

PERSONAL COMPUTER

THE COMPLETE COMPUTING WEEKLY

NEWS

JUNE 3 - JUNE 9 1983 Vol 1 No 13 35p

**We pick up
the Ajile ...**

**... and Pro-Test it for price,
power and portability.**

Full report, page 42



SPECIAL FEATURE

DRAGON & TANDY TALK

Make your programs run
on both machines, page 24

PCN GAMEPLAY

NEW GAMES TO PLAY

We test new packages for the
Spectrum, Genie, Ace & Atari, page 48

JOYSTICK ROUNDUP

ARMS CONTROL

As joysticks proliferate, we help
you choose your weapon, page 38

SOFTWARE PRO-TEST

FORTH WITH SPECTRUM

Go-faster graphics
with Abersoft's Forth, page 34

**EVERY
35p
WEEK**

Silver-Reed-Right!

THE DAISY PRINTER OFFERING UNBEATABLE PRICE/PERFORMANCE
PLUS COMPATIBILITY WITH MOST POPULAR WORD-PROCESSING PACKAGES.

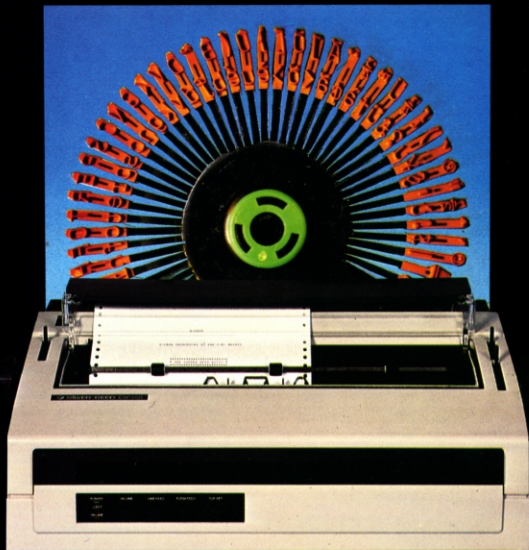
Superbly engineered, the Silver-Reed EXP550 provides the widest range of word-processing functions at a true entry-level price. Features include single pcb electronics and low compo-

nent count for ultimate reliability, and industry standard interfaces.

All backed by X-Data's renowned customer support service.

- 16 cps bi-directional
- original plus four copies
- up to 17in paper width
- easy-load cartridge ribbon
- quiet operation for office environment

Perfect print at a price you can afford.



X-DATA

Equipment Wholesalers

For more information telephone Slough (0753) 72331

X-Data Limited, 750-751 Deal Avenue, Slough Trading Estate, Slough, Berks, SL1 4SH.

PCN SPECIAL OFFER
SAVE £100!
 A superb double-disk drive subsystem for £100 less than its normal price. And it doesn't matter which micro you have. Complete the offer form on page 12 today!

Micropaedia Disk Drives: Part 2

Avoiding the crash, illustrated anatomy of the drive, comparison chart — and future developments.

REGULARS

Election Monitor 2

Four pages of the liveliest General Election coverage you're likely to find this side of the English Channel, with reviews of election night software on PCs, the manifesto of the Basic Party, the preparations of the computerised media, and the attitudes of the party leaders themselves to microcomputer technology. As a bonus, the PCN Plot-o-meter, your own guide to the outcome. All this on pages 2 to 5 — and back in the real world on page 6 Kodak promises 10Mb on a floppy

Random Access 14

Microwaves 16

Oric subroutines, high-speed Dragon, Tandy circles, Lynx's 6845 chip, ZX81 characters

Readout 17

Books for the Spectrum, Commodore 64 and TRS-80

Routine Inquiries 20

The long and short answers to your problems from Max Phillips

Gameplay 24

Spectrum 48

Can you get beyond base camp in Everest Ascent?

Genie 51

All the games you could wish for

Jupiter Ace/Atari 54

Micro-maze — fun in just 3K; and empire-building with Qix

ProgramCards 57

Cupid, a game for romantics

Dragon 32 63

Kill the Alien

Atari 400/800 67

Test your nerves with Time Bomb

Clubnet 70

Report on Namebug, the Essex BBC user group

Databasics 73

Billboard 80

Quit/Datelines 88

Cover photograph by Ian McKinnell

PCN SPECIALS

Dragon meets Tandy 25

Matchmaker Geof Wheelwright officiates — watch two micros achieve compatibility.

Oric Sound: Part 2 24

Grand finale from Bob Maunders gives you Oric, the music-maker.

Basic Transfer

Marc Leduc introduces a program utility which enables you to achieve tape compatibility between the Genie I and II and the Colour Genie.



PCN PRO-TEST: SOFTWARE

Dragon WP 30

Mike Gerrard reviews Microdeal's Telewriter, an easy-to-master word-processing package — possibly the first for the Dragon.

Spectrumised Forth 34

FIG-Forth implementation Abersoft is well worth the price if you're looking for a speedier Spectrum, says Ted Ball.

Apple Graphics 35

It's all done with a paddle or joystick, but is the GPS graphics manipulation package for the Apple II a joy to use? Mike Whitney reports.

PCN PRO-TEST: PERIPHERALS

Joystick Shoot-out 38

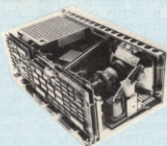
Ian Scales hunts down the slickest stick in the West.

Work to Rule 41

We get the measure of the humble but helpful programmer's ruler.



PCN PRO-TEST: HARDWARE



Ajile Analysed 42

Max Phillips' verdict on this diminutive IBM-compatible. It's superbly designed, and the real state-of-the-art.

CHARACTER SET EDITORIAL: Editor Cyndy Miles Deputy editor Geof Wheelwright Production editor Keith Parish Sub-editors Peter Worlock, John Lettice News editor King Peripherals editor Ian Scales Listings editor Sandra Grandison Editor's assistant Harriet Arnold Art director Jim Dunsie Art editor David Robinson Assistant art editor Floyd Savers Art assistant Dolores Fairman Publisher Fiona Collier Publishing manager Mark Eisen Publishing assistant Jane Green ADVERTISING: Advertisement manager Nic Jones Assistant advertisement manager Sue Hunter Sales executives Robert Stallbrass, Matthew Parrott, Bettina Williams, Ian Whorley, Sarah Barron, Roxanna Johnston, Christian McCarthy Production manager Eva Wozniak Advertisement assistant Jenny Dunn Subscriptions enquiries Simon Maggs Subscription address 53 Frith Street London W1A 2HG 01-439 4242 Editorial address 62 Oxford Street London W1A 2HG 01-636 6890 Advertising address 62 Oxford Street London W1A 2HG 01-523 3211 Published by VNU Business Publications, Evelyn House, 62 Oxford Street London W1A 2HG EC1. No material may be reproduced in whole or in part without written consent from the copyright holders. Photocopy by Quickest, 184-186 Old Street, London EC1. Printed by Chase Web Offset, St Austell, Cornwall. Distributed by Seymour Press, 334 Brixton Road, London SW9, 01-733 4444. Registered at the PO as a newspaper

Future in question



By all accounts next week's General Election will be the most important in many years, in that the result could shape the country for much further into the future than the lifetime of the next Parliament.

Micro technology will be a prominent feature of the future so PCN asked the leaders of the three main

parties for their views of various aspects of the technology. The responses written on their behalf are printed here.

It may not help you to decide which way to vote on June 9, but it is important to know where the people who could be running the country stand.

research and development of 'fifth generation' computers is inadequate compared to the 100 per cent Government funding available in Japan?

5. How would you protect Britain's undoubted leadership in the software field and what would your Government do to reform the confused state of copyright protection for computer software?

6. How do you view the impact of information technology over the next five years? Does it provide the opportunity to create new jobs or pose a threat to existing ones?

1. In the light of the results of Information Technology Year what action would your Government take to develop computer literacy?
2. What support would your Gov-

ernment give to educational computing and vocational training?

3. What action would your Government take to help British micro-computer manufacturers compete

with their overseas competitors and fight off the growing Japanese threat?

4. How would your Government respond to criticism that support for

THE PARTIES REPLY



CONSERVATIVE

1 and 2. IT year was a tremendous success, it greatly increased people's awareness of the importance of Information Technology. Our Micros-in-Schools scheme has put one micro in every secondary school and, now, into half our primary schools. In addition, we have now extended the scheme to cover peripherals like printers and VDUs. We have also installed a complete computer system in every teacher training college and are setting up ITECs to train young and unskilled unemployed people in computer and electronic skills. This programme will be extended to provide evening courses for adults.

3. The micro industry is one of our great successes. There are over 50 companies

making micros in Britain. Sinclair is the first company in the world to sell over one and a half million of them. We have the highest penetration of micros per capita of any country in the world, and last year their sales increased by a phenomenal 400 per cent. We are examining the different levels of tariffs as between components and finished goods in the light of the anxiety expressed by some manufacturers. We will pursue this matter in the EEC.

4. Alvey is the largest co-operative research programme we have ever undertaken. It will involve £350 million over five years. No other European country has a programme on this scale. British companies, universities and government are coming together to pool their resources.

5. We are looking at this matter and a Green Paper on it was issued last year. It would be idle to pretend there is an easy answer. Britain's software industry is outstanding and we must do everything possible to encourage it. We launched the £10 million software products scheme last year. This provides funding of 33½ per cent for pioneering software projects.

6. I believe profoundly that the new information technologies will create great job opportunities as we move towards an information-based society. Some will be in manufacturing, but many more will come

from the application of it. Many new services will spring up — ordering holiday bookings via a teletext screen, mobile telephones, electronic publishing, pocket televisions, mobility aids for the elderly and handicapped, and lessons by video.

We must ensure that Britain does not miss out on the opportunities of the micro-chip revolution. We have shown our commitment by appointing a Minister and increasing the funding for this area from £50 million in 1979 to £200 million a year today.

The Alliance does not even have a spokesman in this area, and in their Manifesto they devote precisely 49 words to innovation and technology. The Labour Party are Johnny-come-latelies in this field. They have had no new ideas for four years. They would shackle the development of cable TV and restore and extend British Telecom's monopoly. Worst of all, they would nationalise part of our highly successful electronics industry. Nationalisation has failed in the older industries; it would be a tragedy if it were now allowed to kill off the new.

We are creating a technological power house in Britain to rejuvenate our industrial base and carry it into the next century. Labour would create an industrial museum.

Kenneth Baker



LABOUR

1. In our Manifesto we state that we will 'increase technological literacy in schools and give boys and girls equal opportunities to study science and technology'. We must restore cuts in education so that adequate computer facilities are available in all

schools. The present Government's one micro per school is merely paying lip service to pupils' real needs. Teachers must be trained, through initial in-service training, to equip their pupils with basic computer skills. The Open University and Open Tech should be used to provide such skills for the majority of adults. We need to make people more aware of IT. According to a Policy Study Institute Survey 59 per cent of firms thought IT82 had made no impact.

2. In our Manifesto we state that we will 'promote the supply of engineers and technicians, including women, to meet the needs of industry and the community'. This requires a substantial increase in educational computing and vocational computer training, by stepping up courses in further

and higher education and increasing opportunities for retraining through increasing provision for day and block release and paid educational leave.

3. Many publications such as NEDC and ACARD reports have stressed the much greater degree of central planning and intervention in electronics by more successful competitors like France, West Germany and Japan. The message, in fact, is the exact reverse of what the Government constantly claims: our competitors are more successful because they do not need to rely so heavily on 'market forces'. They do not believe that streamlined planning of electronics growth hampers the industry's ability to innovate or respond to technological changes. The evidence suggests it improves it. Nor do our

key competitors delegate policy for growth sectors like electronics to numerous official agencies — as the British Government does. In the key areas of UK information technology, there are at present 21 different Government executive bodies with responsibility for some aspect of official IT policy, many of them duplicating each others' activities and many working towards entirely different goals — if any.

4. The National Computing Centre has already expressed concern that the Alvey Report on fifth-generation computers omitted communications and that the funding of the industrial elements to 50 per cent was too limited. The Government has not met the recommendations in full. The report's recommendations on funding of advanced information technology must be implemented. We would also wish to have

more trade union consultation on the development of a programme.

5. The Labour Party is very concerned that the innovation and computerisation of companies is only improving slowly compared with our competitors. At present there is every sign that future growth will be held back by existing skill shortages in key occupations. A recent survey of the Policy Studies Institute revealed micro and electronics skill shortages in two-thirds of establishments using microelectronics in products and processes. Our new Planning Department will set up effective joint machinery with the Manpower Services Commission to monitor trends and ensure that training programmes fully reflected changing workforce requirements. A Labour Government would give serious consideration to a review of copyright protection.

6. As we state in Labour's Manifesto, 'the fall in output, together with the lack of planning and retraining, has meant that new technology has brought major job losses in some sectors'. New technology brings opportunities for more leisure, for new and existing products and for cutting out dangerous and boring jobs. Failure to introduce new techniques would lead to our industry falling even further behind our competitors. We do not believe that we face a collapse of work or permanent technological unemployment, but there is no doubt that certain occupations, particularly in services such as banking and insurance, will be adversely affected. Labour's approach is to encourage the development and application of information technology while planning to ensure that the benefits are evenly shared and the costs of change are minimised.



ALLIANCE

1. Generalised computer literacy can only be improved by a combined programme for both children and adults. We would therefore encourage and support the extensions, where appropriate, of:

- The already widespread use of micro computers in primary and secondary schools.
- The provision of courses in computers and computing already offered to adults by the Open University, especially those designed for teachers and industrialists.
- The provision of similar courses by other providers of adult education.

2. The previous answer covers educational computing other than in higher education. Here we are committed to improving the financing of higher education in general. In particular we would encourage

the extension of computer science provision. We see vocational computer training as an important part of our programme of training for all 16-19 year olds, whether employed or not. We are aware that present training programmes in computing are still inadequate in that many participants remain under-trained at the end. We would encourage selection for these programmes on the basis of aptitude rather than qualification.

3. It is virtually impossible to answer this question without the detailed knowledge of the state of the industry and the state of the national economy that is available only to the party in power. In general terms we see the encouragement of technologically-based modern industry as a very high priority in our economic policy. We would therefore want to do all that we could to help British microcomputer manufacturers. We see the industry as already strong in the field of computers for educational and leisure activities but as much weaker in the field of the more sophisticated machines required by industry and the professions.

4. We would look sympathetically on the recommendations of the Alvey Report that a higher percentage of Government funding should be available to British firms.

5. There are two measures which we

would take to help preserve the current British lead. The first is to maintain and expand our efforts in higher education and in computer science. The second is to encourage those firms involved in software production by contracting out of them the needs of Government for new software. The problems of copyright are formidable in almost every field including computer software. There is only one way of tackling them successfully and that is by international action but we would be supportive of any efforts to solve the problem, even partially.

6. We see the increasing impact of information technology on manufacturing industry, on service industries, on the social and educational services, and on leisure and hobbies as an irreversible trend over the next decade. It is in our view impossible for Britain to opt out of this change. It can bring enormous benefits and can transform the quality of life for the better. In terms of jobs over the next five years the effect is likely to be a balance, which may well be close, between the creation of new ones and the elimination of old ones. We shall take firm and effective measures — particularly in the field of education, training and retraining — to counter any transitional loss of the jobs.

Lord Kilmarnock

PCN PLOT'O'METER

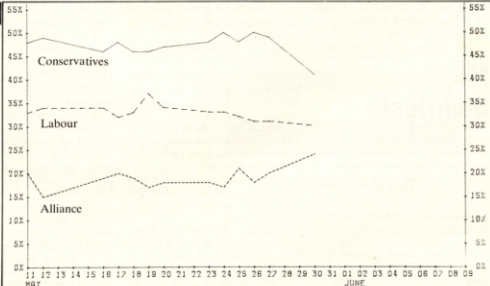
By Nigel Cross

As part of its election coverage PCN brings you the PCN Plot'o'meter, your own day-by-day guide to the progress of the main parties towards the finishing post of June 9.

Running on an Apple II with a Watanabe DigiPlot, the Plot'o'meter program takes details from the national opinion polls published in the daily press and translates them into a comprehensive chart. It allows for more than one poll each day and adjusts the figures to take into account different sample sizes.

The last reliable data we were able to use on the Plot'o'meter dated from May 30, and the result is the chart below. It shows the early wavering of all three parties.

Like a page in an IBM manual, we've deliberately left half the chart blank to let you complete the lines between now and June 9. Keep your eye on the polls.



Computer countdown

By Ralph Bancroft

Put out the cat, plug in, turn on, tune in and settle back for the public computer extravaganza of all time. Thursday night is election night.

Better still, power up your micro and try to beat the big boys at their own game.

Each election the broadcasting organisations try to outdo each other and race to see who can produce the results first. This election is no exception. In addition to seeing who can log the results first they will be competing to see who can do it with the most colour. For this is the colour graphics election.

ITN's *The Nation Decides* will feature Peter Sissons operating a VT80 graphics computer. This machine was designed and built by ITN itself and produces the most amazing colour graphics. For a taste of what it can do, watch Channel Four's evening news programme. Roughly three-quarters of the captions used are generated by the VT80.

This computer has a screen resolution of 1024 pixels per television line (there are about 576 viewable lines on the average television screen). Instead of addressing each pixel individually, the VT80 stores all of the information as shapes that can be recalled and placed anywhere on screen. The machine uses 16-bit words and has 256K of memory.

The VT80 is just the graphics output end of ITN's computer system. As the results are phoned in from each election count they are fed into a VAX 11/750 which has 4Mb of memory and 500Mb of backing store on Winchester hard disks. This machine does all the number-crunching, calculating the percentage share of the poll, turn-out and swing and also updating the forecast of the final result.

A second VAX 11/750 takes the results of this number crunching and prepares it for presentation on screen by the VT80. A third VAX minicomputer will operate on

standby ready to take over if any of the other machines should fail.

Over at the BBC Peter Snow will be the person in charge of the computer. He will be sitting at a Fluke console that can generate graphic displays which should give ITN a good run for its money. Behind the scenes the BBC will also be using a VAX and will be supplementing it with three Quantel graphics processors and a Flair graphics processor.

Both TV organisations will be linking their computers directly into the teletext systems, Ceefax and Oracle. On both systems the service will be essentially the same. One page will be used to display the latest result to come in. Other pages will show the results in individual constituencies.

A special results service will also be available on Prestel. It will be run by Hatfield Polytechnic, which has drafted in a team of sixth-formers from local schools to help collate the information and key in the

results. A Research Machines micro has been used for indexing the constituencies and three Bishops-gate Intelligence terminals with 40 page buffers will be used on the night to edit the pages before uploading via Prestel's Duke computer in London.

There will be three separate indices to help users find the information they want. A 'how the famous/fared' index will give speedy access to the pages featuring well known names. An alphabetical index can be used when the name of a constituency is known. Finally a regional index will help those who are not sure of the constituency name, only the general area.

In addition to the results pages, there will be an election news magazine with news stories, predictions and the views of the pundits.

Hatfield Poly's emphasis on getting the information right is well placed. British embassies around the world have been equipped with Prestel sets to keep up to date.

Blocked votes

By Wendie Pearson

Camssoft's Election Analyst, supposed to turn you into an election fiend, is useful for any kind of election. So when the big day is over you can use it for by-elections, union elections or just for presenting statistics. It runs on the Lynx.

You enter data that is related to the election, and the program sorts candidates into order by number of votes polled. Tabulated results will give you percentages and Election Analyst produces bar charts.

These amazing charts, like rainbow-coloured skyscrapers on the move, appear as if from nowhere and crawl up and down the screen. They will also give you percentage swings for and against competing parties, and if you're feeling lazy, you can always load the sample data which shows the Bermondsey result of 1979 compared to that of the by-election this year.

The cassette is plainly packaged,

but it's what's inside that counts. You get a note of the six possible operations and the rest is up to you.

You will be struck by the brilliant colours that Camssoft has put together, and the whole thing is really almost too neat to be true — certainly very colourful.

But there is only so much you can do with bar charts. Your attention may begin to wander after ten minutes or so, and the program has some quirks.

It shows its disgust by ignoring words when it really wants numbers, but refuses to say 'number please'.

Another interesting feature is the way this program accepts 'no' when it asks you for a candidate.

With relatively little user memory available to you on the Lynx you will be restricted in the amount of data you can actually analyse at any one time.

