011	1206	1301
0520	0607	1002	1016	1211	1306
0525	0612	1007	1021	1216	1311
0530	0617	1012	1026	1221	1316
0535	0622	1017	1031	1226	1321
0540	0627	1022	1036	1231	1326
0545	0632	1027	1041	1236	1331
0550	0637	1032	1046	1241	1336
0555	0642	1037	1051	1246	1341
0600	0647	1042	1056	1251	1346
0605	0652	1047	1101	1256	1351
0610	0657	1052	1106	1301	1356
0615	0702	1057	1111	1306	1401
0620	0707	1102	1116	1311	1406
0625	0712	1107	1121	1316	1411
0630	0717	1112	1126	1321	1416
0635	0722	1117	1131	1326	1421
0640	0727	1122	1136	1331	1426
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0655	0742	1137	1151	1346	1441
0700	0747	1142	1156	1351	1446
0705	0752	1147	1201	1356	1451
0710	0757	1152	1206	1401	1456
0715	0802	1157	1211	1406	1501
0720	0807	1202	1216	1411	1506
0725	0812	1207	1221	1416	1511
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0745	0832	1227	1241	1436	1531
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0910	0957	1352	1406	1601	1656
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1110	1157	1552	1606	1801	1856
1115	1202	1557	1611	1806	1901
1120	1207	1602	1616	1811	1906
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1135	1222	1617	1631	1826	1921
1140	1227	1622	1636	1831	1926
1145	1232	1627	1641	1836	1931
1150	1237	1632	1646	1841	1936
1155	1242	1637	1651	1846	1941
1200	1247	1642	1656	1851	1946
1205	1252	1647	1701	1856	1951
1210	1257	1652	1706	1901	1956
1215	1302	1657	1711	1906	2001
1220	1307	1702	1716	1911	2006
1225	1312	1707	1721	1916	2011
1230	1317	1712	1726	1921	2016
1235	1322	1717	1731	1926	2021
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1305	1352	1747	1801	1956	2051
1310	1357	1752	1806	2001	2056
1315	1402	1757	1811	2006	2101
1320	1407	1802	1816	2011	2106
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1335	1422	1817	1831	2026	2121
1340	1427	1822	1836	2031	2126
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1350	1437	1832	1846	2041	2136
1355	1442	1837	1851	2046	2141
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1405	1452	1847	1901	2056	2151
1410	1457	1852	1906	2101	2156
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1655	1742	2137	2151	2346	2441
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1855	1942	2337	2351	2546	2641
1900	1947	2342	2356	2551	2646
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1915	2002	2357	2411	2606	2701
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1925	2012	2407	2421	2616	2711
1930	2017	2412	2426	2621	2716
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1945	2032	2427	2441	2636	2731
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1955	2042	2437	2451	2646	2741
2000	2047	2442	2456	2651	2746
2005	2052	2447	2501	2656	2751
2010	2057	2452	2506	2701	2756
2015	2102	2457	2511	2706	2801
2020	2107	2462	2516	2711	2806
2025	2112	2467			

How to use Prestel

You have a microcomputer? Then all you need is a telephone line, and a modem, plus the necessary program to handle the communications and generation of the Prestel characters and graphics on the screen. Complete kits are already available for Apple and PET owners; adaptors suitable for use with other microcomputers are available at around the £150 mark.

The MicroNet 800 people will shortly be offering a membership package for existing computer owners that includes everything needed to get you up and running as well as a subscription to their own service. We won't speculate about the price beyond saying it is likely to offer a substantial reduction on previous costs.

If you do not possess a microcomputer, or choose not to link it to Prestel, Viewdata televisions are available from Philips and others – at a price. Picture quality is naturally somewhat bet-

ter than the other alternative of an ordinary TV with an external adaptor; this might be priced at around £150 now, less later in the year. Viewdata sets, which also receive normal TV programmes and Teletext information, typically cost about £200 more than the common or garden variety.