But the compensations come



The Election Analyst package from Camssoft gives you a taste of the analytical procedures of the BBC experts.

partly from the software and partly from the machine. There is liberal use of double-height characters, a thoughtful touch that enhances the already strong graphics. Generally the Lynx makes the most of this electoral rainbow.

If the main attraction of the software is visual, you might prefer

to play with something a little more silly. But for practising a bit of amateur futurology it could be a lot of fun.

Election Analyst costs £7.90 from Camssoft.

You can buy it from Spectrum Centres in various towns around the country.

Micro manifesto

Princes of the blood royal, convicted criminals and the insane are not allowed to vote in British elections. But there's nothing to stop the mildly eccentric from standing for Parliament.

Peter Dick, 36, is the official parliamentary candidate for the Basic Party in the west London constituency of Hammersmith. The Basic Party, which demands the removal of VAT from micros, has only one member — Peter Dick.

Mr Dick's campaign is a careful blend of serious electioneering and cheerful frivolity. His manifesto includes two shameless vote-catchers — the removal of the 70 mph speed limit on motorways, and a subsidy on cat food for old age pensioners (for their cats).

The serious aspect is deadly serious. 'I've taken a month off work and it's costing me a fortune,' says Mr Dick.

If elected (and Mr Dick is not over-optimistic) he will probably foot-pedal the speed limit and cat food proposals and press the Government on the removal of VAT

from micros. 'The most important thing in the world today is the computer,' he says. 'The quicker youth graps machines the better. The answer is to remove VAT and classify micros as tools, not toys.'

Should he hold the balance of power in a hung Parliament the possibilities are almost boundless: free cat food for all, unbribed mayhem on UK roads, and a sensible approach to technology. But for the moment he is a lone voice crying in the wilderness. It is to be hoped that the voters of Hammersmith are fully conscious of their responsibility.



Peter Dick and his pet subjects.

Into the swing on your own PC

By David Guesst

When the first returning officer of the night steps forward with the first result of the election you could have an overall forecast a couple of seconds later.

Not by courtesy of the massed ranks of experts in the studios of the BBC and ITV, but from your own personal computer. Impex Portable Software is selling a program called Swingometer that runs either on a Sinclair ZX81 system with 16K or on an Osborne 1.

The program has a distinguished pedigree. Designed by Christopher Munkton, a special advisor to the Prime Minister, it has been running in Downing St for several months. It didn't exactly pick the date for Mrs Thatcher, but it confirmed a general feeling that with a lead as strong as the opinion polls gave us, June was a good time, says Mr Munkton. He adds: 'It did tell us that unless

Labour was able to get within five points of us, the Alliance was no threat.'

PCN tested the version for the Osborne. It requires MBasic and loads from drive B, putting not only the program but also the results of the last general election into memory. With a minimum of fancy preliminaries it presents you with options:

- To forecast the result based on national opinion polls — on the strength of a poll conducted on May 24 (Conservatives 47.5 per cent, Labour 32.5, Alliance 19) it predicted a Conservative majority of 212 seats.

- To give more precise forecasts based on regional opinion polls — it uses the 11 regions of the Gallup organisation but showed some confusion over the exact location of Rochdale.

- To calculate the swings from

by-elections and use them in a national forecast.

- To make forecasts for individual seats or blocks of seats to work out what might happen in your area — Harrow East looks safe for the Tories barring an outbreak of mass hysteria.

- To enter the results as they come in on the night of June 9, producing instantly updated forecasts from the very first result.

Running the program on opinion polls and invented data two weeks before the election is a pleasantly relaxed exercise. The software has a hint of polish and it is very responsive.

But if you want to use it on June 9, try to find somebody who will watch the television or listen to the radio while you peer at the Osborne. Keying in figures could become frantic when the results start to flow.

Also, take care of the numeric keys. Entry validation is efficient but the program accepts zeroes too readily and is prone to steam ahead with an analysis based on naughts.

A neat practical feature is its capacity to work with either percentages, as the opinion polls present

their results, or with figures, as the results will come in. It calculates swings three ways and offers a variety of summaries.

On the question of its accuracy, Swingometer stores the results from the last election and makes a rough estimate of how those results would have been affected if the new boundaries had been applied. In the instruction booklet it points out that its predictions will gradually become more reliable as results come in, which seems like stating the obvious.

The program's output is unopinionated; it just displays or prints lists and tables of results.

Swingometer comes with a lucid instruction booklet which includes a full list of constituencies, with the numbers by which the program recognises them.

The version for Sinclair machines costs £9.95 plus 50p for postage and packing; for the Osborne you pay £29.95, again plus 50p; and from June 4 a version for the Jupiter Ace should be available at £26.

Impex Portable Software is at Bedford House, Hockliffe St, Leighton Buzzard, LU7 8EZ, 0525-371597.

The aid of the parties

By Sandra Grandison

As the election heats up, the four political parties' computers are busily bytting away.

At Conservative Central Office, a heavyweight ICL ME29 mini equipped with 4Mb of main storage, 180Mb of backing storage, five VDUs and a heavy-duty line printer has some big number-crunching tasks on its menu.

The machine does direct-mail campaigns, routine word processing, administrative jobs and political analysis. The most important function that the computer has performed was during the three-day interval between local elections and Mrs Thatcher's decision to call the election.

The votes polled by 28,000 candidates were fed into the computer to produce conclusions that helped persuade the Prime Minister to go for June 9.

In addition to the ICL ME29, the Conservative Party owns a multi-micro DRS 20 model 40 with two model 10 intelligent work stations equipped with double floppy disk drives and two letter-quality printers. And behind the scenes an ageing NCR 8250 ticks away doing most of the accounts, and holds names and addresses used for mailouts to candidates and agents.

The Liberal headquarters opted for Digico Prince machines, which are fairly standard business micros. They bought two and have one on loan.

This party uses the micros to write and distribute financial appeals, *Liberal News* and other



Working for the Conservatives, DRS 20 workstations.

political literature, and for routine office administration.

'In due course we will be computerising the accounts,' says Hugh Jones, secretary-general of the party. 'At the moment we're in two minds — whether to add to the micros or whether to have a central unit with two terminals.'

Labour's plans to introduce modern micros had to be shelved when the General Election date was announced. At the moment they are coping with an ICL 2903 bought in 1976.

James Taite, of the party's finance department, said: 'We use the ICL 2903 for all the election expenses we charge our constituen-

cies. After the elections there's going to be a whole rethink about our computer equipment.'

On the Social Democrat front computers have chipped in in several ways. The party has Wotton Jeffrey's bureau handling its membership system and a Shelton Signet micro dealing with internal accounts.

The SDP is also the first party to use Prestel to communicate with regional offices and parliamentary candidates.

Its Prestel pages are used to send press releases, briefing papers and so on to the 15 individual candidates and six regional offices hooked up to the service.

ELECTION NIGHT GUIDE

BBC Television

10.40pm-4am 'Election 83'
5.30am-6am Special Ceefax service on screen giving a review of results so far.

6am-10am Breakfast Time: news roundup.

10am-4pm 'Election 83'.

Continuous Ceefax service with latest results and results for individual constituencies.

ITV Television

10pm-4am 'The Nation Decides',
6am-10am TV AM: news roundup.

10am-4pm 'The Nation Decides'
Continuous Oracle service with latest results and results for individual constituencies.

Prestel

Election results service on page 2885, run by Hatfield Polytechnic with news magazine and constituency by constituency results.

Safety valve

Bug-Byte is deliberately saving its program, General Election, until after the election for people who are disgruntled with the result.

'The result could be bad news for people on less than £40,000 a year,' said marketing manager John Phillips. 'It will help them vent their anguish by letting them make up new parties like Nuclear Prawn or the Save The Whale party.'

General Election will run on the Spectrum. It will set you back £5.95.

Kodak claims superfloppy

Ten megabytes on a 5¼in floppy is the promise of Eastman Kodak.

The company claims it will have a range of floppy disks using vertical recording available by the end of this year. This technique involves putting the magnetic impulses on their ends, enabling many more of them to be contained on a length of track.

Kodak claims its product will bear as much as 10 Mb on a 5¼in floppy at not more than 50 per cent above the price of a conventional floppy.

It was expected to be years before disk and media manufacturers managed to make a vertical recording system available to the public. But Kodak seems to have exploited its experience in coating camera film to steal the march on other companies known to be in the race, including Toshiba, Xerox and the Japanese giant Matsushita.

It remains to be seen whether any other company is manufacturing drives to make use of the new medium.

We'll let you know . . .

PCN Charts

PCN Charts follows the rise and fall of the UK's best-selling micros. This fortnightly top-of-the-shops list tells you what's selling best over the counter; it does not take account of mail order and does not count deposit-only orders. This week's figures show the number of machines sold in the two-week period ending a week before publication date (in this case June 3), so these charts tell the story in high streets between May 13 and May 27.

Machine prices quoted are for the no-frills models and include VAT. Information for the PCN Charts is culled from retailers and dealers throughout the country and compiled by MRIB, London. They will be updated every alternate week . . . so watch for the arrows to follow the ups and downs of the best-sellers.

Top Twenty up to £1,000

	MODEL	PRICE	DISTRIBUTOR
▶ 1 (1)	Sinclair Spectrum *	£99	(SI)
▲ 2 (5)	BBC Model B	£399	(AC)
▼ 3 (2)	Sinclair ZX81	£40	(SI)
▼ 4 (3)	Oric 1	£100	(OR)
▲ 5 (10)	Dragon 32	£200	(DR)
▼ 6 (4)	Atari 400	£150	(AT)
▶ 7 (7)	Lynx 48	£225	(CA)
▶ 8 (8)	Newbrain A	£228	(GR)
▼ 9 (6)	Commodore Vic 20	£170	(CO)
▼ 10 (9)	Atari 800	£300	(AT)
▲ 11 (11)	Epson HX20	£472	(EP)
▲ 12 (13)	Sharp MZ80 A	£549	(SH)
▲ 13 (14)	Texas TI 99	£150	(TI)
▲ 14 (19)	Colour Genie	£224	(LO)
▲ 15 (—)	Nascom 3	£549	(LL)
▼ 16 (12)	Commodore 64	£345	(SH)
▼ 17 (16)	Sharp PC1500	£170	(JU)
▼ 18 (15)	Jupiter Ace	£90	(AP)
▼ 19 (17)	Apple IIe	£969	(AC)
▼ 20 (18)	Acorn Atom	£174	(AP)

Top Ten over £1,000

▲ 1 (3)	Osborne 1	£1,581	(OS)
▼ 2 (1)	Sirius 1	£2,754	(ACT)
▲ 3 (7)	Apple III	£2,780	(AP)
▲ 4 (4)	IBM PC	£2,392	(IBM)
▼ 5 (5)	Commodore 8032	£1,129	(CO)
▼ 6 (2)	Olivetti M20	£2,754	(OL)
▼ 7 (7)	Superbrain II	£2,070	(IC)
▲ 8 (8)	HP 86A	£1,541	(HP)
▶ 9 (—)	Sanyo MBC 1000	£1,195	(SA)
▶ 10 (—)	DEC Rainbow	£2,714	(DEC)

AC Acorn Computers. ACT — ACT Sirius. AP — Apple Computers. AT — Atari International. CA — Computers. CO — Commodore. DEC — Digital Equipment Corporation. DR — Dragon Data. GR — Grundy Business. HP — Hewlett-Packard. IBM — IBM. IC — Icarus Computers. JU — Jupiter Cantab. LO — Lowe Electronics. LL — Lucas Logic. OL — Olivetti. OR — Oric. OS — Osborne Computers Corporation. SA — Sanyo. SH — Sharp. SI — Sinclair. TE — Texas Instruments.

Romik's new dimensions

New games bringing you 3D monsters and 4D space cubes for the Dragon, Spectrum and ZX81 will be in the shops next week.

The games, from Romik, include the £9.99 Romik Cube for the Dragon which features three cube games on one tape — practice cube, 4D time cube and 4D space cube. With this one you can use up to 27 colours at a time.

Games for the Spectrum are Colour Clash (several games in one) at £7.99, Three-D Monster

Maze at £6.99, Spectra Smash (a bomber-type) and Breakout on one tape for £6.99, and Galactic Trooper at £5.99.

Galactic Trooper is also coming out for the ZX81, and will be joined by Galaxy Jail Break, Bubble Bugs (which involves defending your fortress against invading bubbles) and Bank Robber — all at £4.99.

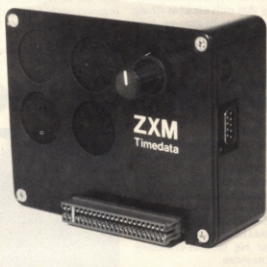
These will all be available from Romik dealers such as Curry's and Lasky's at their branches around the country.

Still counting

Lotus 1-2-3 is to get a foothold on machines 4,5,6,7 and 8, with implementations just announced for the Wang Professional, the Zenith Z-100, Dynalogue's Hyperion. NEC's Advanced Personal Computer, and the DEC Rainbow.

This new database/spreadsheet/graphics package started life on the IBM and is due to appear this month on the Sirius/Victor and on the Texas Instruments Professional. But the DEC version marks 1-2-3's first move onto CPM-86.

This autumn is the target date for the five new versions.



SOUND SPECTRUM — This modestly styled little unit is the latest means of giving your Sinclair vocal chords. It stops short of actual speech synthesis but offers a range of sound effects and its built-in amplifier and loudspeaker can boost your Spectrum's beeping noises. Called the ZXM Sound Box, it comes from Timedata. You can use it either on a ZX81 or a Spectrum, and it has a 9-pin I/O socket so you can plug it into the back of the unit. It costs £29.95 from Timedata, on Basilidon (0268) 418121.

Acorn delays

By Geof Wheelwright

The launches of both Teletext software and Acorn's teletext adapters have been delayed until August at least.

An Acorn spokesman said last week that although field trials of the teletext adapter have been successfully completed, the company wanted more time to rewrite some of its software before broadcasting it on Cefax for downloading through the adapter.

He added that the BBC had also requested more time to improve its central library of programs before going on the air with the service.

But a letter sent out by Vector Marketing to customers who had ordered the teletext adapter as early as January told them that

some hardware adjustments were also taking place.

'The field trials . . . have indicated various areas where the operation of the software both in the teletext ROM and the BBC Cefax computer can be usefully extended. In addition to making the unit more user friendly, these improvements will noticeably reduce the time to download a program and make provision for future extensions to the BBC Teletext service.'

The letter also said that the start of Teletext broadcasts will be timed to coincide with the launch of the adapter in August. Cefax currently broadcasts computer programs, but only as on-screen listings.

THE WORLD'S LEADING MICROS AT PRICES YOU CAN AFFORD!

OEM offer one of the most comprehensive ranges of business micros in the U.K. — so come to our King Street showrooms where you can discuss your application and have a demonstration on:



From £12.98 p.w.

IBM
Personal Computer



From £13.98 p.w.

olivetti M20



From £12.98 p.w.

apple III



From £12.98 p.w.

OSBORNE 1



From £7.98 p.w.

apple IIe



From £4.58 p.w.

Also Canon Photocopiers *from £3.48 p.w.* Call our hotline 01-748 8404 for some of the keenest prices in Britain!

PLUS! Epson — Ricoh 1600 Flowriter — Facit — Qume — Praxis 35 — and a whole range of dot matrix and daisywheel printers and peripherals.

As one of Britain's foremost companies in the field of high technology as well as one of the leading micro computer outlets in the U.K., OEM offer as part of our all round expertise:—

TRAINING

Our monthly training courses cover most leading software packages but must usually be booked 4 weeks in advance!

SUPPORT

Our customer support department is second to none!

NETWORKING

Our Multinet 2000 range interfaces almost any computer to any other computer/peripheral whether main-frame, mini or micro.

BUSINESS PACKAGES

A wide range including accounts, word processing and spreadsheet programs!

SOFTWARE DEVELOPMENT

Software written to your needs and specification.

HARDWARE DEVELOPMENT

Our team of engineers will design and build any system/peripheral you require!

MAINTENANCE

We will repair/maintain/service most micros whether purchased from us or not.

WEEKLY BARGAINS!

Every Friday evening we change our **showroom** demonstration models — which you can pick up (only one week old) at vastly reduced prices!

To: Office Efficiency Machines Ltd.
150—152 King Street,
London W.6.

PCN12

Tel: 741 7383/4/5/6

Please send me information/quote on:

I am an ☐ End User ☐ Dealer ☐ Urgent

I have a requirement for ☐ 1 system ☐ 2—9 systems
☐ 10 or more systems

I will be purchasing within

☐ 1 month ☐ 3 months ☐ 6 months or more

My budget is £

Name Title

Company

Address

Postcode

Phone Extension



OFFICE EFFICIENCY MACHINES LTD

150—152 King Street, London W.6.

Tel: 01-741 7383/4/5/6 Telex 263559 MICRO G



GREAT NEW SOFTWARE DEAL

Buy 'n Try – the sensible way to shop for software. Simply buy any item from our software range. Try it out at home. If it's not exactly what you expected, then we'll buy it back for a full 80% of the price you paid against another purchase of equivalent or greater catalogue value any time within 1 month of purchase.

Which means you can keep right up to date with the latest software and games releases without making costly mistakes.

How it Works

Example: Buy a game for £10. If it's not as good as you thought, then we'll buy it back for £8 against your choice of another game worth £10 or more. Just send us the difference. There's just one simple rule we can only agree to buy back software that's in working order.

Look at our super selection and complete the order form to take advantage of the hottest software deal ever, or telephone your order to **Software Centre on 01-487-5974**, quoting your Access/Barclaycard number (24-hour telephone service).

B.B.C. MICRO

Mem Reg d	Supplier	Code No	Price
Space Peaters	16K	02B001	£8.00
Space Warp	32K	02B002	£9.00
Golf	32K	02B003	£5.50
Drongo Quest 1	16K	02B004	£11.50
Fruit Machine	B	03B006	£5.50
B.B.C. Airlift	B	02B007	£5.50
Polars	32K	02B008	£5.50
B.B.C. Chess	32K	02B009	£8.00
B.B.C. Backgammon	A/B	02B010	£8.00
B.B.C. Multitile	16K	02B011	£15.00
B.B.C. Micro Derby	A/B	02B012	£5.50
Swing B/A	32K	24B029	£6.95
Alien Destroyers	32K	24B030	£6.95
Galactic Commander	32K	24B031	£6.95
Timetrek	32K	24B032	£6.95
Laser Command B/A	32K	24B033	£6.95
Astro Navigator B/A	32K	24B034	£4.95
Chess B/A	32K	24B035	£6.95
Footer B/A	32K	24B036	£6.95
Adventure	32K	24B037	£6.95
Cowboy Shootout	32K	24B038	£5.95
Munchyman	32K	24B039	£5.95
Seek	32K	24B040	£5.95
Elaborado Gold B/A	32K	24B041	£5.95
Route 1 B/A	32K	24B042	£4.95
Reversi 2 B/A	32K	24B043	£4.95
Filer	32K	24B044	£8.95
Micro Budget	32K	24B045	£5.95
Constellation B/A	32K	24B046	£5.95
Disassembler	32K	24B047	£5.95
World Geography	32K	24B048	£5.95
Where B/A	32K	24B049	£5.95
Junior Maths Pack	32K	24B050	£5.95
Star Trek Candyfloss	A or B	33B001	£6.50
6 Games	A or B	33B002	£4.50
Mutant Inv/Breakout	A or B	33B003	£6.50
Beep Beep B or A	32K	33B004	£4.50
Beebmann B or A	32K	33B005	£6.50
Super Hangman B or A	32K	33B006	£4.50
3D Maze B or A	32K	33B007	£4.50
Invaders A	32K	33B008	£5.50
Invaders B or A	32K	33B009	£7.50
Wordpro B or A	32K	33B010	£10.50
Atlantis/Scramble	32K	33B011	£7.50
Flags	32K	33B012	£4.50
Hyperdrive	32K	33B013	£6.50
Strato Bomber	32K	33B014	£7.50
Creative Graphics	A/B	33B051	£9.95
Arcadians	B	33B052	£9.95
Sliding Block Puzzles	B	33B053	£9.95
Snapper	B	33B054	£9.95
Desk Diary	A/B	33B055	£9.95

B.B.C. MICRO cont.

Mem Reg d	Supplier	Code No	Price
Cube Master	B	Acornsoft	53B056 £9.95
Tree of Knowledge	B	Acornsoft	53B057 £9.95
Lisp	A/B	Acornsoft	53B058 £16.85
City Defence	Bug Byte	02B059	£7.50
Space Invaders	Bug Byte	02B060	£7.50
Galaxy Wars	Bug Byte	02B061	£7.50
Asteroid Belt	Comp. Concept	60B073	£7.80
Space Hawks	Comp. Concept	60B074	£7.80
Golden Baton	Digit. Fantasia	61B075	£8.95
Time Machine	Digit. Fantasia	61B076	£8.95
Arrow Death 1	Digit. Fantasia	61B077	£8.95
Arrow Death 2	Digit. Fantasia	61B078	£8.95
Pulsar 7	Digit. Fantasia	61B079	£8.95
Circus	32K	Digit. Fantasia	61B080 £8.95
Feasibility Experiment	Digit. Fantasia	61B081	£8.95
Frogger	I.J.K.	33B088	£7.50
Cruiser	Monopower	24B108	£7.95
Dragon Rider	Salamander	62B109	£7.95
Tanks	Salamander	62B110	£7.95
Graphics Package	Salamander	62B111	£24.95
Compendium B1	Salamander	62B112	£5.95
Compendium B3	Salamander	62B113	£5.95
Database Management System	Gemini	63B114	£19.50
Invoices & Statements	Gemini	63B115	£19.95
Home Accounts & Budget	Gemini	63B116	£19.95
Decision Maker	Gemini	63B117	£5.95
Stock Control System	Gemini	63B118	£19.95
Selective Mailing List	Gemini	63B119	£19.95
Commercial Accounting	Gemini	63B120	£19.95
BBC World Processing	32K A or B	Gemini	63B121 £19.95
Beetbolic	Gemini	63B122	£19.95

COMMODORE 64

Monopole	Rabbit	13K002	£9.99
Grave Robbers	Rabbit	13K003	£9.99
Sprite Editor/Graphic Generator	Rabbit	13K004	£9.99
Adventure Pack 1	Rabbit	13K005	£9.99
Attack on Mutant Camels	Liamasoft	52K006	£8.50
Rox 64	Liamasoft	52K007	£4.95
Gridrunner	Liamasoft	52K008	£8.50
Colonels House	Rabbit	13K009	£9.99
Orbis 64	Rabbit	13K010	£9.99
Adventure 2	Rabbit	13K011	£9.99
Grand Master Chess	AudioLogic	16K012	£17.95
Renaissance	AudioLogic	16K013	£17.95
Motor Mania	AudioLogic	16K014	£8.95

DRAGON 32

Ghost Attack (cart)	Dragon Data	17C007	£24.95
Cave Hunter (cart)	Dragon Data	17C008	£24.95
Starship Chameleon (cart)	Dragon Data	17C009	£24.95

NB. Software Centre is not a software library.

DRAGON 32 cont.

Mem Req'd	Supplier	Code No	Price
	Dragon Data	17C007	£24.95
	Dragon Data	17C008	£24.95
	Dragon Data	17C009	£24.95
	Dragon Data	17C011	£24.95
	Dragon Data	17C012	£7.95
	Dragon Data	17C013	£7.95
	Dragon Data	17C016	£7.95
	Dragon Data	17C017	£7.95
	Dragon Data	17C018	£7.95
	Dragon Data	17C022	£7.95
	Romik	10C050	£9.99
	Salamander	62C061	£9.95
	Salamander	62C062	£7.95
	Salamander	62C063	£7.95
	Salamander	62C064	£7.95
	Salamander	62C065	£7.95
	Salamander	62C066	£7.95
	P.S.S.	64C067	£7.95
	P.S.S.	64C068	£12.95
	P.S.S.	64C069	£12.95
	P.S.S.	64C070	£7.95
	P.S.S.	64C071	£12.95
	Dragon Data	17C074	£7.95
	Gemini	63C075	£19.50
	Gemini	63C076	£19.50
	Gemini	63C077	£19.50



**FOR USE ON VIC20 + 16K,
DRAGON, COMMODORE 64,
ORIC 1, SINCLAIR ZX81 + 16K**

CENTRESPREAD SC

A fast flexible spread-sheet program. Set up the spread and test 'what-if' options. Centrespread calculates formulae on columns and lines. Superb forecasting and planning aid.

£19.95**DATABASE SC**

A powerful database management program to select and sort complex data from any of twelve fields. Ideal for records, home accounts, mail lists, stock lists etc.

£19.95

NB When ordering please state computer model

THE BEST WAY TO BUY

Software Centre's great Buy 'n' Try deal stops costly mistakes by making sure you only keep what you really want!



Mem Req'd	Supplier	Code No	Price
	Quicksilver	12D047	£6.95
	Quicksilver	12D048	£6.95
	Quicksilver	12D049	£4.95
	Quicksilver	12D050	£4.95
	DK Tronics	09D063	£4.95
	DK Tronics	09D064	£4.95
	DK Tronics	09D065	£4.95
	DK Tronics	09D066	£5.00
	Micro Gen	06D067	£6.95
	Micro Gen	06D068	£3.50
	Micro Gen	06D069	£3.50
16/48K	Silversoft	29D001	£9.95
16/48K	Silversoft	29D002	£5.95
16/48K	Silversoft	29D003	£5.95
16/48K	Silversoft	29D004	£5.95
16/48K	Artic	25D071	£4.95
16/48K	Artic	25D072	£4.95
16/48K	Artic	25D073	£4.95
48K	Artic	25D074	£3.95
48K	Artic	25D075	£3.95
	Imagine	05D076	£5.50
	Imagine	05D077	£5.50
	Artic	25D078	£5.95
	Artic	25D079	£5.95
	Artic	25D080	£5.95
	Artic	25D081	£6.95
	Artic	25D083	£4.95
	Artic	25D084	£4.95
	Artic	25D085	£2.50
	Artic	25D086	£7.00
	Artic	25D087	£29.95
	Artic	25D088	£5.95
	Artic	25D089	£9.45
	Artic	25D090	£9.95
	J.K. Greye	32D091	£4.95
	Melbourne H.	65D092	£3.95
	Melbourne H.	65D093	£14.95
	Melbourne H.	65D094	£5.95
	Melbourne H.	65D095	£5.95
	Melbourne H.	65D096	£5.95
	Quicksilver	12D097	£4.95
	Titan	22D098	£5.00
	Microgen	06D099	£6.95
	Microgen	06D100	£3.95
	P.S.S.	64D101	£8.95
	P.S.S.	64D102	£4.95
	P.S.S.	64D103	£4.95
	P.S.S.	64D104	£19.50
	Gemini	63D105	£19.95
	Gemini	63D106	£5.95
	Gemini	63D107	£5.95
	Gemini	63D108	£19.95
	Gemini	63D109	£19.95

SOFTWARE CENTRE 24 HOUR HOT-LINE ORDER SERVICE 01-487-5974

SINCLAIR SPECTRUM

Planet of Death	Artic	25D001	£6.95
Inca Curse	Artic	25D002	£6.95
Ship of Doom	Artic	25D003	£6.95
Espionage Island	Artic	25D004	£6.95
Reversi/Othello	Moi	26D005	£7.95
Club Record Cont'	ICL	27D006	£9.95
Collectors Pack	ICL	27D007	£9.95
G1: Games 1	ICL	27D008	£4.95
G2: Games 2	ICL	27D009	£4.95
G3: Games 3	ICL	27D010	£4.95
G4: Games 4	ICL	27D011	£4.95
G5: Games 5	ICL	27D012	£4.95
Pastimes 1	ICL	27D013	£4.95
Pastimes 2	ICL	27D014	£4.95
Space Raiders	Pison	27D015	£4.95
Planoids	Pison	27D016	£4.95
Hungry Horace	ICL	27D017	£4.95
Biorhythms	ICL	27D018	£6.95
History 1	ICL	27D019	£6.95
Geography 1	ICL	27D020	£6.95
Inventions 1	ICL	27D021	£6.95
Music 1	ICL	27D022	£6.95
English Literature	ICL	27D023	£6.95
Chess	Microgen	06D024	£7.95
Flight Simulation	Pison	28D025	£4.95
VU-CALC	Pison	28D026	£4.95
VU-FILE	Pison	28D027	£4.95
VU-3D	Pison	28D028	£4.95
Academy	Imagine	05D029	£5.50
Scramble	Micro Gen	06D030	£5.50
Master Chess	Micro Gen	06D031	£5.95
Sorcerers Castle	Micro Gen	06D032	£5.50
Cosmic Raiders	Micro Gen	06D033	£5.95
Krazy Kong	48K Cotech	07D034	£5.50
Astro Scramble	Cotech	07D035	£5.50
Arcade	Cotech	07D036	£5.50
Spectral Invaders	48K Bug Byte	02D037	£5.00
Spectres	Bug Byte	02D038	£5.00
Aspect Editor	Bug Byte	02D039	£5.00
Nightline	16/48K Hewson	70D042	£5.95
Speak Easy	48K Quicksilver	12D046	£4.95

Space Invaders	Microgen	06E001	£3.95
Breakout	Microgen	06E002	£3.95
Bomber	Microgen	06E003	£3.95
ZX Chess	Microgen	06E004	£3.50
Sorcerer's Castle	Microgen	06E005	£3.95
1K ZX Chess	Sinclair	20E006	£2.50
Thro the wall/Scramble	Pison	28E007	£4.95
Super Glooper/Frogs	16K Pison	28E008	£4.95
1K Games Pack	Sinclair	20E009	£3.95
Planet of Death	16K Artic	25E010	£5.95
Inca Curse	16K Artic	25E011	£5.95
The Ship of Doom	16K Sinclair	20E012	£5.95
Espionage Island	16K Sinclair	20E013	£5.95
Reversi/Othello	16K Sinclair	20E014	£5.95
Games 1	Moi	26E015	£6.95
Junior Education 2	ICL	27E016	£3.95
Business & Household 3	ICL	27E017	£3.95
Games 4	ICL	27E018	£3.95
Junior Education 5	ICL	27E019	£3.95
Family Quiz 6	ICL	27E020	£3.95
G12 Fantasy Games	Pison	28E121	£3.95
G13 Space Raiders	Pison	28E122	£4.75
G1 Super Program 1	ICL	27E124	£4.95
G2 Super Program 2	ICL	27E125	£4.95
G3 Super Program 3	ICL	27E126	£4.95
G4 Super Program 4	ICL	27E127	£4.95
G5 Super Program 5	ICL	27E128	£4.95
G6 Super Program 6	ICL	27E129	£4.95
G7 Super Program 7	ICL	27E130	£20.95
G8 Super Program 8	ICL	27E131	£4.95
G10 Backgammon	Pison	28E132	£5.95
G14 Flight Simulation	Pison	28E133	£5.95
E1 English Lit. 1	ICL	27E134	£4.95
E2 English Lit. 2	ICL	27E135	£4.95
E3 Geography	ICL	27E136	£4.95
E4 History	ICL	27E137	£4.95
E5 Maths 1	ICL	27E138	£4.95
E6 Music 1	ICL	27E139	£4.95
7 Inventions 1	ICL	27E140	£4.95
E8 Spelling 1	ICL	27E141	£4.95
G11 Chess	Pison	28E142	£4.95

SINCLAIR ZX81 cont. Mem Req'd				Supplier	Code No	Price	VIC 20 cont.				Mem Req'd	Supplier	Code No	Price
G3 Boobytraps				Sinclair	20E143	£6.95	Decision Maker					Creative	19V020	£14.95
B4 VU-CLAC				Sinclair	20E144	£7.95	Loan Analyzer					Creative	19V022	£14.95
B4 VU-FILE				Sinclair	20E145	£7.95	Car Costs					Creative	19V023	£14.95
B1 Collectors				Sinclair	20E146	£9.95	Home Inventory					Creative	19V024	£14.95
B2 Club Records				Sinclair	20E147	£9.95	Household Finance					Creative	19V025	£14.95
Z5 Toolkit				Quicksilver	12E148	£3.95	Forth (cart)					Audogenic	16V026	£24.95
QS Invaders				16K Quicksilver	12E149	£3.95	Monitor (cart)					Audogenic	16V027	£19.95
QS Asteroids				16K Quicksilver	12E150	£3.95	Bonzo				8K	Audogenic	16V028	£7.95
QS Defenda				16K Quicksilver	12E151	£3.95	Tomb of Drewn				16K	Audogenic	16V029	£12.95
Marius				16K Bug Byte	02E175	£10.00	Fishman (cart)					Audogenic	16V030	£19.95
Invaders				16K Bug Byte	02E176	£4.00	Pit				3K	Audogenic	16V031	£7.95
Adventure				16K Bug Byte	02E177	£8.00	Astro Blitz (cart)					Audogenic	16V032	£19.95
ZXAS Assembler				Bug Byte	02E178	£5.00	Boss				8K	Audogenic	16V033	£14.95
Z5 Toolkit				Bug Byte	02E179	£5.00	Tank Attack (cart)					Audogenic	16V034	£19.95
ZX80B D/sampler & Debugger				Bug Byte	02E180	£6.50	Outworld (cart)					Audogenic	16V035	£19.95
Damsel and the Beast				Bug Byte	02E181	£6.50	Blockade					Audogenic	16V036	£6.95
Dictator				Bug Byte	02E182	£9.00	Amok					Audogenic	16V037	£6.95
Star Trek				Bug Byte	02E183	£5.00	Vicalc					Audogenic	16V038	£8.95
Constellation				Bug Byte	02E184	£8.00	Alien Blitz					Audogenic	16V039	£7.95
Multifile				16K Bug Byte	02E185	£17.50	Sky Math					Audogenic	16V040	£6.95
Awan				Sinclair	20E186	£6.95	Space Division				3K	Audogenic	16V041	£6.95
Games Pack 1				Sinclair	20E187	£4.75	The Alien				3K	Audogenic	16V042	£7.95
Games Pack 2				Sinclair	20E188	£4.75	Vicat				3K	Audogenic	16V043	£8.95
Asteroids				Sinclair	20E189	£4.95	Hangman/Hang Math					Audogenic	16V044	£7.95
Centipede				Sinclair	20E190	£4.95	Math Hurdle/Monster Maze					Audogenic	16V045	£7.95
Defender				Sinclair	20E191	£4.95	Sea Wolf/Bounce Out/Vic					Audogenic	16V046	£8.95
Space Invaders				Sinclair	20E192	£4.95	Code Maker/Code Breaker					Audogenic	16V047	£7.95
Games 1 10 Games							Cosmic Kamikaze				3 or 8K	Audogenic	16V048	£7.95
Games 2 Starfighter				1K J K Greye	32E001	£3.95	Minikit					Audogenic	16V049	£7.95
Artist				1K J K Greye	32E002	£3.95	Golf					Audogenic	16V050	£7.95
Games 3 Catacombs				16K J K Greye	32E003	£4.95	Spiders of Mars (cart)					Audogenic	16V051	£19.95
Games 4 3D Monster Maze				16K J K Greye	32E004	£4.95	Cloudburst (cart)					Audogenic	16V052	£19.95
Games 5 3D Defender				16K J K Greye	32E005	£4.95	Renaissance (cart)					Audogenic	16V053	£19.95
Football Manager				16K Addicive	50E193	£3.95	Satellites and Meteorites (cart)					Audogenic	16V054	£19.95
Gobblin				16K Artic	25E194	£3.95	Meteor Run (cart)					Audogenic	16V055	£19.95
Namer Raiders				16K Artic	25E195	£3.95	Magnificent Seven				3K	Audogenic	16V056	£4.95
Galaxy Warrior/Star Trek				16K Artic	25E196	£6.50	Mikro Assembler (cart)					Audogenic	16V057	£48.95
Invasion Force				16K Artic	25E197	£3.95	Wacky Waters					Imagine	05V149	£5.50
Assembler				16K Artic	25E198	£3.95	Gatcha Snatcha					Imagine	05V150	£5.50
Chess 11				1K Artic	25E199	£3.95	Arcadia					Imagine	05V151	£5.50
Chess				1K Artic	25E200	£2.95	Castlemath				16K	Audogenic	16V058	£8.95
Krait				Artic	25E201	£3.95	Arcadia					Imagine	05V059	£5.50
Adventure A				Artic	25E202	£3.95	Marian Raider					Romik	10V072	£9.99
Adventure B				Artic	25E203	£3.95	Mind Twisters					Romik	10V073	£9.99
Adventure C				Artic	25E204	£3.95	Shark Attack					Romik	10V074	£9.99
Adventure D				Artic	25E205	£3.95	Multisound Synthesizer					Romik	10V075	£9.99
Galaxians				Artic	25E206	£3.95	Sea Invasion					Romik	10V076	£9.99
Galaxians				1K Artic	25E207	£5.00	Space Attack					Romik	10V077	£9.99
Wizard of Peace				Artic	25E208	£6.50	Chess				16K	Bug Byte	02V078	£7.00
Toolkit				Artic	25E209	£5.95	Asteroids					Bug Byte	02V079	£7.00
Bug				Artic	25E210	£29.95	Another Vic in the Wall					Bug Byte	02V080	£7.00
Fort				Artic	02E211	£7.00	Panic					Bug Byte	02V081	£7.00
Assembler				Bug Byte	02E212	£5.00	Cosmids					Bug Byte	02V082	£7.00
Invaders				Bug Byte	02E213	£4.00	Backgammon				3K	Bug Byte	02V083	£7.00
Adventure				Bug Byte	02E214	£4.00	Scramble					Bug Byte	02V084	£7.00
Macrops				Bug Byte	02E215	£10.00	Blitz					Commodore	04V103	£4.99
Pilot				16K Hewson	70E216	£3.95	Heggit					Commodore	04V104	£4.99
Puckman				Hewson	70E217	£3.95	Race					Commodore	04V105	£4.99
Games				Microgen	06E218	£3.95	Strategic Advance				16K	Commodore	04V106	£4.99
Scramble				Microgen	06E219	£3.95	Simplicat				16K	Commodore	04V107	£19.95
Games				Microgen	06E220	£3.95	Vic Stock Control				8K	Commodore	04V108	£4.99
Paintmaze				Microgen	06E221	£3.95	Vic Writer				8K	Commodore	04V109	£19.95
Asteroids				Microgen	06E222	£3.95	English Language				8K	Commodore	04V110	£9.99
Tempest				Microgen	06E223	£3.95	Maths 1				8K	Commodore	04V111	£9.99
Games				Microgen	06E224	£3.95	Maths 2				8K	Commodore	04V112	£9.99
Debug				1K Microgen	06E225	£3.95	Biology				8K	Commodore	04V113	£9.99
Asteroids				Quicksilver	12E226	£3.95	Chemistry				8K	Commodore	04V114	£9.99
Croaka Crawla				Quicksilver	12E227	£3.95	Physics				8K	Commodore	04V115	£9.99
Munchies				Quicksilver	12E228	£3.95	Apple Tree Birds				3K	Commodore	04V116	£4.99
Trader				Quicksilver	12E229	£3.95	Engine Shed				3K	Commodore	04V117	£4.99
Starquest				Quicksilver	12E230	£3.95	Lighthouse & Subtraction				3K	Commodore	04V118	£4.99
Super Nine				Quicksilver	12E231	£9.99	Quizmaster				8K	Commodore	04V119	£9.99
Database Management System				Gemini	63E232	£7.95	Know your own I.Q.				8K	Commodore	04V120	£9.99
Decision Maker				Gemini	63E233	£5.95	Know your child's I.Q.				8K	Commodore	04V121	£9.99
							Know your own personality				8K	Commodore	04V122	£9.99
							Robert Carrier Menu Planner				8K	Commodore	04V123	£9.99

VIC 20 cont.