Business users with limited desk space might consider a dedicated Prestel terminal with telephone, black and white screen and keypad built into a single unit. One of the snazziest of these is Plessey's Vutel Mark 1. However despite the extra cost we think it is worth considering a model with full typewriter keyboard for electronic mail. Taking the Plessey Vutels as a guide, the keypad version cost £520

+ VAT, against £620 + VAT for the full keyboard model. If your interest encompasses graphics however, a colour set would seem to be indicated. •

What you need

The Prestel adaptor or set is plugged into a telephone jack socket; at other times the telephone line can still be used for normal calls. Depressing a single button causes the system to dial up the nearest Prestel computer; in most parts of the country this is a local call. One is almost immediately greeted with a cheery message saluting you by name, and a message telling you when you last logged on. If any electronic mail has come in since that time, there will be a message to that effect too.

From here on in progress is via a sequence of progressively more specialized indexes until you reach the page you are looking for. Unless of course, you already knew its number, in which case you would have keyed directly to it.

What is a Micronet?

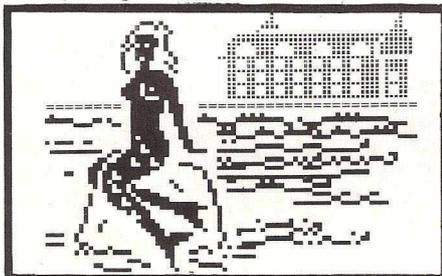
MicroNet 800 is a special Prestel service aimed at home, educational and business computer users. The database will carry hardware and software news and buyers guides, advertising, user group information and downloadable software, some of which will be free, the rest chargeable. The cost of membership will include an adaptor and subscription to the full Prestel service, including the Mailbox electronic mail facility. If the adaptor is purchased separately, membership will cost about £1 per week. This covers all access charges for the MicroNet database (but not other Prestel services). Details from Petersham House, 57a Hatton Garden, London EC1B 1DT.

The cost of Prestel

Prestel has been widely criticised for being too expensive. However British Telecom's access charges have now been scrapped outside office hours. Normal telephone call charges are incurred, but for most of the country these are at local rate.

Individual Information Providers may levy charges for access to their pages, although 80% of the 200,000 information pages available are free. Index pages are always free.

Each charge is separately identified on the quarterly telephone account submitted by British Telecom.



► "O.K. Mister. So they are not so great now. But they will be you'll see".

From the flush on her cheeks I knew I had struck a raw nerve. "Tell me about Electronic Mail", I said quietly.

Light glinted on a diamond as the long golden fingers flashed over the keyboard again. "There are about 1200 subscribers using the Mailbox facility in the London area at the moment. They pass about a thousand messages a day," she recited mechanically. "The maximum message length per page is 400 characters. If you want to send a longer one, you transmit more pages". She looked at her watch. "Will there be anything else?"

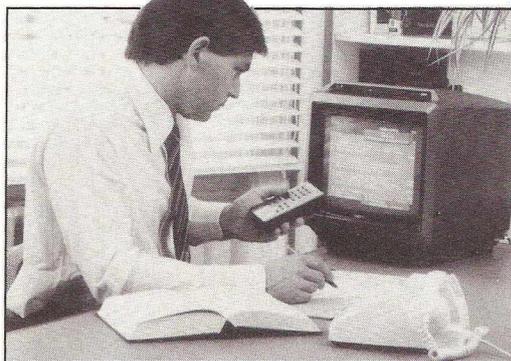
As he coolly escorted me back to the lift. I felt as if I had failed some sort of test.

Outside it was still raining, and where my car had been there was just a space.

A dedicated printer can be used to supply 'hard copy' versions of any prestel page.

Considerable care was taken when choosing the standard set of characters and graphics symbols. Some pages have been disqualified on the grounds of 'naughtiness' though this picture of Copenhagen Harbour apparently comes under the heading of 'culture'.

In the home, PRESTEL will ultimately provide the capability for 'shopping by keyboard'.



A large proportion of PRESTEL pages are devoted to business information, such as currency exchange notes. Businesses will be prime users of the Electronic Mail Facilities Planned for the future.