Machine Code Monitor Cartridge	Mem Req'd	Supplier	Code No	Price
Missile Panic		Commodore	041V38	£34.95
Round Runner		Titan	22V141	£6.00
Android Attack		Titan	22V142	£5.00
Space Hopper		Titan	22V143	£5.00
Star Wars 2		Titan	22V144	£5.00
Mawai Attack		Titan	22V145	£5.00
Space Wars/Battle Zone		Titan	22V146	£5.00
Space Fortress		Romik	10V135	£9.99
Space Attack		Romik	10V136	£9.99
Quackers		Rabbit	13V137	£9.99
Annihilator		Rabbit	13V138	£9.99
Orbis		Rabbit	13V139	£9.99
Night Crawler		Rabbit	13V140	£9.99
Galactic Crossfire		Rabbit	13V141	£9.99
Krell		Rabbit	13V142	£9.99
Hopper		Rabbit	13V143	£9.99
Skramble		Rabbit	13V144	£9.99
Alien Soccer		Rabbit	13V145	£9.99
Tank War		Rabbit	13V146	£9.99
Myriad		Rabbit	13V147	£9.99
Space Phreeks		Rabbit	13V148	£9.99
Innovative 1		Melbourne H	65V149	£5.95
Innovative 2		Melbourne H	65V150	£5.95
Innovative 3		Melbourne H	65V151	£5.95
Wizard & Princess		Melbourne H	65V152	£5.95
Tornado		Quicksilver	12V153	£5.95
Harvester		Quicksilver	12V154	£7.95
Pixel Power		Quicksilver	12V155	£7.95
Trader		Quicksilver	12V156	£14.95
Subspace Striker		Quicksilver	12V157	£7.95
Starquest		Quicksilver	12V158	£7.95
Moons of Jupiter		Romik	10V159	£9.99
Grand Master Chess	8K	AudioLogic	16V160	£17.50
Chopflipper (cart)		AudioLogic	16V161	£24.95
Snake (cart)		AudioLogic	16V162	£24.95
Serpentine (cart)		AudioLogic	16V163	£24.95
Mangrove		AudioLogic	16V164	£7.95
Countryside Garden	8K	AudioLogic	16V165	£7.95
Kaktus	8K	AudioLogic	16V166	£7.95
Rabbit Call		Rabbit	13V167	£19.99
Abductor		Llamosoft	52V168	£6.00
Blitzkrieg		Llamosoft	52V169	£4.95
Gidrunner		Llamosoft	52V170	£6.00
Andromeda		Llamosoft	52V171	£8.00
Database Management System		Gemini	63V172	£19.50
Invoices & Statements		Gemini	63V173	£19.50
Home Accounts & Budget		Gemini	63V174	£19.50
Decision Maker		Gemini	63V175	£5.95
Stock Control System		Gemini	63V176	£19.50
Selective Mailing List		Gemini	63V177	£19.50
Commercial Accounting		Gemini	63V178	£19.50

ATARI cont.

Machine Code Monitor Cartridge	Mem Req'd	Supplier	Code No	Price
Curse of Ra	32K	Automated Simul	35V063	£14.75
Danger in Drindisi	32K	Automated Simul	35V064	£14.75
Dalestones of Ryn	32K	Automated Simul	35V065	£14.75
Morloc's Tower	32K	Automated Simul	35V066	£14.75
Rescue at Rigel	32K	Automated Simul	35V067	£22.00
Star Warrior	32K	Automated Simul	35V068	£29.75
Crush, Crumble & Chomp	32K	Automated Simul	35V069	£22.00
Ricochet	16K	Automated Simul	35V070	£29.75
King Arthur's Heir	16K	Automated Simul	35V071	£14.75
Monster Maze	16K	Automated Simul	35V072	£29.75
Plaster Menia	16K	Automated Simul	35V073	£29.75
Alien Garden	16K	Automated Simul	35V074	£29.75
Action Quest	16K	J V Software	36V075	£22.00
Ghost Encounters	16K	J V Software	36V076	£22.00
Journey to the Planets	32K	J V Software	36V077	£22.00
Golf	16K	Roklan Corp.	37V078	£33.25
Wizard of Wor	16K	Roklan Corp.	37V079	£33.25
Battle of Shiloh	48K	Strategic Simul	38V080	£31.00
Tigers in the Snow	40K	Strategic Simul	38V081	£31.00
Firebird	4K	Gebelli Software	39V082	£29.50
Embargo	8K	Gebelli Software	39V083	£33.00
Sentinel of the Gorn	32K	In-Home Software	40V084	£22.00
Guardian I	24K	In-Home Software	40V085	£22.00
Pool 400	16K	Innovative Design	41V086	£29.50
Chopflipper	16K	Broderbund	42V087	£29.95
Stellar Shuttle	32K	Broderbund	42V088	£23.55
Moon Shuttle	16K	Datascop Inc.	43V089	£31.40
Zaxxon	16K	Datascop Inc.	43V090	£31.40
Astro Chase	32K	First Star Software	44V091	£22.00
Venus Voyager	16K	English Software Co.	45V092	£19.95
Baja Buggies	16K	Gamestar	46V093	£22.00
Clam Jumper	16K	Synapse Software	47V094	£27.50
Shamus	16K	Synapse Software	47V095	£29.95
Shamus	16K	Synapse Software	47V097	£29.95
Picnic Paranoia	16K	Synapse Software	47V098	£27.50
Picnic Paranoia	16K	Synapse Software	47V099	£29.95
Neocomancer	16K	Synapse Software	47V100	£27.50
Neocomancer	16K	Synapse Software	47V101	£29.95
Survivor	16K	Synapse Software	47V102	£27.50
Survivor	16K	Synapse Software	47V103	£29.95
Shamus II	16K	Synapse Software	47V104	£27.50
Shamus II	16K	Synapse Software	47V105	£29.95
Stargate Courier	16K	Synco	48V106	£27.50
Laser Arts	16K	Synco	48V107	£18.50
Laser Arts	16K	Synco	48V108	£26.75
Astron IX	16K	Synco	48V109	£18.50

* Denotes cartridge

BUY WITH CONFIDENCE ... TRY AT YOUR LEISURE

When we send your software order, you'll find a return address label and a list of the buy-back prices for each item ordered.

Remember, we are pleased to buy back your software against a new purchase of equivalent or greater catalogue value, provided you purchased it from us. And you get a full month to decide whether to keep your software or benefit from the buy-back option.

Of course, if you wish to return two or more software items against the purchase of a more expensive item... then provided that their initial purchase price does not exceed that of the new program you want... we'll be happy to help.



SOFTWARE CENTRE 128 WIGMORE STREET LONDON W1 Tel 01-487-5974

BRANCHES: LEICESTER

9 Millstone Lane Leicester.
Tel (0533) 532704.

ILFORD

426 Cranbrook Road,
Gants Hill, Ilford, Tel 01-554-6574.

SOUTHAMPTON

The Software Centre, 112 East Street,
Southampton, SO1 1HD, Tel 0703-24703.

Please rush me the following programs, and put me on the Software Centre mailing list for program up-dates and great special purchase offers. I confirm that I shall not attempt to copy any program bought from Software Centre.

Name Code No Price
 Name Code No Price
 Name Code No Price

Cheque () Postal order () enclosed.

Total order value £

Please debit my Access () Barclaycard () in the sum of £ Account no.

My computer is (make) Model

Memory Peripherals

Name

Address

Post code Customer Tel. No.

Signed Please allow up to 14 days for delivery.

SEND TO:

SOFTWARE CENTRE
128 WIGMORE STREET
LONDON W1
01-487-5974

OR YOUR NEAREST BRANCH.

PCN Special offer

SAVE MORE THAN £100 ON THIS FULLY GUARANTEED DOUBLE DISK DRIVE



Slimline drives, for BBC and other micros

Boxed in a light beige, low-profile case with its own switch mode PSU, these 80-track double-sided drives give you 800K of formatted storage with the BBC micro, or 1600K for other machines.

The BBC drives of similar spec cost nearly £800; so take advantage of PCN's special offer now — get your order in by the closing date, June 30.



This offer comes with all you need except the interface:

- Mains cable with plug
- Twin drive cable
- BBC diskformatter program

Bought separately these would cost more than £35.

Complete the coupon and send it to us today, with your cheque for £585.45 for each Subsystem. We'll deliver within 28 days. The drives will be provided by Micronix Computers Ltd and made by Mitsubishi or Canon, supplied at the discretion of Micronix.

SPECIFICATION

Capacity: 1Mb per disk, 500K per side
6.25K per track

Transfer rate: 250Kbits per second

Recording density: 5922 bits per inch

Track density: 96 tracks per inch

Access time: track to track, 3 milliseconds
settling time, 15 milliseconds
average, 94 milliseconds

Unit life: Five years

Mean time between failure: 10,000 power-on hours

To: PCN Special Offer, VNU Business Publications, 62 Oxford Street, London W1A 2HG

Yes, please send me Disk Drive Subsystems at £499 + Delivery + VAT
(total price £585.45).

I claim my FREE mains cable, disk drive cable and BBC diskformatter program,
worth over £35!

I enclose a cheque for _____ made payable to VNU
Business Publications.

Name _____

Address _____

This PCN Special Offer represents very special value:

if stocks are exhausted, full refund will be made to all customers immediately.

VNU Business Publications Incorporated in the Netherlands. Handelsregister NR 01697 Haarlem.

Dynamic Games for the ZX Spectrum

Dynamic Games for the ZX Spectrum

TIM HARTNELL

A sinclair COMPUTERGUIDE

by **Tim Hartnell**

Tim Hartnell has selected 20 dynamic games of lasting interest. They range from board games like *CHES* and *PIRANDELLO*, to arcade action in *JOGGER* and *DEATHRACE 2000*, and include a major adventure game, *REVENGE OF CASTLE DREAD*.

A detailed introduction is provided for every game and, in most cases, the program is explained line by line, highlighting the tricks the programmers have used and suggesting how these can be applied in other programs and games. At the end of the book a chapter is devoted to suggestions on how to improve your own programs.

0 946195 13 7

May 1983

192pp

(paper) £5.95

The ZX Spectrum Explored

by **Tim Hartnell**,
Foreword by **Clive Sinclair**

In this practical guide — with programs throughout — Tim Hartnell takes his readers from their first steps in programming to how the ZX Spectrum can be used as a tool at home, at work and for education. He looks at the use of sound, colour and 3D graphics, and shows how to write programs in BASIC, as well as how to use machine code on the ZX Spectrum.

The ZX Spectrum Explored is complete with many programs for education, business and — not least — pure fun!

0 946195 00 5

218pp

October 1982

£5.95



Marketed by

John Wiley & Sons Limited

Baffins Lane · Chichester · Sussex PO19 1UD · England

Random Access is PCN's forum for readers with a point of view.



Letters come from people like you, so pull out your INKEY finger and feed us a line. If it's of star quality PCN will add £10 to your spreadsheet.

Address us at Random Access, Personal Computer News, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

Is Basic a low level language?

I am writing to say a few things about the language Basic, you know, that great, all time best, The language. At the moment there is only one home computer that comes with an alternative — the Jupiter Ace from Jupiter Cantab that runs Forth. Now I'm not saying that we should all rush to the shops and buy an Ace; rather, I am pleased there is one intelligent company that realises the shortcomings of Basic.

PCN £10 Star Letter



The newcomer to computing is led to believe that Basic is the language that he will use for the rest of his life, and that there is no reason why he should look elsewhere. Of course there are quite a few other languages available for most computers — the ZX Spectrum already has three versions of Forth, Pascal, Logo and Lisp.

A few more are promised, but it is always a bother first having to LOAD it off tape (after all, how many people can afford a disk drive, even Sinclair users), and then finding that you have run out of memory. What is needed therefore is a plug-in language chip on all computers. It's available on the Beeb up to a point, but there are still quite a few machines you can't plug cartridges into.

You only need to pause for a moment, ask yourself — how many word-processing packages or space games are written in Basic and you realise how little Basic has to offer. It's not really far as far as the beginner is concerned, because he is

being deprived of the chance to write something really great.

First he's got to get to know the way his machine works, and then dive into machine code. If he were able to program in Logo or Forth perhaps (which are just as easy to learn as Basic) he could be writing Star Trek or something equally impressive.

As you may have guessed, I am quite impressed by Forth. It is a very flexible language — in fact in a way you are writing your own language. It runs up to ten times faster than Basic, uses less memory and is more exciting to program in. It's still not quite as fast as machine code, but then what does that matter, it's still fast. By the way, ten out of ten for your series on Forth a few weeks ago.

It remains to be seen whether computer manufacturers will change their ideas. Whether they do or they don't, it is time people were shown what they are missing.

Chris Haine,
Rugby, Warwickshire

Something to byte into

I am in my mid 30s and have just ventured into the land of computers, with the purchase of a Vic 20, an experience I am finding enjoyable. But oh, oh, the jargon and abbreviations!

So I started reading PCN for enlightenment, which I now receive in snippets with each issue. But I would like to speed up the process, so could I suggest an ongoing feature for consideration, such as a glossary of terms and possibly a potted history to show their derivation, which would explain to us geonatics what every school boy apparently knows.

For starters how about IEEE, RS232, and why 1,024 bytes to the kilobyte? (SI Unit K = 1,000).
D Furness,
Springhead, Oldham

I am considering publishing a newcomers-start-here page, but just for starters:

■ IEEE refers to the IEEE-488 standard interface, which is a defined standard for attaching equipment to computers. It's usually associated with scientific applications, but is used for printers and disk drives.

■ RS232 is another standard interface. It's not a very good

standard but you can usually get cables and software together so that RS232 devices will talk to each other. Its main uses are for printers, terminals and modems.

■ K in the SI system is 1,000 and K in computers is 1,024. This is simply because 1,000 is such a silly number in the binary numbers that computers understand. It's 1111101000. K=1,024 is used because it's the nearest number to 1,000 that's a sensible power of two. It's 2¹⁰ or 1000000000 — Ed.

The Dragon double-up

I would like to point out the unfair deal the Dragon 32 has been receiving lately. In tests, no mention is made about the Dragon's double speed. This cuts all the benchmark times in half, giving an impressive speed. The fast and slow modes are mentioned for the ZX81, so why isn't double speed taken into account for the Dragon? No mention either for the most powerful 8-bit CPU in the world — far better than the Z80 or 6502.

With the 6809, languages such as Pascal can be run at great speeds, so machine code isn't needed. With advanced graphics and sound, a proper keyboard, interfaces already built in, good editing, a re-numbering command, 32K RAM and automatic scrolling, the Dragon is well worth the price of £199.

Any little thing is picked on, such as the lack of lower case. Who needs lower case anyway? The Dragon is a powerful machine, and it should be recognised by all, not just Dragon owners.

Philip Kirshan,
Harrogate, North Yorkshire.

POKE 65495,0 to speed up the Dragon doesn't work on all machines and should be avoided. The 6809 is a powerful chip but its software that counts. It will be a while before you can run Pascal on a Dragon — Ed.

Cheap at twice the price?

In PCN (week ending April 29) you mention the new Star DP510 printer in PCN Monitor and state that 'pricing seems

good — the DP510 will cost £349 + VAT...'. However, in PCN (week ending May 13) in a test of the DP510 you say that 'at £289 + VAT it is not going to set the world running to the door of the suppliers...'. Please make up your minds, at £349 it is good value, but at £289 you do not think so. I have one of these and think it is good value for money, especially when compared with Epson at £100 more, etc.

S R Linter,
Prestel no. 227750600

We were victims of timing here. The Monitor story was based on the printer's spec sheet and looked promising. The Pro-Test was based on the printer's original price of £349 and judged accordingly. Just as we went to press we found the price had dropped to £289 + VAT. All we could do at that stage was change the price. We couldn't redo the review. At least, as a weekly, we could do that much though! Sorry for the confusion — Ed.

Are you feeling boxed-in?

Micronet can save lives! (Well, nearly.) You can guess the frustration of having a brand new twin disk drive and no 8271 disk controller for the disk interface.

It seemed that even the cardboard box looked sad all wrapped up. So what could I possibly do?

I sent a message out via Mailbox on Micronet. (PCN replied to my plea with a few ideas — unfortunately they proved fruitless but thanks anyway.) So I sent out first at all shops and then decided to try all members whose names started with the letter A. This could have been a long job but luckily, within a week, I had a positive reply. A chap in Birmingham who has a spare one!

We agreed a price and within three days I had the drives working perfectly. All negotiations except one via Mailbox. Many friends of mine who bought drives at the same time are staring at full cardboard boxes feeling very jealous.

So, apart from a great system that's a lot of fun as well as functional, it is possible to find someone to help you on your

way through the frustrations of computer life (lyrical what!). So, if this is published thanks to all those who bothered to reply, PCN included.

If anyone is on the brink of joining Micronet I can recommend it wholeheartedly.

Ian Osborne,
Prestel 013979384

Thanks Ian, and remember, PCN's Prestel number is 016366890 — Ed.

The low-down on Prestel payouts

Concerning the use of Prestel, I do not feel the costs have been highlighted sufficiently in PCN.

When you join Micronet you pay £57 and receive an acoustic modem and software to talk to Prestel. As the cost is subsidised, you must agree to subscribe for at least one year, after which the choice of renewal is yours.

Quarterly costs are: Prestel £5, Micronet £8. So, after the first year, you could remain a Prestel user for only £5 a quarter.

It should be remembered there is no time connect charge after 6pm and before 8am weekdays, after 1pm Saturdays and all day Sunday. There is a telephone charge (of course), but this is only 32p for one hour on the local cheap rate band, which is when most will use it.

Finally, it has been said that 'unlike Micronet, most pages have frame charges'. The opposite is true, most do not.

At the moment, the standard of indexing on Micronet is pretty poor and should not be taken as representative of the rest (see Viewfax, page 258 for a good example).

One other complaint, page 0 of Prestel is only accessible to Gnetters by keying 40, a ludicrous situation, to which Prestel should never have agreed.

Perhaps we could look for a change here?

Justin Barley,
Prestel No: 013813026

Short shrift from the shops

At the moment I am in the dilemma of choosing a micro for under £200, with the shortlist being Oric 1 48K, Acorn Electron, Dragon, and 48K Spectrum, in that order.

The Oric 1 seems about the

best of the aforementioned on account of its decent keyboard, excellent graphics, advanced sound and expandability: disk drive, printer, communications modem, hi-fi etc.

The Electron falls down on availability but has the appeal of BBC Basic. The Dragon seems a good all-rounder, if a little pricey and the Spectrum wins hands down on price, but as for those keywords...

So, armed with my shortlist I decided to do my own 'bench-tests' of these four with the aid of Newcastle's computer shops. I aimed to learn as much as possible about each one, try each one and finally find the cheapest shop, with an eye to software as well as hardware.

Unfortunately, the first shop I visited put me off high street dealers straight away. I entered the shop and was immediately asked 'Can I help you?' I asked about Oric software and was told 'No'.

I asked about Oric hardware and was told 'If you want to play arcade games, go to the arcade and play'.

I saw an Oric and tried to make 'computer conversation' with just straight 'yes' and 'no' answers. I keyed in a quick FOR...PRINT CHR\$(X), NEXT loop and when RUN was told thank you and given a hard stare.

I promptly CLEARED out of the shop not wishing to give it £200 for a computer.

If I hadn't known computers better I would have been totally put off the idea of a home computer, but I persevered and was amazed by courteous, polite and helpful service given by W H Smith, Dixons, Laskys, Binns and Camera Mart, who provided me with yet another alternative — the Lynx.

So come on, the majority of computer shops are great, but the minority, well...

The first shop has lost an order of £169.95 and a possible £100-£200 for a disk drive.

On the subject of Oric, will there be software available at a Spectrum?

CJ Appleby,
Peter Lee, Co Durham

Sadly, short shrift in computers shops is a widespread problem. The more people who complain, the quicker we might see improvements! And yes, Oric software is on the way. So far only standard stuff has appeared, but be patient, there's great potential here — Ed.

MASTER

MASTER is a totally new concept... a complete package for program development. Used by top professionals in the USA and Europe, MASTER has everything you need to write your own software, to the highest professional standards... up to 85 new commands that work with CBM BASIC IV... and just one command can replace whole paragraphs of Basic code. That's why Master is...

a new concept in CBM Basic

MASTER has 17 DISK HANDLING commands (both keyed and sequential access, masked retrieval, batch operation, existence tests, etc)... 12 INPUT MANAGEMENT commands (input/output screen zones, with alpha, numeric and date formatting, etc)... 8 SCREEN MANAGEMENT commands (with screen pages loadable from disk or memory)... 10 commands for REPORT MANAGEMENT (with disk-loadable report formats)... 18 BUSINESS BASIC commands (with 20-place arithmetic, data compression, automatic date control etc)... and on the CBM 8096, all the features of PM96 (46K for programs, 26K for variables, as well as 17 BASIC UTILITY commands).

now available for the CBM 64

... Including the full CBM Basic IV command set, and all the MASTER features listed above! Supplied on a CBM 1541 diskette, with a cassette port security key, MASTER 64 is the most powerful software utility ever offered to personal computer users! MASTER also supports CBM/PET models 4032, 8032, 8096, (and 8032 with CP/MAKER), as well as the CBM 4040, 8050 and 8250 floppy disks, plus the CBM 9060 or 9090 hard disks, and is supplied with a User Reference Manual, Quick Reference Guide, Installation Guide, Demo Disk, and with a security key for either cassette port.

PM 96 for the CBM 8096

CBM 8096 users can at last make full use of their 64K Expansion Memory... with PM96, the only product that offers sophisticated, yet simple, dynamic memory management... as well as 17 extra commands that work with CBM Basic IV. 82K of memory is available to the user, with 56K for programs (up to 16 together!), and 26K for variables (maintained even while editing or loading!). The new Basic commands include all the TOOLKIT functions, plus PRINT USING, IF-THEN-ELSE, STOP key disable, HARDDISK screen dump, CALL, FETCH, PLOT (50 by 150), WINDOW, and more. PM96 comes with a User Reference Manual, Quick Reference Guide, Disk with demo programs, and UD11 Support Rom.

New prices and products!

MASTER 64 FOR THE CBM 64	INTRODUCTORY OFFER	£125.00
PM96 FOR ALL BASIC IV CBM/PETS		£295.00
PM96 MEMORY MANAGEMENT + EXTRA BASIC FOR CBM 8096		£99.50
KRAM KEYBOARD DISK ACCESS, FOR ALL BASIC II/IV CBM/PETS		£99.50
KRAM - PM96 COMBINED	SPECIAL OFFER	£160.00
COMMAND-0 39 COMMANDS FOR CBM BASIC IV	PRICE NOW	£39.95
DISK-0-PRO ADDS BASIC IV (AND MORE) TO BASIC II		£29.95
SPECTRUM 64 - NOW ADAPTOR (NOT FOR 8096)		£10.95
VISICALC 32K/96K RRP	NOW £175.00	SPECIAL OFFER
IBM VISI-SERIES SPECIAL OFFER ON IBM VISI-PRODUCTS		£208.00 OFF
SUPERSCRIPIT I FOR ALL BASIC II/IV CBM/PETS		£249.00
SUPERSCRIPIT 700 (INCLUDES SUPERSPELL)		£450.00
SUPERSPELL FOR ALL BASIC II/IV CBM/PETS		£150.00
SUPERSPELL I EDUCATIONAL PRICE (SEND OFFICIAL ORDER)		£100.00
SUPERSPELL 700 THE DEFINITIVE INFORMATION MANAGER		£450.00
SUPERSPELL 64 THE PERSONAL DATA BASE		£100.00
VIZAWRITE 64 THE PERSONAL WORD PROCESSOR		£69.00
VIZASPELL 64 DISK DICTIONARY/SPELLING CHECKER		£59.00
VIZAWRITE 700 (INCLUDES VIZASPELL)		£94.00

ORDERING INFORMATION: ADD 15% VAT TO QUOTED PRICES. ORDER BY POST/TELEPHONE/PRESTEL, USING CHEQUE, ACCESS, BARCLAY CARD OR OFFICIAL ORDER. TELEPHONE 01-546-7256 FOR SAME DAY DISPATCH. POSTAGE IS FREE EXCEPT ON CREDIT OR OVERSEAS ORDERS. (REF A1A)

Calco Software

LAKESIDE HOUSE, KINGSTON HILL, SURREY KT2 7QT TEL 01-546-7256



MICROWAVES

Got a tip? Send it to PCN and get a cash reward. £5 for every hint printed

Lynx chip unveiled

Lots of letters about the Lynx do wonderful things using the output ports &86 and &87. The reason they do so much is that they give access to the Lynx's 6845 chip.

To access the registers, you specify which you want with OUT &86,x where x is the register number from 0 to 17. The new value is then sent with OUT &87,x with x being the value from 0 to 255.

Ian McNeill,
Belfast

0	Total number of horizontal characters	Write only
1	Total number of displayed horizontal characters	Write only
2	Horizontal sync position	Write only
3	Sync width	Write only
4	Total number of vertical lines	Write only
5	Vertical total adjust	Write only
6	Total number of displayed vertical lines	Write only
7	Vertical sync position	Write only
8	Interface and skew	Write only
9	Maximum raster address	Write only
10	Cursor start raster	Write only
11	Cursor end raster	Write only
12	Ram start address (high byte)	Read only
13	Ram start address (low byte)	Read only
14	Cursor position (high byte)	Read only
15	Cursor position (low byte)	Read only
16	Light pen (high byte)	Read only
17	Light pen (low byte)	Read only

Go to the top of your Oric

This subroutine allows 48K Oric programmers to print on the top line of the screen which is normally used for Oric's messages. Just set MS="Text to print" and GOSUB 110. You can make the text flash by adding the line 120 MS=CHR\$(#C)+MS.

In the unlikely event that you've got a 16K Oric, you should subtract 8000 hex from all the addresses used.

Colin Failes,
Glasgow.

```

100 REM PRINT #8 ON TOP LINE OF
110 FOR I = #8000 TO #8000 + 361
120 FOR J = 1 TO LEN (MS) : POKE
#8000 + I, ASC ( MID$( MS, J,
130 NEXT J
140 RETURN

```

Into the Dragon at high speed

Dragon users who find IN-KEY's too slow for their liking might like to read the keyboard directly. These addresses should be PEEKed to see which of the arrow keys is pressed.

Left 343
Right 344
Up 341
Down 342

If the key is pressed down, you'll get a value of 223, otherwise the PEEK will return 255. Using a statement like IF PEEK(341)=223 THEN ... would allow you to simulate auto repeating keys.

Peter Talks,
Warwick.

Tandy on the circle line

This program (above right) draws a circle on the screen. But it does it using R²=X²+Y² rather than the inefficient sine

```

10 RS=R*R
20 FOR X1=X-R TO X+R
30 IF X1>127 OR X1<0 THEN 70
40 Y1=0.56*SQR(RS-(X1-X)* (X1-X))
50 GOSUB 80
60 Y1=-Y1:GOSUB 80
70 NEXT: RETURN
80 IF Y+Y1 > 0 AND Y+Y1 < 49 THEN SET (X1, Y+Y1)
90 RETURN

```

Tandy program

and cosine method you see in many listings. The program is written for a TRS80 level II (Models I or 3) but could easily be converted to run on any Basic machine.

The 0.56 in line 40 is just to adjust the shape of the circle for the Tandy's screen. You may need to change it for your own micro. The rest of the program is straightforward. X and Y are the co-ordinates of the centre of the circle. R is its radius.

Derek Grainger,
Fleetwood, Lancashire.

Attributed to the Oric

I've been an Oric owner since early March. I had to learn without the proper manual so it was quite a surprise to find (PCN, 29 April-6 May) that you could use CHR\$(27) followed by certain letters to obtain single lines of coloured text.

I've always used the following list. For example, PRINT CHR\$(128); CHR\$(150); "HELLO" produces a black 'hello' on a cyan background.

I discovered this list purely by experimentation — there may be others.

Note that CHR\$ 138, 139, 142 and 149 need two identical program lines to achieve the desired effect.

Frank Prior,
Chigwell, Essex.

CHR\$(128) — Black Foreground (Text & Graphics)
CHR\$(129) — Red Foreground (Text & Graphics)

CHR\$(130) — Green Foreground (Text & Graphics)
CHR\$(131) — Yellow Foreground (Text & Graphics)
CHR\$(132) — Blue Foreground (Text & Graphics)
CHR\$(133) — Magenta Foreground (Text & Graphics)
CHR\$(134) — Cyan Foreground (Text & Graphics)
CHR\$(135) — White Foreground (Text & Graphics)
CHR\$(136) — Black Foreground (Text & Graphics)
CHR\$(137) — Graphics
CHR\$(138) — Double Height Text
CHR\$(139) — Double Height Graphics
CHR\$(140) — Flashing Text
CHR\$(141) — Flashing Graphics
CHR\$(142) — Flashing Double Height Text
CHR\$(143) — Double Height Flashing Graphics
CHR\$(144) — Black Background
CHR\$(145) — Red Background
CHR\$(146) — Green Background
CHR\$(147) — Yellow Background
CHR\$(148) — Blue Background
CHR\$(149) — Magenta Background
CHR\$(150) — Cyan Background
CHR\$(151) — White Background

Print format is POSSIBLE

TAB on the Oric can be a problem, even when you've discovered that you need to add 10 to it to persuade it to work.

TAB can work just like the SPC function, so if you TAB(20) and TAB(30) on the

same PRINT line, the cursor is moved ten spaces to the right and not just to column 30.

One way round this is to use POS. You can subtract the position of the cursor from the column you want to tab to. For example, to put two messages at columns 20 and 30 you could use PRINT SPC(20-POS(0)); "HELLO"; SPC(30-POS(0)); "GOODBYE".
Chris Thompson,
Orpington, Kent.

Hang on to your variables

Many Lynx owners may not know how to save variables with their programs. You can do it with this routine ... it also saves PROTECT levels and INK and PAPER colours.

1000 CODE EB 21 F6 61 E5
2A IF 62 E5 21 00 00 C3 FF
3E

1010 REM "PROGRAM NAME"
1020 CALL LCTN (1000), LCTN (1010)

1030 REM "Program will run from here"

Save your program with RUN 1020. To load the program, use MLOAD "PROGRAMNAME".

M Valentine,
Shrewsbury, Shrops

Find the character

It's often useful to be able to tell what character is at a particular place on the screen. On a 16K ZX81 you could use a sub-routine like this:

1000 PRINT X,Y:
1010 LET P = PEEK (PEEK 16398 + 256* PEEK 16399)
1020 LET AS = CHR\$P
1030 RETURN

This returns the character at X, Y in AS.
James R Mortleman,
London E18

THE ZX SPECTRUM

—YOUR PERSONAL COMPUTER

The ZX Spectrum — your personal computer, by Ian McLean, Simon Rushbrook, Williams and Peter Williams, published by Prentice/Hall International at £5.95 (paperback 221 pages).

Some books can turn you off straight away. You know the sort I mean — all the books that tell you how to make your first million in 30 minutes through the application of a positive mental attitude. They set out to build up your morale, then send you out into a series of problems to be tackled.

This book, unfortunately, is a little like this at the start. It sets the scene by telling you that your brain is potentially one million times as powerful as the largest of computers, and takes it from there. There's certainly a market for microcomputing books that start at the beginning, but the problem with this one is that the beginning turns out to be a lot further back than you'd ever have dreamed.

This really is the problem throughout the book: it'll certainly tell the absolute novice how to use the Spectrum, but it takes an inordinate amount of space to do it. Up to a certain point, you'll certainly become a polished programmer, but for the money, and in the space available, you should be able to learn more.

It's a pity, because the further you get into the book, the more useful it gets. If you can bear the elementary introductions to the music section, for example ('You will probably have heard of the musical scale: doh, re, me...') you'll learn quite a lot about music and the Spectrum. You won't learn that you'll need a fairly complex add-on set-up to get anything more useful than half a dozen kinds of beep out of it, but you've got to bear in mind that books of this sort are essentially partisan.

Certainly, it's a good

machine, and it could have been a good book too. But the parts that are useful to anyone but the absolute beginner are overshadowed by the rest. If the authors had aimed their sights a little higher, I feel they could have performed a greater service to the micro industry than they have done. JL

TRS-80 Models I, III, & Color Computer Interfacing Projects

By William Barden, Jr.



TRS-80 Models I, III & Color Computer Interfacing Projects, by William Barden, published by Howard W Sams at £12.70 (paperback, 272 pages).

Marketed in the UK by Prentice Hall International, 0442-58531. This is one of those 'into the real world' books, dealing with computer interfacing techniques and projects for the Tandy TRS-80 model I, III, and Color Computer.

The author claims it's easy to interface to the real world, and that his book will show you how. Its 23 chapters are well laid out, and easy to read. There are lots of diagrams, charts, drawings, circuits, and program listings — in both machine code and Basic.

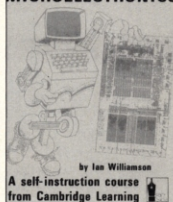
The projects covered range from the measurement of temperature to a half year clock. Some of the projects make extensive use of the hardware already built into the machines, such as the analogue to digital converters.

The interfacing techniques presented are applicable to other machines with a little modification. The projects are built on 'bread boards', and the layouts given are clear and easy to follow.

A basic knowledge of electronics would not go amiss, but don't be put off as the book contains a lot of good tidbits, as well as useful sugges-

tions. As a bonus the internal design of the Tandy computers is given a good going over. TJ

MICROPROCESSORS AND MICROELECTRONICS



by Ian Williamson

A self-instruction course from Cambridge Learning

'Microprocessors and Microelectronics', by Ian Williamson, published by Cambridge Learning at £6.50 (paperback, 171 pages).

If you're on the lookout for a good but simple book on microelectronics, then this self-instruction course from Cambridge Learning may be the one you need.

Microprocessors and Microelectronics runs to eight chapters covering such topics as microprocessor fundamentals at an easy to understand level, and progresses through semiconductor technology, number systems, digital logic, machine code and high-level languages.

Explanation of the logic and operation of microprocessors is given, and it tells you how to build up a complete system design using support chips. You can produce memories, TV controller and versatile interface adaptors, for example.

The descriptive parts of the book are broken up by questions testing your knowledge with the answers provided on the next page in easily identifiable rectangular boxes. Each chapter begins with a summary, along with a list of key words contained in the chapter.

The book is littered with examples, diagrams, and cartoons. It's aimed at those with little prior knowledge, but after they've read it their grasp of what a microprocessor is, and what it can do, should be enhanced.

But the book is more than just a self-instruction course; it deals with various kinds of integrated circuits, magnetic bubble memory, digital logic design and flowcharting symbols. TJ



'Commodore 64 Games Book', by Clifford and Mark Ramshaw, published by Melbourne House (01-405 6347) at £5.95 (paperback, 192 pages).

Games books occupy a category of their own. They are, I suppose, the computer publication equivalent of pulp romances. The only qualities they should be required to possess are legibility, variety and a high ratio of program listings per pound.

The *Commodore 64 Games Book* seems to meet all the criteria. The listings price out at 20p each, the legibility is as adequate as can be expected when the programs are typeset from a dot-matrix printer, and the games featured vary from the sublime (Invaders) to the very sublime (Poetry).

Including notes on how the individual programs actually set about putting things on screens seems to be almost mandatory in books of this kind, though the authors always seem to feel they've stumbled on something revolutionary. True to form each program listing has a preface which explains the program structure; defining each step and mapping the step with its first and last line numbers. The variables are also defined for reference.

The big advantage in slapping dot-matrix printing straight onto the page is the better than even chance that the listings won't be ridden with bugs. This doesn't mean that you'll get them to go first time, but if you don't, your keying-in is probably the culprit.

There are 30 games and here is a random sample of their titles: Paranoid, Quack, Cats & Dogs, UFO, Cowboy Shoot-out, Flight Simulator, Earth Defence, etc etc.

For a Commodore 64 games enthusiast who is also a speed typist with plenty of time on his hands, this book is a must. IS

48K SPECTRUM



WALL

“VALHALLA is an animated graphics adventure whose undisguised intention is to steal the title of "best micro adventure game bar none" from THE HOBBIT.

The 48K program which will be released on July 15, uses a new operating system MOVISOFT and boasts a number of HOBBIT-like features. There are 20 significant characters, each with their own aims and objectives.

You are a minor God set the task of recovering Odin's Golden Helmet. To complete this

you will also have to master three lesser tasks, one of which is to rescue IDUN, a maiden responsible for the Golden Apples which keep the Gods youthful.

The games' designer, LEGEND, claims that the program involves a sophisticated degree of interaction. For example, should an enemy overhear you telling a friend some important information, he will try to ruin your plans.

LEGEND stresses that the personality of each of the characters is genuinely independent "as opposed to pseudo independent behaviour

like Thorin sitting down and singing about gold or Gandalf walking off with your door for no reason".

The moving graphics are reportedly of cartoon quality, with both background and foreground movement illustrating the events of the plot.

Pretty impressive claims.

HOBBIT fans will no doubt feel both intrigued and sceptical..

Watch this space.”

...Graham Taylor,
Software Editor,
POPULAR COMPUTING WEEKLY -26th MAY'83

MOVI
SOFT



LEGEND

ALLA



ROUTINE INQUIRIES

Got a query? Max Phillips opens the pod door Hal. Send all those unanswerables here. No personal replies promised but you never know . . .

Write to: Max Phillips, Routine Inquiries, *Personal Computer News*, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

Moving up with the BBC

Q I am not clear about the upgrade for the BBC micro. If you upgrade your Model A to a Model B, is it as good as a new Model B? Would I be sensible to buy a Model B in the first place?
Miss S Riley, Tooting, London.

A A 'Model A to Model B' upgrade does turn an A into a full blown Model B. You can also upgrade in stages . . . having the extra memory and interfaces fitted as you need them.

For a while, a Model A with 32K Ram was a popular configuration. You could run lots of Model B software without buying a full upgrade.

But it's better to buy a B straight off if you . . . it's a much better configuration. If you buy an A, you'll only have to take it in for the upgrade after a week or two.

Plugging the Sinclair

Q I've a problem I cannot solve. Is it possible to buy a 5-pin DIN plug that fits a ZX81 for instance, with two small microphone jacks on the other end?

Martin Tims, Watford, Herts

A I presume you are looking for a cassette lead with two jacks for the ZX81's MIC and EAR sockets at one end and a 5-pin DIN for a Record/Play-back socket at the other.

These should be very easy to find. Try your local hi-fi or electrical shops. A Tandy store would be a good starting point. If you can't get one, it won't cost the earth to have one made up for you.

If you can't find a friend or shop who'll do it, you could try the people who advertise leads for BBCs, Lynxes and so on in the classifieds of computer magazines. You may find them willing to do a special one-off

for you if they don't have stocks.

Once you've got your lead, you'll need to experiment as to which jack goes where. This will depend on the wiring of the DIN plug inside the cassette recorder.

Once you've found which way round they go, remember to label them!

Gain control of the MPF-II

Q I own a Microprofessor MPF-II and read with interest your review (PCN, issue 9). I wonder if you could help me with a few points.

When I try to run Apple programs, I can't poll the keyboard to control the spaceships and so on using the arrow keys.

Also, is there any way to find out where a program is in memory and how long it is?

T Willis, Solihull, West Midlands

A Good news first. Basic pointers seem to be in the same place as they are in the Apple.

So you can use standard Apple stuff for finding out about your program. Locations 103 and 104 hold the address of the start of the program and 105 and 106 hold the address of the end of the program, give or take a few bytes.

So your program starts at PEEK(103)+PEEK(104)*256 and ends at PEEK(105)+PEEK(106)*256. The difference between these is the length of the program. Give or take a few bytes . . .

The keyboard's not so simple. The Apple programs won't use the arrow keys . . . the Apple hasn't got up/down keys so, of course, the programs won't be looking for them. You should find that if the program is supposed to use left and right arrows they do work.

If the keyboard is being read with the GET statement, then it's a simple matter to substitute in the right codes. Up is 112, Down is 113. Left and Right are as the Apple, 8 and 21. If you've the extension keyboard, the fire key generates a full stop or ASCII 46.

But the big problem is polling the keyboard directly using locations -16384 and -16368.

This is the standard Apple way of checking for single keypresses without bringing programs to a halt.

Although the Microprofessor uses the same locations, you can't just PEEK and POKE them Apple-style. So most Apple programs will have to be modified.

This involves a bit of machine code.

If you're interested in that sort of thing, your machine code routine should call SCAN1 at \$F043 to read the code into the Acc. C will be set if a key was pressed, otherwise it will be clear. You can then call IOSAVE at \$FF4A to save the 6502 registers. A surprise for Apple users . . . the Acc is saved to \$7FO. These routines are detailed on page 78 of the user guide.

If you don't like the sound of machine code, here's an inelegant but usable patch in Basic. In your program's initialisation section, insert the following lines:

```
FOR I=768 TO 773:READ B:
POKE I,B: NEXT I
DATA 32,67,240,76,74,255
```

This loads the machine code routine into the normally unused page 3 memory. To read the keyboard CALL 768 and set K=PEEK(2032). This gives a result identical to K=PEEK(-16384) on an Apple. You don't need to POKE -16368,0 afterwards as you would the Apple.

So to convert an Applesoft program to read keypresses on the Microprofessor, change any K=PEEK(-16384) references to CALL 768: K=PEEK(2032) and take out any POKE -16368,0 statements.

If you want to build the up and down arrows into the program, they generate codes 240 (up) and 241 (down). I did want to make this path into a nice shiny USR function, but it turns out that the USR restart address at \$E2F2 on the Apple has moved.

Don't ask me where to . . . I'm still looking.