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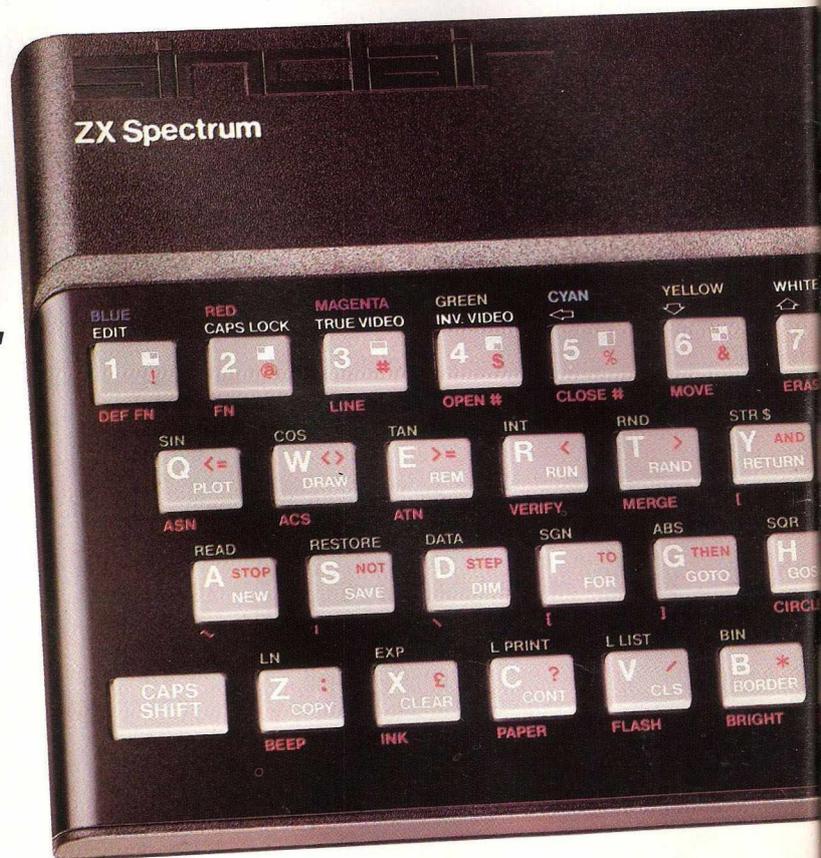
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Sinclair ZX Spectrum

**16K or 48K RAM...
full-size moving-
key keyboard...
colour and sound...
high-resolution
graphics...**

**From only
£125!**



First, there was the world-beating Sinclair ZX80. The first personal computer for under £100.

Then, the ZX81. With up to 16K RAM available, and the ZX Printer. Giving more power and more flexibility. Together, they've sold over 500,000 so far, to make Sinclair world leaders in personal computing. And the ZX81 remains the ideal low-cost introduction to computing.

Now there's the ZX Spectrum! With up to 48K of RAM. A full-size moving-key keyboard. Vivid colour and sound. High-resolution graphics. And a low price that's unrivalled.

Professional power— personal computer price!

The ZX Spectrum incorporates all the proven features of the ZX81. But its new 16K BASIC ROM dramatically increases your computing power.

You have access to a range of 8 colours for foreground, background and border, together with a sound generator and high-resolution graphics.

You have the facility to support separate data files.

You have a choice of storage capacities (governed by the amount of RAM). 16K of RAM (which you can uprate later to 48K of RAM) or a massive 48K of RAM.

Yet the price of the Spectrum 16K is an amazing £125! Even the popular 48K version costs only £175!

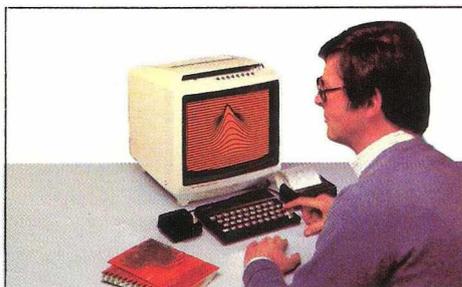
You may decide to begin with the 16K version. If so, you can still return it later for an upgrade. The cost? Around £60.

Ready to use today, easy to expand tomorrow

Your ZX Spectrum comes with a mains adaptor and all the necessary leads to connect to most cassette recorders and TVs (colour or black and white).

Employing Sinclair BASIC (now used in over 500,000 computers worldwide) the ZX Spectrum comes complete with two manuals which together represent a detailed course in BASIC programming. Whether you're a beginner or a competent programmer, you'll find them both of immense help. Depending on your computer experience, you'll quickly be moving into the colourful world of ZX Spectrum professional-level computing.