To the heart of the Atari

Q My dad often borrows an Atari 400 from school. I have great fun using it but I'd like to know how to write the machine code on it.

Also, could you tell me how to generate random characters?

Martin Cubitt, Rayleigh, Essex.

A Machine code programming is a fairly complex subject, even *Routine Inquiries* would think twice about teaching it in a short answer. If you're interested, you could try any of the machine code tutorials for the Atari at your local bookshop.

You'll also find that some non-specific texts such as Rodnay Zaks' *Programming the 6502* will be a great help.

You can write short routines in machine code, using PEEK and POKE from Basic but you'll need to buy a monitor and an Assembler program if you're going to get at all serious.

Random characters are much easier. The simplest way is to use CHR\$ to generate the character and RND to pick it. RND(O) is usually used as part of the expression INT(RND(O)*N)+L where N is the number of different numbers you want and L is the lowest number that could be generated. To pick random capital letters, we want to choose from 26 different numbers, starting at 'A', whose code is 65. Try:

```
10 PRINT CHR$( INT(RND(O)*26)+65): GOTO 10.
```

If you want to generate other characters, just use a table of the Atari's ASCII set (Appendix C, Atari Basic reference manual) to tell you the numbers to use with RND(O).

Electrons and Atomic theory

Q I bought an Acorn Atom 12K+12K in January and I'm not very satisfied with it. When I heard news of the Acorn Electron, I decided to sell the Atom and buy an Electron instead. Do you think my decision is wise?

Sanjay Parmar, Leicester

A It seems rather silly to sell your computer now only to wait at least two months for a machine no-one has ever seen.

If you're unhappy with the Atom, try to decide why. Then consider machines that make up for the Atom's deficiencies.

An Oric bug that isn't...

Q I think I have found a strange bug in the Oric's ROM. Try the following program:

```
10 INPUT A
20 PRINT A
30 GOTO 10
```

Enter the data 1,2,P,., and,;. The numbers 1 and 2 are printed as you'd expect. P and / aren't printed... there's the message 'Redo from start'. But E is taken as the number 0 and no message is printed. Finally, the ; causes the unlisted 'Extra ignored' code to be printed. Can you explain what's happening?

*Peter Regan,
Cardiff, S Wales*

A There are bugs in the Oric's ROM, many of them, but this isn't one of them. INPUT A in line 10 asks for a number to be entered. P and / aren't numbers so the Oric asks to try again with 'Redo from start.' E really is part of a number. Microsoft Basic uses a scientific notation for numbers that are too big or too small to display and enter in the normal way. As an example 2E4 is 2 with four 0s after it, or 20000. Page 55 of the Oric manual introduces this notation.

By entering E on its own, the Oric thinks you've entered OEO which is, of course, zero. Lastly, semicolons and commas are used to separate data when you are responding to an INPUT with multiple variables.

INPUT A, B, C wants you to input three numbers, separated by commas. So if you enter a semicolon or a comma whenever you are responding to a single INPUT statement, the Oric thinks you are entering more than it needs. So it just ignores any surplus. Hence the message 'Extra Ignored'.

But don't worry if you still want an odd bug to play with. Try this program:

```
10 A=1
20 C=1
30 IF A=C THEN PRINT A
ELSE PRINT C
```

The questions is, 'What does the program print?' The answer is not one.

... And one to turn your Oric green

Q One of the oddities of the Oric's PLOT command is

that it will only plot a string. If you give it a number (eg PLOT 10, 10, 100) it plots CHR\$(100)... a 'd'. So if you try a program such as:

```
10 INPUT X
20 PLOT 10, 20, "You have entered"
```

30 Plot 10,20,X
the Oric would convert the X into CHR\$(X) and print it at 10,20. To get round this, I used STR\$(X) instead of just X. Can you tell me why this prints the value of X in green at position 10, 20?

*E H Wilson,
Sevenoaks, Kent*

A It's perfectly simple—it's a ridiculous bug in the Oric's ROMs. The STR\$ function takes a number and converts it to a string containing its digits. The Oric goes one better than most computers because its STR\$(X) then sticks a Control B (CHR\$(2)) on the front of the string.

I've no idea how or why STR\$ does this. It's not a bug in the original Microsoft Basic but it's one of those extras Oric has thrown in to make sure there is 'no comparable competition'.

Most of the time, loose Control Bs on the front of strings will go unnoticed. But you'll come unstuck with functions like LEN and MID\$ if you try to use them. In particular, if you plot a string with a Control Bin it, it turns text colour green. Hence your charming little PLOT statement.

It's best to chop off the Control B whenever you use STR\$. To do this, stick a flag BGD=1 at the start of all your programs. Then in an initialisation section of the program, include ZO=1: IF BGD=1 THEN ZO=2. Now instead of using STR\$, use MID\$(STR\$(X),ZO) throughout your programs.

This may seem a lengthy way of putting MID\$(STR\$(X),2) statements in your program. It is. But if you follow this procedure, when Oric fixes the bugs in the Rom, you only have to change the first line of your programs to BGD=0 and they will work perfectly.

If you've any other patches in the program, they should use BGD to test if it's a bugged machine or not. When fixed ROM machines become available, someone will discover a PEEK that distinguishes between the two versions of the Roms.

You can use this to set BGD

automatically. You may think that this is a horribly tiresome process but you could be the first on your block to develop programs that run on both bugged and unbugged machines.

Subject to verification

Q In a leaflet printed by Oric it says 'All types of information may be saved such as programs, data, arrays, blocks of memory, screen displays. After saving, correct recording may be verified before deleting the information in memory.'

How do you save data? How do you verify it? There appears to be no VERIFY command.

*T Richardson,
Sale, Cheshire*

A You can save anything you like on the Oric. You've just got to know how. There's no known Basic command to save arrays and Basic data but you should be able to fudge it using SAVE with the A and E parameters.

All you need to know is where the pointers to Basic's data are and how the information is organised. Oric should publish this information rather than let some poor soul go grubbing around memory for it.

The leaflet also implies there's a VERIFY command. Perhaps you're supposed to develop that yourself as well. I can't find any reference to VERIFY anywhere except in the famous 'no comparable competition' leaflet. I strongly suspect you're entitled to your money back if you want to push the point.

Oric says it is planning fixed ROMs but could give no details of when or how they will be available.

Hopefully, the ROMs will include file handling and VERIFY. In the meantime, SAVE everything at least twice. And keep waiting and hoping...

Micro of the future

Q Could you please give me some details about a computer made by Binatone?

*D Dandy,
Bolton, Lancs*

A There isn't one. Not yet anyway. Binatone original-

ly announced plans for a personal computer back in November. Goodies were to include colour, sound, 64K or 16K RAM at an ambitious starting price of £49.95.

But the Binatone hasn't been launched yet. I get three letters a week asking after it and Binatone probably gets more.

The company is still working on the machine though it's no longer quoting any price, never mind £50. It's best to leave Binatone alone and let it get on with the development. You can start thinking about buying one when it's launched.

Anyone interested in computing should buy a machine that's available. There will be something even better than the Binatone by the time it comes along.

There's just no point in waiting in this business.

Hands on that dream machine

Q Could you please tell me when I will be able to purchase the new Acorn Electron?

Could you give me your opinion on the Dragon 32 as a computer for games and education?

*J Trotter,
Edinburgh*

A Acorn is planning to launch the Electron in August, although the company hasn't specified which year. Seriously though, even if Acorn meets its revised deadline, the demand for the machine is likely to be so high that it will be a few months after that before you can find them in shop windows.

As for the Dragon, what's your opinion? Have you been to a dealer and tried some of the games? Have you been round to your local club and begged a go on one?

The Dragon is used mostly for playing games and learning to program. There's little educational software available for it.

It's a simple and conservative design and its phenomenal success has ensured that it's a reasonably safe buy.

But while you're in the shop looking at the Dragon, don't ignore the other machines. There are others with better games, both in terms of cost and quality. It pays to shop around now, rather than later.

There will always be good reasons to buy the new HP-86 personal computer.

You'll run out of problems before the HP-86 personal computer runs out of solutions.

- Spreadsheet analysis solutions.
- Letter, memo, and report solutions.
- Information management solutions.
- Presentation graphics solutions.
- Data communications solutions.

And there are lots of software options – for everything from accounting and finance to engineering.

Put that together with the modular configuration of the HP-86, and you've got a system designed to expand as your needs expand.

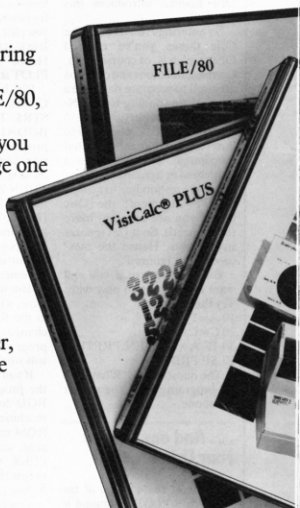
But there are reasons to

From now until 14th July 1983, Hewlett-Packard is offering three valuable pieces of software for the price of *one*. In the Personal Productivity Pac, you'll get VisiCalc® PLUS, FILE/80, and Graphics Presentations.

VisiCalc® PLUS is a powerful analytical tool that lets you lay your worksheets out in front of you electronically. Change one number, and adjustments are automatically made throughout. It's a wonderfully easy way to do your 'what-if' planning.

FILE/80 software lets you store and retrieve information quickly, add to your records, delete or modify them, and maintain your customer files or stock control system for rapid review and usage.

Graphics Presentations, when combined with a plotter, lets you produce professional-quality pie and bar charts, line graphs, and text pages. You can even make overhead transparencies.





three very good buy it now.

**SUPER
SOFTWARE
OFFER!**
3 Pacs for the
price of 1!

All in all, this is an offer designed to meet your essential software needs. With the HP-86 and the Personal Productivity Pac, you're ready to achieve true efficiency.

Incidentally, if you've only just bought an HP-86, don't kick yourself – our offer stands for existing owners too!

* VisiCalc is a registered trademark of VisiCorp. All information correct at time of going to press.



**HEWLETT
PACKARD**

CONTACT YOUR LOCAL DEALER FOR FULL DETAILS: Aberdeen Tyseal Computers Ltd, Tel: 0224-647365. Belfast Cardiac Services, Tel: 0232-625566. Belper (Derbyshire) Midelectron Ltd, Tel: 077382-6811. Birmingham John Mabon Associates Ltd, Tel: 021-6436351. Sumlock-Bondain Ltd, Tel: 021-745 8616. Bournemouth South Coast Business Machines, Tel: 0202-893040. Brighton Office Machinery Engineering, Tel: 0273-689682. Bristol Decimal Business Machines Ltd, Tel: 0272-214091. Cambridge Hi-Tek Distribution Ltd, Tel: 0954-81996. Edinburgh Robox Office Equipment Ltd, Tel: 031-225 3871. Glasgow Robox Office Equipment Ltd, Tel: 041-221 8413/4. Harlow STC Micros, Tel: 0279 29522. High Wycombe Rapid Recall Ltd, Tel: 0494-26271. Leeds Holdene Ltd, Tel: 0532-459459. Leicester Sumlock Services, Tel: 0533-29673. London The Computer Terminal, Tel: 01-236 2187. Microcomputers at Laskys, Tel: 01-636 0845. Midelectron Ltd, Tel: 01-488 2400. Sumlock-Bondain Ltd, Tel: 01-250 0505, 01-626 0487. Manchester Automated Business Equipment, Tel: 061-4320708. Holdene Ltd, Tel: 0625-529486. Norwich Rapid Recall Ltd, Tel: 0270-629090. Newcastle Thos Hill International Ltd, Tel: 0632-739261. Norwich Sumlock-Bondain (East Anglia) Ltd, Tel: 0603-26259. Reading CSE Computers, Tel: 0734-61492. Royston (Herts) Electroplan Ltd, Tel: 0763-41171. Slough Crellon Microsystems, Tel: 06286-4300. St Albans Albeta Ltd, Tel: 0727-74361/2. Tunbridge Wells D J Henriott Ltd, Tel: 0892-22443.



IF OUR ADVERT DOES NOT CONVINCE YOU THE FREE PRINTOUT SAMPLE WILL.

SHINWA-CTI CP80

FULL FEATURED 80 COLUMN MATRIX PRINTER

PROBABLY THE BEST PRINTER AVAILABLE IN THE WORLD
BELOW £300!!

COMPATIBLE CENTRONICS INTERFACE
AND INDUSTRY STANDARD CONTROL
CODES MAKES THE CP 80
IDEAL FOR:-

BBC, DRAGON, ORIC,
APPLE, NEWBRAIN,
SIRIUS and many more.

OPTIONAL RS232
INTERFACES AVAILABLE
BOTH UNBUFFERED
AND BUFFERED

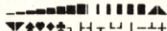


Made in Japan

FULL ONE YEAR WARRANTY

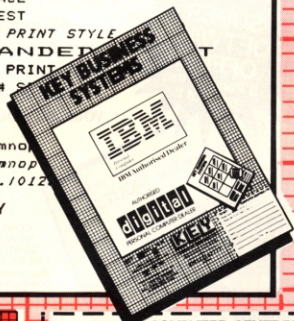
SPECIFICATIONS

- + 80 COLUMN
- + FRICTION AND ADJUSTABLE TRACTOR FEED
- + BIDIRECTIONAL LOGIC SEEKING
- + HI-RES GRAPHICS AND BLOCK GRAPHICS
- + SUB AND SUPERSCRIPTS
- + 9 X 9 DOT MATRIX - TRUE DESCENDERS
- + CONDENSED PRINT
- + EMPHASISED PRINT
- + GRAPHICS SET -
- + AUTO UNDERLINING
- + VERTICAL AND HORIZONTAL TABS
- + BACKSPACE
- + SELF TEST
- + ITALIC PRINT STYLE
- + EXPANDED PRINT
- + DOUBLE PRINT
- + £ AND \$



@ABCDEFGHIJKLMNPOQRSTUVWXYZ[\]^_ 'abcdefghijklmnopqrstuvwxyz
@ABCDEFGHIJKLMNPOQRSTUVWXYZ[\]^_ 'abcdefghijklmnopqrstuvwxyz
! " # \$ % & ' () * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? ! " # \$ % & ' () * + , - . / 0 1 2

NO DELAY! - TELEPHONE YOUR CREDIT CARD No. TODAY
AND YOU CAN START PRINTING TOMORROW
- AND IF YOUR NOT SATISFIED RETURN WITHIN 14 DAYS
FOR A FULL REFUND.



HAMPTON COURT ■ KEY WALTON

OPEN 6 DAYS A WEEK
MON - SAT 9am to 7pm (6pm SAT)



PRICES QUOTED EX-VAT AT 15%
H.P. FACILITIES ARRANGED
CAN BE DELIVERED WITHIN
24 HOURS FROM STOCK



COMPUTER CENTRES LTD.

Enterprise House 44 Terrace Road,
Walton-on-Thames, Surrey KT12 2SD

Telephone: Walton-on-Thames

(09322) 42777

(4 lines)

TO KEY COMPUTER CENTRES LTD.

Please send me FREE print out samples
and literature.

Name

Address

Post Code

Geof Wheelwright is the matchmaker for this marriage between Tandy Color and the Dragon.

A sideways switch



With a little work, meaningful conversation is possible between the Dragon and the Tandy.

The Tandy Color and Dragon computers have a lot in common — same processor, largely the same Basic, the same type of graphics and an ability to share much of each other's cartridge software.

You'll even find that programs written for the Dragon will often work on the Tandy without any modifications whatsoever, as long as you studiously type them in from a listing.

But when it comes to taking cassette software from one machine and loading it on the other, the famed compatibility begins to break down.

If you're simply exchanging programs with a friend who owns a Dragon (and you own a Tandy), just ask your friend to save programs under CSAVE "File Name".A and the file will be saved as an ASCII text

file. You can then simply LOAD the program on either machine, LIST it and it should run without further conversion.

Syntax Error

However, if you're trying to convert a commercial piece of software it's a different story. Although you're unlikely to have any problems getting a Dragon program to LOAD on your Tandy Color Computer (or vice-versa), you'll inevitably find that when you attempt to RUN it, a Syntax Error will be the response.

The reason for the error quickly becomes evident when you LIST the program. A simple FOR X=1TO15 statement comes out as FORXRENUMIPCLS15, while PRINT 2*3 becomes PRINT 2PUT3.

These odd transpositions are a built-in protection for the companies that make the

machines, ensuring that they can't be considered clones of each other.

If you start on the premise that the major difference in programs loaded from cassette is the interpretation of Basic reserved words and operators, you won't be far off the mark. The table below gives a list of words in Dragon's Microsoft Basic and shows the corresponding words that turn up on the Tandy when you load a Dragon program into the Color Computer.

Crossed words

Many of the words are exactly the same. Commands such as DATA, IF, INT, ON, PRINT and READ go unchanged in moving from a Dragon program to the Tandy's memory. But the IF statement isn't much good without a corresponding THEN — and THEN is read by the Tandy as SCREEN.

Even the equals sign is misread by the Tandy as RENUM. The easiest way to convert programs from one machine to another would be a word processor that can edit Basic and allow you a simple Search and Replace function to change all the words that have been misinterpreted. But since word processing packages tend towards the price end of the software scale (especially ones that can edit Basic programs on low-cost micros), you ought to have an alternative conversion method.

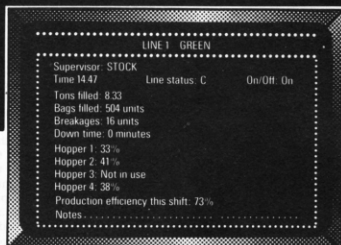
The alternative method would involve writing a machine-code routine which would contain all the information in a data table compiled from the information in the table. The machine code routine would check any program you loaded into it and replace any occurrence of tokens that were incorrect using the table as its source of information.

Otherwise, it's up to you — LOAD your program, LIST it, arm yourself with this table and start converting.

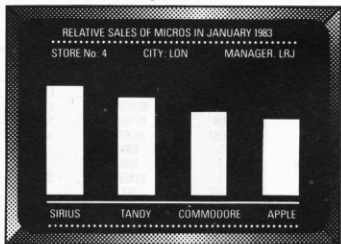
DRAGON	TANDY	DRAGON	TANDY	DRAGON	TANDY	DRAGON	TANDY
ABS	ABS	EXEC	TAB/	NEW	CLOAD	RESTORE	RESTORE
ACS	MIDS	EXP	LEN	ON	ON	RETURN	RETURN
ATN	CHRS	FIX	ATN	OPEN	LLIST	RIGHTS	RIGHTS
AUDIO	SKIPF	FOR	FOR	PAINT	>	RND	RND
CHRS	POINT	GET	=	PCLEAR	↑	RUN	RUN
CIRCLE	OR	GO SUB	GOPSET	PCLS	+	SCREEN	SCREEN
CLEAR	NEW	GOTO	GOPCLS	PCOPY	EDIT	SET	SET
CLOAD	OPEN	HEX	COS	PEEK	EDF	SGN	SGN
CLOADM	OPENM	IF	IF	PLAY	TROFF	SKIPF	SKIPF
CLOSE	SET	THEN	SCREEN	PMODE	TRON	SIN	SIN
CLS	SOUND	INKEYS	POS	POINT	LOG	SOUND	SOUND
COLOR	AND	INPUT	INPUT	POKE	CONT	STOP	STOP
CONT	LIST	INSTR	VARPTR	POS	USR	STRINGS	PPPOINT
COS	VAL	INT	INT	PPOINT	TIMER	STRS	LEFTS
CSAVE	CLOSE	JOYSTK	JOYSK	PRESET	*	SQR	SIN
CSAVEM	CLOSEM	LEFTS	TAN	PRINT	PRINT	TAN	ASC
DATA	DATA	LEN	JOYSTK	PRINT TAB	PRINT TAB	TIMER	INSTR
DEF FN	CSAVE PRESET	LET	RUN	PRINT USING	PRINT USING	TROFF	STEP
DEFUSR	CSAVE STRINGS	LIST	CLEAR	PRINT @	PRINT @	TRON	NOT
DEL	SUB	LLIST	RESET	PSET	—	USR	STRINGS
DIM	DIM	LINE	OFF	PUT	<	VAL	RIGHTS
DLOAD	DEF	LINE INPUT	OFF INPUT	READ	READ	VARTR	HEXS
DRAW	DEL	LOG	PEEK	REM	REM	>	DLOAD
EDIT	THEN	MEM	SQR	RENUM	RENUM	<	FN
END	END	MIDS	FIX	RESET	RESET	=	RENUM
EOF	INKEYS	MOTOR	AUDIO			↑	PCOPY

This table shows you how to convert the Tandy's vocabulary to the Dragon.

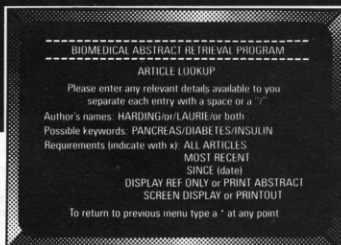
Hundreds of problems. One solution.



Controlling the production of tomato grow bags may sound simple enough, but co-ordinating *all* the different aspects on a brand-new production line was not without its headaches. When the production manager turned to the company's new micro for an answer, it was **THE LAST ONE** which made it possible to create a system in hours rather than months. TLO then went on to produce over one hundred individual solutions for this company in a period of less than a year.



A simple, moving, graphic display was needed by a major computer retailer to demonstrate how a new product line could maintain compatibility with some of his earlier machines. Half an hour's work with **THE LAST ONE** and he had a program displaying bar-charts, graphs and printouts. Little more than an hour later the same program was up and running on three other makes of micro. When asked what made the four machines compatible, he laid the credit squarely with **THE LAST ONE** - "some manufacturers would be hard put to even use the same mains plug - TLO at least gets them all speaking the same language."



The biochemistry department of a major Scottish university had a need for a filing system which could store details of abstracts of biochemical articles and which would allow retrieval of relevant material through entry of key words alone. A massive database had to be implemented on an Apple II computer and retrieval times needed to be measured in seconds not hours. TLO did it and the solution has since been widely published for use on other machines.

Using a computer to solve a complex problem is not always as easy as it sounds.

One solution that has helped solve hundreds of problems in installations throughout the world is **THE LAST ONE (TLO)**.

A glance through the three examples on this page will give you some idea just how versatile TLO is.

TLO runs on the Apple II and IIe, Commodore 4032 and 8032/96, TRS-80 Model II (TRSDOS or CP/M), most CP/M, CP/M 86 and MS-DOS machines including the IBM PC (PC-DOS) and Sirius.

Try out TLO for £50 + VAT

A limited demonstration version of TLO is now available for just £57.50 including full documentation, VAT, postage and packing. This is fully refundable against purchase of the full version.

Find out what TLO can do for you by sending today for a free information pack. It could be the solution to hundreds of your problems.

THE LAST ONE®

D.J. 'Al' Systems Ltd., Dept D, Station Road, Ilminster, Somerset, TA19 9BQ. Telephone: Ilminster (04605) 4117.

Nominated 'SOFTWARE PRODUCT OF THE YEAR 1982', and selected as finalist in Recognition of Information Technology Achievement Awards (RITA)

Bob Maunder continues his orchestration of your micro's sound and music commands.

Music-making Oric

Last week's Oric feature looked at toggling sound channels on and off as well as use of the envelope command. This week we use the PLAY, SOUND and WAIT commands to continue the pursuit of musiccomputer excellence.

The PLAY command on its own is not much use. But when combined with SOUND, it can give both musical and non-musical noises, from whistles to footsteps.

The sound command takes the form:

SOUND CH,P,V

Where CH is the channel (1 to 3 are the tone channels, and 4 to 6 the noise channels), P is the pitch (or period of the vibration of the note) of the sound produced, and V is the volume, which varies from 1 (the lowest) to 15 (the loudest).

If V is set to zero, then PLAY determines the volume.

The following program gives a footsteps sound by alternating between a pitch of 10 and 15.

```
5 REM FOOTSTEPS
10 FOR N=1 TO 20
20 PLAY 0,1,1,300
30 P=(N AND 1)*5 + 10
40 SOUND 4,P,5
50 PLAY 0,0,0,0
60 WAIT 60
70 NEXT N
```

It is more convincing with pictures:

```
5 GOSUB 100:GOSUB 300
10 FOR N=1 TO 37
20 PLAY 0,1,1,300
30 P=(N AND 1)*5 + 10
35 GOSUB 200
40 SOUND 4,P,5
50 PLAY 0,0,0,0
60 WAIT 60
70 NEXT N
80 WAIT 1000:CLS:PAPER 7:INK 0
90 PRINT CHR$(20):POKE
  #26A,3:STOP
99 REM Set up walking figure
100 FOR J=0 TO 15
110 READ B:POKE 46080+8
  "ASC("a")+J,B
120 NEXT J
130 DATA 28,28,28,8,28,62,62,
  61,61,60,28,20,50,34,51
140 RETURN
199 REM Draw figure at position N
200 PLOT N,10,"a":PLOT N,11,".b"
210 RETURN
299 REM Draw scene
300 CLS:PAPER 3:INK 0:POKE
  #26A,10:PRINT CHR$(20)
310 POKE 48520,18:POKE 48480,18
320 FOR L=0 TO 3
330 POKE 48040+L*40,20
340 NEXT L
350 POKE 48200,17:POKE
  48201,4:POKE 48240,17
360 PLOT 1,4,CHR$(9) +
  "012345678901234567890123456789
  012345"
370 RETURN
```

Although SOUND can be used to produce musical notes, the Oric has been supplied with a command especially for this purpose — MUSIC:

MUSIC CH,OCT,N,V

CH is the tone channel (1 to 3), V is the volume (1 to 15, or 0 for PLAY to determine the volume), OCT is the octave number from 0 (low) to 6 (high), and finally, N is the note number.

N ranges from 1 (note C) going up one digit per semitone to 12 (note B). The command is very flexible and has an excellent range, as shown in the program here:

```
10 PLAY 1,0,1,200
20 FOR OCT=0 TO 6
30 FOR N=1 TO 12
40 MUSIC 1,OCT,N,2
50 WAIT 20
60 NEXT N
70 NEXT OCT
80 PLAY 0,0,0,0
```

Chords are easily obtained: all three tone channels can be opened, using PLAY, and then a different note of the chord can be set on each channel by separate MUSIC commands.

It is simple to get the Oric to play a tune. Because of the flexibility of the instructions, you can vary volume and tempo to your taste as shown:

```
10 CLS:PAPER 6:INK 0
20 INPUT "Enter volume (1-15)";V
30 V=V AND 15
40 INPUT "Enter delay (1-7)";D
50 D=D AND 7
100 POKE #26A,11:PLAY 2,0,1,2000
110 FOR J=1 TO 18
120 READ N,W
130 MUSIC 2,3,N,V
140 WAIT W*D*10
150 NEXT J
160 MUSIC 2,2,10,V
170 WAIT 240
180 PLAY 0,0,0,0
190 STOP
1000 DATA 3,2,6,4,8,2,10,3,11,1,10,2,
  8,4,5,2,1,3,3,1,5,2
1010 DATA 6,4,3,2,3,3,2,1,3,2,5,4,2,2
```

Notes are held in the DATA statements as two-digit pairs, the first specifying the note number, and the second specifying its length (in eighths).

If all the notes are the same length (as in a little jingle), then the note numbers may be put in a string:

```
5 PLAY 1,0,2,1000
10 TS="13243546571324354657666798:9;
  <<<<<:987654321111"
20 FOR J=1 TO LEN(TS)
30 N=ASC(MID$(TS,J,1))-48
40 MUSIC 1,3,N,3
50 WAIT 20
60 NEXT
70 PLAY 0,0,0,0
```



Suddenly the Colour Genie can run the programs available for the Genie I. Marc Leduc explains.

Colour Genie's thought transference



Many people still own and buy the Genie I micro-computer because of its reliability and vast amount of available software. Unfortunately, the Genie I has a black and white display, and sound can only be produced by software generating square waves from the cassette port into an external amplifier.

It is possible to purchase a colour board, a high resolution board and a sound board for the machine, but that would bring the computer cost high above other machines with similar features.

The Colour Genie, on the other hand, is comparatively inexpensive. It also supports 98 per cent of the Basic commands available on the Genie I, the exceptions being SET, RESET and POINT.

These commands were used for the very low resolution graphics on the Genie I, but remarkably, the first 12K of the Colour Genie ROM is almost identical to the Genie I ROM. The Colour Genie has a 4K ROM extension to support the Colour and Sound enhancement commands.

The Colour Genie has two types of screen displays: a text screen and a high resolution screen. The high resolution screen allows 160×96 pixels with four colours — and this takes up 4K of user RAM.

But here's the funny part. In the text screen, you can program the individual pixels in 128 characters, or you can use 128 pre-defined characters. With simple programming, you could produce a display of

FIG 1

```
16K - 32000
32K - 48384
48K - 64768
```

FIG 2

```
10 DEFINT A - Z
20 FOR I = 128 TO 255
30 PRINT CHR$(I);
40 NEXT I
50 GOTO 20
```

FIG 3

P
r
o
b
l
e
m

Keyboard Map

Video Map
(text mode)

Genie I and II

Colour Genie

3801H - 3880H

F801H - F880H

3C00H - 3FFFH

4400H - 47FFFH

Figure 1. Memory reservations for the different versions of CSAVERS.

Figure 2. A sample program to transfer to the Colour Genie which requires no modification.

Figure 3. Addresses of potential problem areas when converting programs from the Genie I and II to the Colour Genie.

ADDRESSES

320×192 pixels in 16 colours (eight colours, eight tints and hues), and take up only 1K of user memory!

As the Colour Genie and the Genie I are so much alike, you would think that any software sold for the Genie I should run on the Colour Genie. Well, not entirely.

The Genie I supports a 64×16 character screen, while the Colour Genie has a 40×24 character text screen. This isn't a great problem, as anyone who gets the hang of programming on the Colour Genie will soon be able to make the slight alteration that is necessary to change Genie I programs.

The other snag is that the Genie I tapes are 500 Baud, while the Colour Genie tapes are 1,200 Baud. Also, the format of the tapes is slightly different.

So you could conclude that the only

method of transferring Basic programs is to type in the program by hand. Not so.

Machine language

CSAVER is a utility which allows you to take a Basic Program LOADED into the Genie I or II, and then make a copy of that program onto a tape which will LOAD into the Colour Genie. Instead of spending the next two weeks retyping and debugging a 16K Genie I Basic program, you now only need a few minutes to make a good copy. Suddenly, the Colour Genie has access to the large set of programs available for the Genie I.

CSAVER is a machine language program, and must be entered using an editor/assembler. The program is very short, and you should be able to get it working within a couple of hours.

Mike Gerrard passes sentence on a cassette-based word processing package for the Dragon.

Microdeal has been importing good quality arcade games from the US and successfully converting them from the Tandy to the Dragon, and with Telewriter it has introduced what seems to be the first word processing package for the Welsh machine.

It is also the first word processor I've used, and as a novice I was surprised how easy it was to master.

Features

Telewriter converts the Dragon's rather large and boring-looking 32 x 16 text screen into a 51 x 24 display of clear characters, in both upper and lower case, enabling you to manipulate text easily and quickly. Four versions of the program are on the cassette.

Some word processing packages try to incorporate every printer into one program, thereby sacrificing facilities, but the first version here will work with most standard printers, the second is for the Epson Graffiti, the third is a Centronics version and the fourth will link with Terminus, Teletype and some daisywheel printers not covered by the other three.

Presentation

The cassette comes with a smart cream ring-binder, A4 size, which contains both a 33-page reference manual for the experienced user and a 27-page tutorial for the newcomer. The manual is indexed and contains a useful appendix of commands. I only wish the manual that came with the Dragon was this helpful and logical.

Getting started

When loaded (and the programs are duplicated in case of problems) a menu allows you, on a single key command, to create a new file, edit an existing one, save a file or part of a file to tape, read in a file from tape, add a file from tape to what's already held in memory, verify a file that has been loaded, move to the printer format or have a word and line count of the text currently held, there being room for up to 18,500 characters.

In use

The tutorial begins by showing you how to create a new file, and then leads you through the control commands available, showing you how to move the cursor around, delete and insert text, align paragraphs, move blocks of text from one place to another, and scroll quickly back and forwards through the pages on file.

Just a few hours with the instructions familiarised me fairly well with the commands, as most of them are logical entries, such as B for Begin, P for Paging and so on. There was little confusion with the Dragon's own editing commands.

The program also provides a search facility, enabling you to skip through the text and locate every instance of a word. You can then delete it, ignore it, or replace it with another pre-chosen word. What it doesn't have, though, are two different areas of text memory which would allow

Big-screen writing on the Dragon



Stuart Breese

you, for example, to keep a standard letter in file and send different copies to each of a series of names and addresses held elsewhere. But in a program costing only £50 and aimed at a home micro you can't expect all the facilities business executives demand from more expensive systems.

There is an automatic wordwrap; any word which would be left unfinished at the end of a line is transferred to the next line. This facility can be disabled if you want your words broken, though this is the nearest the program comes to offering automatic justification of the right-hand margin. If you want that without broken words, you'll have to wait for a more expensive package.

The printing commands allow you to set the line spacing, left margin, characters per line, upper and lower margins, lines per page and pagination. You can also have

direct access from file tape to printer or from keyboard to printer.

One extremely useful feature is %Print, allowing you to run off a few lines for inspection before going ahead with the whole printing. This facility also applies to saving files from tape, so you can easily confirm that saving is actually happening. There is also an auto-restore feature when searching for files, so you don't have to type in CLOAD continually. The machine just keeps on looking for the file you want.

Reliability

There is a certain amount of precaution against error, with a prompt of 'Sure???' when attempting to type in something which would wipe out an existing file, and although most of the commands are only double-key entries (such as CLEAR-X), I think the worst you could do inadvertently would be to wipe out a line of text by hitting K for kill instead of M for menu. It seems to be a small risk when set against the simplicity of use.

The commands for setting the printer are also fool-proofed, and if in error you make your 4-space margins 44, or even 444444 as I tried, they are instantly resettable.

In two days of working on the package, the program crashed just twice. While scrolling backwards through several pages of text that I had entered from the demo programs provided on the tape, I found myself looking at a page full of what appeared to be Chinese characters, and there was nothing for it but to reload.

This unfortunate incident was no great disaster with a demo program, but losing several pages of incomparable and irreplaceable prose would have taught the virtue of saving as you go.

Verdict

I was impressed by Telewriter. It was easy to master, even for someone with no direct experience of word processors.

Similar packages for other machines seem to cost at least half as much again as Telewriter, and Microdeal hasn't skimped on documentation.

Comparing it to a full-blown package is like comparing the Pocket Oxford Dictionary to the full 13-volume edition, and while it might be nice to have the full set, the pocket version will satisfy your needs about 90 per cent of the time.

RATING

Features
Documentation
Performance
Usability
Reliability
Overall value



Name Telewriter Application Word processor
System Dragon 32 Price £49.95 Publisher
Microdeal (0726-67676) Format Cassette
Language Machine code Other versions Tandy
Color Computer Outlets Mail order, John
Menzies, selected Boots, other dealers.

Strengthen your hand *with Superbase* 64

The complete information control system for the Commodore 64. Ideal for any home, business or professional environment where records are kept. Create the format you

need and enter your records. If the layout or data field sizes are not quite right, correct them and carry on. Superbase gives you an unrivalled range of powerful features including:

FLEXIBLE RECORDS

- Fully definable records with text, numeric, calculated result, date, constant, linking and key fields
- Record size up to 1000 characters
- Up to 128 items per record
- Up to 4 screens per record
- File size up to 16 million characters

QUICK ACCESS

- Search, select from and sort names, dates, values
- Fast key access
- Search and select using multiple criteria
- Print, display or store selections
- Fully definable report and screen formats
- Browse feature

EASY AMENDMENTS

- Add or amend fields dynamically or alter their length with no need to rebuild files
- Completely redefinable records
- Full file update and delete facility
- Fast on screen recalculation of numeric fields gives genuine spreadsheet capability
- Calendar arithmetic

LINKS TO WORD PROCESSING

- Links to Easy Script word processor and Easy letters, quotes, tables etc with 100% spelling accuracy
- Calculator and explanatory HELP screens
- Off the Shelf applications to suit your special needs - customer/client records, stock and catering etc



Come and see for yourself at the Commodore Computer Show, Cunard International Hotel, Hammersmith 9-11 June 1983 on Stands B36 and B124.

Also at the London Computer Fair 16-19 June on the Commodore Stand.

Send me details of my nearest Commodore Superbase 64 dealer.

Name _____

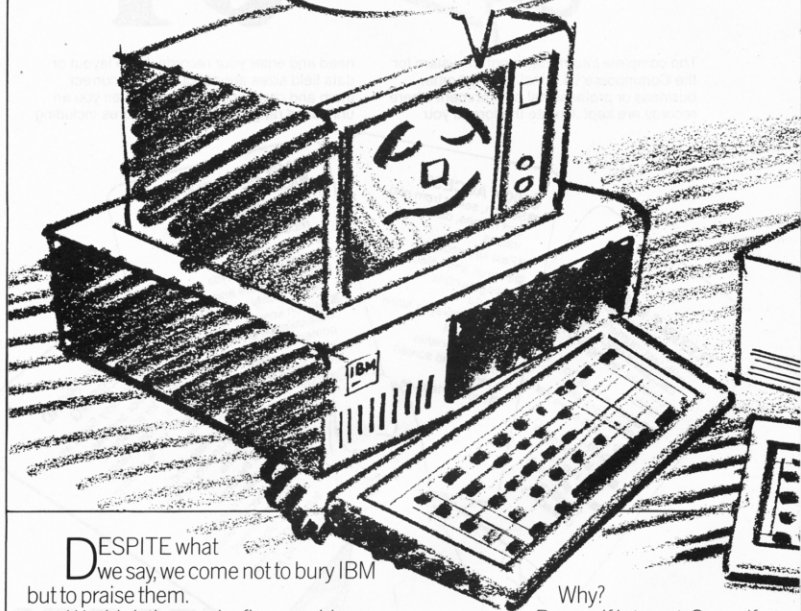
Address _____

Tel. No. _____

Precision Software Limited
Park House 4 Park Terrace
Worcester Park
Surrey KT4 7JZ, England
Telephone: 01-330 7166
Telex: 8955021 PRECIS G

Precision Software

"BET YOU WISH
YOU WERE CALLED
IBM."



DESPITE what we say, we come not to bury IBM but to praise them.

We think they make fine machines. And they're probably the most well-known computer manufacturer you've ever heard of.

So rather than just ask you to compare our CAL personal computer with just anyone's personal computer, we'd like you to compare it with IBM's. (Plus the new DEC machine and the Sirius too, if you like).

Why?

Pure self interest. Our self interest and your self interest.

To begin with, price is a big plus for the CAL personal computer. In general, we work out about 33% less expensive.

But price is only a small part of the story.

The CAL personal computer can take 8 bit and 16 bit software.

The keyboard is identical to the

**"BET YOU WISH YOU WERE BRITISH,
ALMOST 33% LESS EXPENSIVE, HAD
8 AND 16 BIT PROCESSORS WITH
FULL MULTI-USER CAPABILITY."**



IBM PC. Very easy to use. A detached 71 key unit.

When it comes to languages the CAL PC features Basic, Cobol, Fortran, Pascal and Multi User Microcobol.

The CAL gives you two 400K floppy discs as standard. Plus an inbuilt 5MB, 10MB, 15MB or 20MB hard disc.

The CAL PC has RS 232, Centronics

or the option of RS 422 ports. For operating systems the CAL can have CP/M*, CP/M 86*, MS-DOS* and BOS*. Using the BOS* system, CAL's personal computer can operate as a multi-terminal system with remote visual display units.

Depending on your experience so far, some of this will sound impressive, or some of it will sound like gobbledygook.

In either instance we'll be only too happy to tell you more.

The CAL PC is the latest product to emerge from Computer Ancillaries: a British company that's successfully produced the CALtext word processor and the Durango computer range.

As a British company, we offer a fully established on-site service and support facility from our own engineering staff throughout the UK and Eire.

Which, with all due respect to our American friends, tends to put the icing on the cake so far as you're concerned.

Please ring or write now for further information.

*CP/M is a trademark of Digital Research Inc. *CP/M 86 is a trademark of Digital Research Inc. *MS-DOS is a trademark of Microsoft *BOS is a trademark of MPSL.

☐ Please send me further information on the CAL PC.

☐ I am a dealer and would like more details. My current main line product is _____

Name _____ Position _____

Company _____

Address _____

Tel. No. _____

Computer Ancillaries Limited
64 High Street, Egham, Surrey TW20 9EY.
Tel: (0784) 36455.