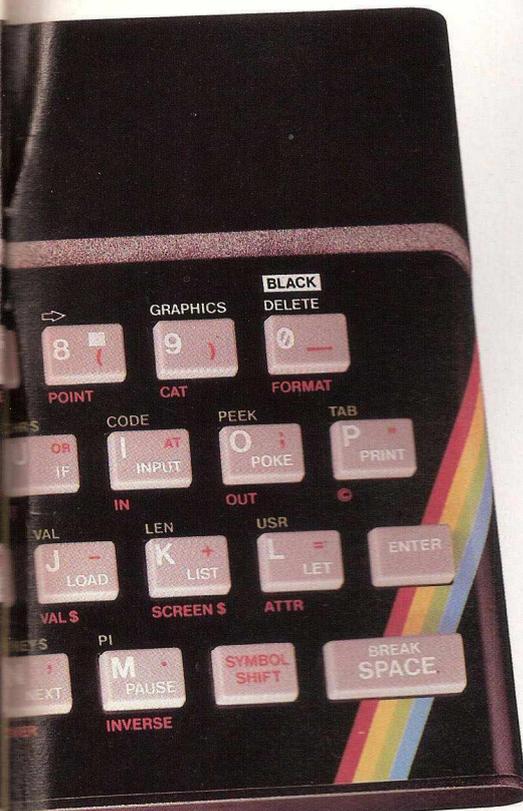
There's no need to stop there. The ZX Printer—available now—is fully compatible with the ZX Spectrum. And later this year there will be Microdrives for massive amounts of extra on-line storage, plus an RS232/network interface board.



Key features of the Sinclair ZX Spectrum

- Full colour—8 colours each for foreground, background and border, plus flashing and brightness-intensity control.
- Sound—BEEP command with variable pitch and duration.
- Massive RAM—16K or 48K.
- Full-size moving-key keyboard— all keys at normal typewriter pitch, with repeat facility on each key.
- High-resolution—256 dots horizontally x 192 vertically, each individually addressable for true high-resolution graphics.
- ASCII character set—with upper- and lower-case characters.
- Teletext-compatible—user software can generate 40 characters per line or other settings.
- High speed LOAD & SAVE—16K in 100 seconds via cassette, with VERIFY & MERGE for programs and separate data files.
- Sinclair 16K extended BASIC—incorporating unique 'one-touch' keyword entry, syntax check, and report codes.

um



ZX Spectrum software on cassettes – available now

The first 21 software cassettes are now available directly from Sinclair. Produced by ICL and Psion, subjects include games, education, and business/household management. Galactic Invasion... Flight Simulation... Chess... History... Inventions... VU-CALC... VU-3D... 47 programs in all. There's something for everyone, and they all make full use of the Spectrum's colour, sound and graphics capabilities. You'll receive a detailed catalogue with your Spectrum.

RS232/network interface board

This interface, available later this year, will enable you to connect your ZX Spectrum to a whole host of printers, terminals and other computers.

The potential is enormous. And the astonishingly low price of only £20 is possible only because the operating systems are already designed into the ROM.

sinclair

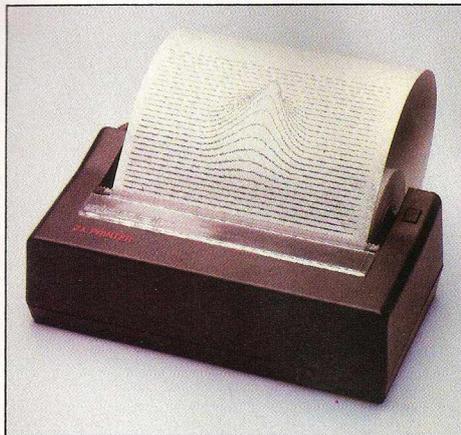
Sinclair Research Ltd, Stanhope Road, Camberley, Surrey GU15 3PS.
Tel: Camberley (0276) 685311.

The ZX Printer – available now

Designed exclusively for use with the Sinclair ZX range of computers, the printer offers ZX Spectrum owners the full ASCII character set – including lower-case characters and high-resolution graphics.

A special feature is COPY which prints out exactly what is on the whole TV screen without the need for further instructions. Printing speed is 50 characters per second, with 32 characters per line and 9 lines per vertical inch.

The ZX Printer connects to the rear of your ZX Spectrum. A roll of paper (65ft long and 4in wide) is supplied, along with full instructions. Further supplies of paper are available in packs of five rolls.



The ZX Microdrive – coming soon

The new Microdrives, designed especially for the ZX Spectrum, are set to change the face of personal computing.

Each Microdrive is capable of holding up to 100K bytes using a single interchangeable microflop.

The transfer rate is 16K bytes per second, with average access time of 3.5 seconds. And you'll be able to connect up to 8 ZX Microdrives to your ZX Spectrum.

All the BASIC commands required for the Microdrives are included on the Spectrum.

A remarkable breakthrough at a remarkable price. The Microdrives are available later this year, for around £50.



How to order your ZX Spectrum

BY PHONE – Access, Barclaycard or Trustcard holders can call 01-200 0200 for personal attention 24 hours a day, every day. BY FREEPOST – use the no-stamp needed coupon below. You can pay by cheque, postal order, Barclaycard,

Access or Trustcard.

EITHER WAY – please allow up to 28 days for delivery. And there's a 14-day money-back option, of course. We want you to be satisfied beyond doubt – and we have no doubt that you will be.

To: Sinclair Research, FREEPOST, Camberley, Surrey, GU15 3BR.

Order

Qty	Item	Code	Item Price £	Total £
	Sinclair ZX Spectrum – 16K RAM version	100	125.00	
	Sinclair ZX Spectrum – 48K RAM version	101	175.00	
	Sinclair ZX Printer	27	59.95	
	Printer paper (pack of 5 rolls)	16	11.95	
	Postage and packing: orders under £100	28	2.95	
	orders over £100	29	4.95	
				Total £

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Typical Applications

- Networking computers
- Linking to electronic mail system (Euronet)
- Converting microcomputer to Viewdata (Prestel) receiver

Key Features

- Snap-fit acoustic link between standard telephone handset and terminal equipment
- Low cost
- Slimline design
- Lightweight and compact
- Specially designed acoustic chambers need no rubber seals

PAC-M1: This acoustic modem provides a link between telephone line and Serial Data socket of a microcomputer, thus allowing conversion into a Prestel receiver and facilities for transfer of telesoftware programmes. £135 + VAT, P&P.

PAC-M2: Specifically for fully interactive data communication at 300/300 Baud rate, this acoustic modem is designed for networking computers and for electronic mail system. It operates in an originate mode to the CCITT V21 standard and connects Serial Data via an RS232C socket. £135 + VAT, P&P.

PAC-1: Provides an acoustic link between standard telephone handset and all types of Prestel and private Viewdata terminals, TV sets and adaptors. Powered by a single PP3 battery, this acoustic coupler allows Viewdata equipment to be used in office or home without a fixed BT socket. £85 + VAT, P&P.

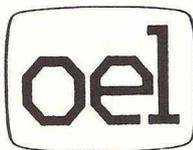
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(tick as required)

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Claims by a certain computer hack to have enjoyed pre-marital intercourse with the Princess of Wales should be accorded the usual credibility rating. The closest 'The Legless One' has ever come to interaction with Royalty was covering an exhibition opened by the then Lady Di, who apologised to the assembled scribes for keeping them waiting. "Think nothing of it, your Excellency," was our inebriated news-hound's immortal and only reply.

One of the best jokes in Walt Disney's *Tron* is Space Paranoids, a cunning satire on the Space Invaders genre. Disney moguls, who wouldn't know satire if it bit them on the leg, promptly registered the name and rushed Space Paranoids program cartridges into production. *Tron's* satirical script writers, who now stand to make a fortune from software royalties, don't know whether to laugh or cry.

Fear reigns once again at Chateau Commodore. Cause of the terror is the Commodore's decision to have his luxurious HS125 Pet Jet, hitherto equipped for twelve, converted to a six-seater. Now the dozen members of the CBM board are wondering which half are for the chop.

A Queen's Award for Industry is keenly anticipated by admirers of Mr. Dennis Jarrett, Micro-Journalism's answer to Barbara Cartland. So prolific is the Big D, that he is obliged to write under a myriad of pseudonyms, amongst them 'Henry Deckhand' (sic). For some reason our hero declines to discuss the sources of this cornucopia, the mysterious RE# program with which he 'recycles' so much of his material. The recycling record is presently held by an article on printers which has been sold to no less than nine computer publishers – so far.

Naughty Corner! Colonel Sanders look alike, Mike Sterland, of Personal Computers Ltd, has had an interesting new clause inserted in his showroom lease. The doyen of micro dealers is specifically prohibited from keeping a brothel on the premises. Do the Colonel's landlords know something we don't?

Come Dancing To the Institute of Data Processing Management, the somnolent serenity of which is ordinarily disturbed only by the occasionally anti-micro outburst of its Secretary General, the stately Ted Cluff. But today the halls are alive with the sound of music, provided by Whispering Sid Waxman and his Luton Strollers. Through the marbled gloom, I perceive the ghostly form of Ted, resplendent in white tie and tails, tripping a solitary light fantastic. As I silently steal away, the Strollers break into a snappy Albanian Samba.

Why are the offices of Computer Answers awash with redundant rivetters? In an effort to boost the magazine's prestige, Editor Ben Woolley was ordered to appoint an advisory panel of Elders. Woolley, alas, is hard of hearing and promptly hired a panel of – you've guessed it – welders.

Now the VIC 20 and 64 can communicate with PET peripherals



VIC and 64 users

Would you like to be able to access **any** of these peripherals from your computer?

- 1/3 megabyte disks (Commodore 4040 drive)
- 1 megabyte disks (Commodore 8050 drive)
- 10 megabyte disks (Commodore 9090 hard disk)
- Printers including a wide range of inexpensive IEEE and RS232 matrix and quality printers
- IEEE instruments such as volt meters, plotters etc.

Now you are no longer limited by the VIC or the 64's serial bus. Simply by attaching INTERPOD you can vastly increase the power of your VIC 20 and when used with the new 64, INTERPOD turns the computer into a really powerful system.

With INTERPOD the VIC and 64 become capable of running really professional quality software such as Word-processing, Accounting, Instrument control and many more.

INTERPOD will work with any software. No extra commands are required and INTERPOD does not affect your computer in any way.

Using INTERPOD is as easy as this:

Simply plug INTERPOD into the serial port of your computer, power-up and you are ready to communicate with any number of parallel and serial IEEE devices and any RS232 printer.

INTERPOD costs £95.95 + VAT

INTERPOD

GIVE YOUR VIC

EYES!

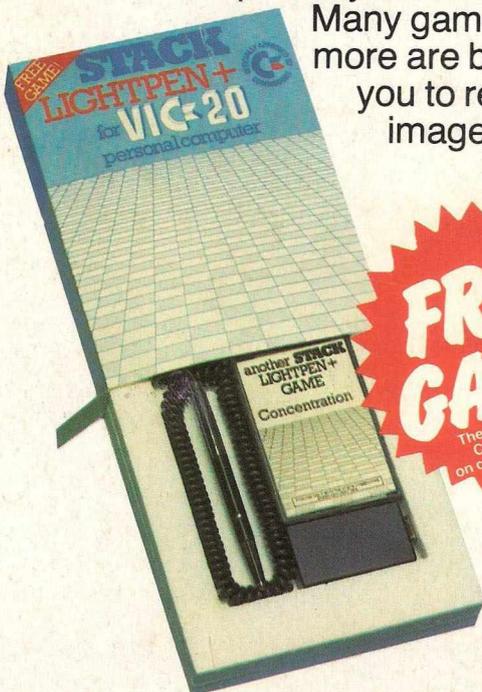


Hold the LIGHT PEN like a normal pen, point it at your TV screen and the pen tells your VIC-20 what it sees!

Instead of pressing keys, touch the screen with your LIGHT PEN and move your man in CHESS, create LIFE, play OTHELLO, take in DRAUGHTS, play GO.

Point the pen at your man and move him to his new position.

Many games are already available for the LIGHT PEN and many more are being developed. You can write programs which allow you to read with your LIGHT PEN from the TV screen or place images or words on the screen. e.g. From a long list on your screen use the LIGHT PEN to choose the facts and figures you want.



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