Looking for a speedier Spectrum? Ted Ball reviews a Forth-coming attraction from Abersoft.

A Forth first for the Spectrum

Forth is becoming a very popular programming language on small microcomputers because it's almost as easy to use as Basic and almost as fast as machine code. Abersoft Forth is an implementation of FIG-Forth, with disk simulation in RAM, and a number of extensions which are mostly to allow you to use the special features of the Spectrum.

Features

Being an implementation of FIG-Forth, Abersoft Forth includes the complete standard FIG-Forth vocabulary, and with the disk simulation in RAM you can enter and run published program listings without having to make changes.

The disk simulation uses 11K of memory to represent a disk, and the disk handling words treat this block of memory as if it were a disk. There is an editor which allows you to type programs into the 'disk' area, in the usual FIG format where each 1K of disk is treated as a 'screen' with 16 lines of 64 characters. Although this is not really suitable for the Spectrum's 22 x 32 screen, Abersoft has kept it for the sake of compatibility.

Abersoft's extensions to FIG-Forth include sound, colour, graphics, tape, keyboard and printer commands. Where possible it has the same names as the corresponding commands in Basic, but you have to use them in Forth's normal Reverse Polish form.

All the colour and graphics commands from Spectrum Basic have equivalents in Abersoft Forth, except CIRCLE, presumably because of the difficulty of implementing and using this command in an integer-only language.

DRAW is rather different from the Basic DRAW command. In Abersoft Forth, xy DRAW draws a line from the current position to the point (x, y), while the Basic command DRAW x,y draws a line from the current position to a point at a distance x horizontally and y vertically from the current position.

For sound, Abersoft Forth has the word BLEEP, which allows you to set values of duration and pitch related to the processor clock cycles. With the extra speed of Forth you can produce more varied sounds with BLEEP than with the BEEP command in Basic, where you have to give duration in seconds and pitch in semitones.

As well as the extensions that allow you to use the special hardware features of the Spectrum there are some miscellaneous non-standard words. These include CASE, ENDCASE, OF, ENDOF, which together give a case statement of the type

found in Pascal and other structured languages. There are also words that operate on 32-bit numbers — 2DUP, 2OVER, etc.

Presentation

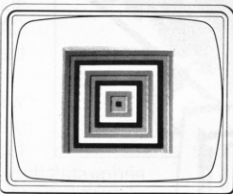
The tape and a neatly printed instruction booklet come in a clearly labelled box.

The booklet is mostly for reference, but it does have a short introductory section to help you get started. It describes some differences in using the computer in Forth instead of Basic. For example, there is a different method for getting the symbols which are printed in red below the keys.

There is a short explanation of some of the extensions, mainly the graphics and input/output words. The section on the editor defines the editor commands, and gives some explanation of their use.

More than half the booklet's 28 pages are a glossary listing words available in Abersoft Forth, giving precise definitions of what the words do, the inputs they expect and the outputs they give. But there are misprints and omissions in this section.

Some misprints could give you a lot of



```
1 LIST
2 SCR # 1
3 0 0 DRAW 23678 0 0 + SWAP 2367
4 0 0 SWAP DRAW 0 0 SWAP MINUS DRAW ;
5 1 1 LEFT 0 MINUS 0 DRAW ;
6 1 1 UP 0 SWAP DRAW ;
7 4 4 RIGHT 0 DRAW
8 4 4 SQUARE DUP DOWN DUP LEFT
9 4 4 UP RIGHT
10 5 5 MOVESTART 1 1 DRAW ;
11 7 7 DENO CLS 124 64 PILOT
12 9 9 22 0 DO 1 5 MOD INK
13 10 10 9 1 DO J 6 2 + SQUARE
14 11 11 MOVESTART
15 12 12 2 2 LOOP
16 12 12 LOOP ;
```

All you need is Abersoft's implementation of Forth, a Spectrum and this program and you can produce the above demonstration.

trouble, particularly if you've just started learning Forth. For example > appears as < at the heading of its definition, and the words R0 and S0 (with the digit '0') appear as RO and SO (with the letter 'O').

Most of the omissions are words that Abersoft has added. The introduction mentions UDG, which allows you to set up user defined graphics characters, but UDG

is missing from the glossary. There are also words which come up in the vocabulary when you use VLIST, but are not in the glossary, for example, INCX, INCY, X1, and Y1.

The glossary doesn't tell you which words are in the FIG-Forth standard and which have been added. If you want to write portable programs you need to get the FIG Implementation Manual to find this out.

In use

The editor has been taken from the listing in the FIG Implementation Manual, and is rather complicated to use. For example, to edit a line you first have to give a command to copy the line into the editing buffer, and then if you want to insert extra text into the line you have to give a command to move the editing cursor to the position you want and another command to insert the extra text.

Other forms of editing require a similar sequence of commands. If you are experienced in using Forth you can add extra commands to the editor, or replace it with another, but if you are learning Forth a complicated editor like this can make things difficult.

Once you have got used to the Reverse Polish Notation and the idea of using the stack instead of variables, Forth is an easy language to use, and the graphics commands in Abersoft Forth allow you to do anything in Forth that you can do in Basic.

However, the extra speed of Forth makes a big difference. You can get speed improvements of ten to 50 times, making it possible to produce moving graphics which would otherwise have to be written in machine code.

Verdict

Although at £14.95, Abersoft Forth is more expensive than most versions of Forth for the Spectrum, its features make it well worth the price. I could not find any bugs, and the only real fault is the omissions and misprints in the documentation.

Abersoft also promises low-priced additions including Microdrive file handling, a Z80 assembler, floating-point arithmetic, and a more expensive compiler to allow you to compile Forth programs into a stand-alone form that can be sold in a self-contained form.

These additions will make Abersoft Forth a very useful programming system.

RATING
Features
Documentation
Performance
Usability
Reliability
Overall Value



Name Abersoft Forth. Application Programming language. System 48K ZX Spectrum. Price £14.95. Publisher Abersoft, (0970) 828851. Format Cassette. Language machine code. Outlets Mailorder

It's paddle your own graphics on the Apple II+. But Mike Whitney has that sinking feeling...

Up the creek with a paddle

The Apple II is the granddaddy of all microcomputers. As 'venerable' is the description it most often attracts these days, it's all the more surprising how well its high-resolution colour graphics have stood the test of time.

But the problem with all high-resolution — for the Apple or any other machine — is how to get the picture you want onto the screen. GPS is a graphics editor for the Apple, and attempts a solution to this problem.

Features

The hardware required is an Apple II+, at least one diskette drive, a colour or monochrome monitor and the Apple game paddles or some form of joystick. A 16K RAMcard and additional diskette drives can also be used if available, and an Apple Silentyper or other graphics printer is needed if you will be wanting hard copy of your drawings.

GPS is designed to give you the power to draw on the high-resolution screen, in colour if you have it, using the game paddles or a joystick. The objects you draw can be manipulated either individually or in groups, the manipulations available including moving the object or group around in the picture, duplicating it as often as desired, changing its size, rotating it and changing its colour.

A picture can be saved on diskette, either in GPS format — in which case you will be able to do more work on it later — or as a binary image of the hi-resolution screen for printing or for use as a fixed background for a later picture.



GPS ready to roll

A powerful feature is that individual objects or groups can also be saved in GPS format on the diskette. Objects saved in this way can be used as standard items, loadable into any picture, and fully capable of being manipulated in all the ways described above.

The package is claimed to be capable of printing your picture, directly onto a Silentyper printer, but this feature was not

tested. The alternative method, required for other graphics printers, is to use the binary dump of the screen. But you will need suitable software for this purpose, and this is not supplied with the GPS system.

Presentation

The packaging of this product cannot be faulted. The manual, of about 70 pages, comes in a padded stiff-backed ring-binder, with packets for the two diskettes containing the programs and other software.



An example of GPS' work

One thing to beware of is reading the manual cold — that is, without trying all the examples on the Apple as you go along. This package, because of the kind of job it is trying to do, is not easy to get to grips with at first, and the manual reflects this fact.

But the subject matter is presented in easily swallowed pieces, and a standardised system of phrases is used to describe the required actions — there's even a glossary of these phrases at the end of the manual.

The authors seem to have achieved the not-so-simple feat of making a tutorial text serve equally well as a reference for the more experienced user. All things considered, I would class the documentation as well above average.

Getting started

One of the key features of the program is that almost everything, including menu-selection, is done with the paddle or joystick and the paddle button. Once you've got the hang of this it's very good, but it can land you in some pretty pickles before that happy moment arrives.

But this kind of difficulty has to be seen in perspective. Software can be easy for the beginner to use, or fast and efficient for the more experienced, but rarely both at the same time. The manipulation of graphic images is an awkward business at best, and it was probably right in this case to give the advantage to experience.

In use

GPS is not for doodlers — you need to plan your approach to drawing your picture very carefully. Start with the background, and work forwards. Treat every surface as a separate object. Don't start colouring in your picture until everything has been done in outline. Save work-in-progress to diskette at regular and frequent intervals. Learn the package thoroughly before trying anything too ambitious, so that you know all the time-saving dodges!

One problem I found was that it was difficult to control the graphics cursor. This is a little spot of light on the screen, which is your 'pencil point', and which you move with the game paddles — one for left-right, and one for up-down. I have tried this before, and find it next to impossible. On this occasion I used the Apple joystick: this is a little better, but not much.

The software could have helped out more here by providing some useful standard shapes automatically; the only automatic drawing feature actually present is the ability to draw straight lines from point to point. The addition of such features would add considerably to the value of the package.

Reliability

Program 'hang' is a phenomenon all micro users have met at one time or another. For no apparent reason your program seizes up solid, and won't respond to anything you do. The only remedy is to turn the machine off completely, so losing whatever work has been done since you last saved it.

GPS did this three times in a four-hour session. What gets me is that the manual even warns you about this possibility. It seems totally pointless to test a program, find a bug and then, instead of curing it, just document it in the manual. As far as I'm concerned, programs with this sort of fault score very low on reliability.

Verdict

This package will do the job it is designed for, provided you are prepared to put in the necessary effort. The reliability problem is irritating, but you can keep its effects to a minimum by regular saving of your work. It could be improved, but in its present form is perfectly usable, and could be a great boon to, for example, writers of games programs.

RATING
Features
Documentation
Performance
Usability
Reliability
Overall value



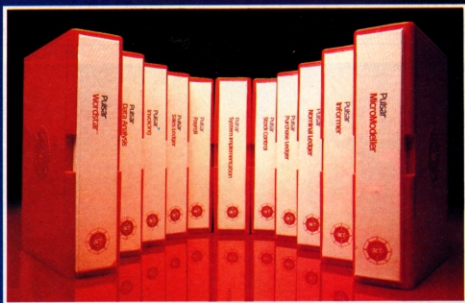
Name GPS graphics processing system
Application Apple hi-res graphics System Apple II+ **Price** £57.45 inc VAT **Publisher** Stoneware Inc, San Rafael, California, USA **Format** Diskette **Language** N/A **Other versions** Professional **Outlets** SBD Software, 01-870 9275, and Apple dealers

A new star is born



pulsar

16 BIT BUSINESS SOFTWARE



PULSAR business software is the creation of ACT – the company behind the Sirius 1 and recognised leader in 16-bit personal computing.

The new PULSAR range, developed by ACT at a cost in excess of £1 million, takes full advantage of the power and expandability of 16-bit computers.

It is inherently faster and more powerful than traditional 8-bit software.

And it is a true 16-bit range, designed and developed by ACT's own software engineers.

PULSAR offers more of all the key requirements in business software:

MORE PORTABILITY

Written throughout in machine-independent portable languages to protect your software investment.

LONGER PEDIGREE

ACT has more than 17 years experience in developing business software. Thousands of companies throughout the world use ACT packages.

GREATER INTEGRATION

All the PULSAR packages are designed to share information, avoiding duplication of files and eliminating re-entering of data.

MORE USER-FRIENDLY

ACT's unique UFO (user-friendly origination) routines allow even the inexperienced user to quickly and easily configure a PULSAR system to precise requirements.

BETTER TRAINING

Two training centres, in London and Birmingham are open to all PULSAR users.

MORE SUPPORT

A "hot line" telephone support scheme to instantly resolve any operating queries.

PULSAR SOFTWARE CENTERS

Only PULSAR is available through the unique network of PULSAR Software Centers. These are hand-picked computer dealers who handle a range of personal computers but who specialise purely in PULSAR to meet all business needs.

THE PULSAR RANGE

Sales Ledger	£195	Informer Database	£295
Purchase Ledger	£195	Micromodeller	£595
Nominal Ledger	£195	SuperCalc™	£150
Payroll	£195	MultiPlan™	£159
Stock Control	£195	WordStar™	£295
Invoicing	£195	Select™	£295
Data Analysis	£195	MailMerge™	£95
		dBaseII	£395

**AVAILABLE NOW FOR SIRIUS –
IBM PC and DEC Rainbow
coming soon.**



For more information on the new PULSAR Range clip the coupon and return to

ACT (Pulsar) Ltd
FREEPOST,
Birmingham B16 1BR
or call
021-454 8585

Please send me further details of the new PULSAR Range.

Name

Position

Company

Address

Tel

SCI

Which joystick should you buy for your micro? Ian Scales gets to grips with the problem.

JOYSTICK SHOOT-OUT

These days games players are becoming choosier about their joysticks, so devices for manipulating screen-objects are appearing in great variety. All of them claim to provide the ultimate 'user interface', giving you more accurate control and delivering better scores.

Over the coming months *PCN* will run several joystick roundups, and we'll look at selected joysticks as and when they appear.



Kempston's Competition Pro is a solidly constructed unit and comes with an interface for the ZX Spectrum.



The Spectravision Quickshot features a helicopter-style grip. It works with the Atari and the Vic 20.



The standard Atari joysticks may not be particularly high in quality, but they are a good buy.

Interfacing with the Spectrum

Kempton's Competition-Pro joystick for the Spectrum represents one way around the perennial problem of getting a joystick to manipulate a game designed for a keyboard. The Pickard joystick controller (PCN May 20-26) is an ingenious, if primitive solution to the problem of the portless Spectrum.

The Kempton joystick approaches the problem on two flanks. First, the company has managed to get several software companies to include joystick routines in their commercial games. These are compatible with Kempton's joystick interface.

The interface plugs onto the edge connector on the Spectrum, and the joystick is configured through a standard joystick port. This means it is possible to configure other joysticks to the interface. This is no mean feat, and indicates a certain amount of clout and respect for Kempton among the micro-software industry.

There are currently 14 action games with Kempton joystick compatibility, including products from Artistic, Silversoft and Quicksilver.

The other method of configuration is a little more complex. It is possible to dig into Basic programs and modify them to accept the joystick commands, which are mapped to address 31 in the Spectrum.

Kempton claims the joysticks are selling like hot cakes.

Joysticks tend to be packaged rather like something you'd expect to find in Woolworth's. Kempton's joystick is no exception. The packaging is slick, but the documentation tends to let it down.

It never ceases to amaze me how much effort many companies put into a product, only to shove a scrappy bit of paper in as a last thought. I suspect that the instructions may also be a little obscure for many people.

The joystick itself is another matter — it looks as though it has been ripped out of an Italian sports car. The good thing about it is its low profile and short throw (motoring correspondent jargon for how far the stick moves at its handle).

With longer sticks there is a tendency for the long travel to topple the thing when you're after a particularly devious alien on the other side of the screen. The only solution here is to keep a firm grip of the thing with the other hand.

With the Kempton joystick, I found that as long as I kept enough weight bearing down on the stick, I could keep my other hand completely free for the firing button.

The joystick is extremely accurate, and is very responsive to small movements. Construction is also very rugged. Kempton boasts of the nylon-covered steel shaft on the stick, and the unit has a very droppable feel about it.

The firing buttons, by the way, could be described as 'hair trigger'. It takes only the slightest depression to zap. The joystick is connected to a special interface, which is plugged into the Spectrum edge connector.

The only grumble I can find about the hardware is that the lead dangles down across the Spectrum keyboard, making it difficult to enter the loading commands.

Item Kempton Competition-Pro Joystick and Spectrum interface **Machine** Sinclair Spectrum Joystick and interface £25, Vic 20/Atari joystick £16, Spectrum joystick interface £15. **Outlets** Kempton 0234 852997

Chopper-style fire control

The Spectravision Quicksilver features more of a helicopter-style grip. This is to be encouraged, as extended playing with a stick tends to wear holes in the palm of your hand.

The Quicksilver has a full pistol-grip, with its trigger button on the top of the handle. There is another button on the base, so you can adapt it to your own playing style.

The base also features a 'contour groove' for better grip, although the advantages of this are hard to gauge.

The Quicksilver uses a standard joystick plug compatible with Atari, Commodore Vic 20 and the NEC 6001. It also features suction cups on the corners of the base. These aren't really the ultimate answer to the stability problem, but they can be a help as long as your playing style isn't too aggressive.

Accuracy and feel are very good — there is none of that 'loose tooth' feel in the playing action. The Quicksilver is heavily constructed, and this is a very important factor in choosing a joystick. Its cord is a comfortable four feet.

Distributor Vulcan Electronics is promising to release an interface for the Spectrum soon and this will apparently cost around £10.

Item Spectravision Quicksilver Interface Atari 400/800, Commodore 64, Vic, NEC 6-6001 **Price** £11.95 **Distributor** Vulcan Electronics **Outlets** Most Commodore and Atari dealers

The Atari plays its best shot

Atari's own joystick for the Atari 400 and 800 is worth using as a yardstick for the others. It's probably fair to say that some other computer manufacturers have never really had their hearts in producing fiddly little peripheral items like joysticks.

Atari's joystick controllers consist of what looks like a scale model of Nelson's column without Nelson. This doesn't really endear it to the palm of your hand

— the thing can get rather uncomfortable during an intensely 'gripping' phase of play.

The casing isn't as flimsy as some, and it looks as though it could take a reasonable pounding without problems. The lead is a short three feet. The accuracy is good, although the mechanism seems over-sprung, needing a good deal of effort to move it.

The single firing button is not as responsive as it could be, needing a good strong push to get it firing.

Item Atari Joystick controllers **Machine** Atari 400 and 800 **Price** £13.99 **Outlets** Most Atari dealers

Acorn's portable pistol-grip

Acorn has approached joysticks from yet another angle. The BBC joystick controllers we tested came as pairs, sharing the joystick plug at the back of the BBC micro — both cables go into the same plug.

Instead of the controllers resting on a table, they are the pistol-grip type, with the fire button occupying the trigger position.

You aren't tied to a flat surface while playing — instead the controller is held and fired with one hand and the joystick is manipulated with the other. This gives you more flexibility in your playing position.

Two people playing an action game can easily adjust positions to take turns in front of the screen, and it also makes it much easier to play in front of the domestic telly, which usually doesn't rest on a table. But this hand-held design has disadvantages too. It is often difficult to maintain your bearings when you are controlling a screen object over two dimensions. It pays to try and keep the trigger pointed at the screen, so you can

	QUICKSILVER	ATARI	PRO-TEST INTERFACE	BBC
CONTROL ACCURACY	3	3	3	4
BUTTON RESPONSE	3	2	5	1
GRIP	5	1	4	1
CONSTRUCTION	4	2	5	2
PRICE	£11.95	£13.99 per pair	£25.00	£13.00 per pair
5 EXCELLENT	This panel rates what we consider the most important joystick capabilities of the joysticks featured in this round-up. The products actually varied quite markedly. Some, as can be seen, were good in one area and bad in another.			
4 V. GOOD				
3 GOOD				
2 FAIR				
1 POOR				

COMPETITION-PRO JOYSTICK

PRECISION
GAME CONTROL!

SPECTRUM JOYSTICK
NOW AVAILABLE FROM
WHSMITH

Outstanding Features

• Self centering stick • Super Strong nylon and steel construction, built to last. • A total of 8 directions plus 2 large fire buttons. • Arcade proven moulded leaf switches ensure incredible reliability. • For ZX Spectrum complete with optical interface which simply plugs into the Spectrum expansion port (with or without printer) ONLY £24.99 inc. VAT. • Full range of joystick compatible software for Spectrum Available from WH Smith. Books and leading computer shops or direct from us. • For VIC 20, Commodore 64, Atari 400 and Atari 800 only £14.50 inc. VAT.

Now Available

Conversion Tape I Only £4.95 - Converts seven leading arcade games to run with the Kempston joystick: *Horace Goes Skiing* - *Sinclair*, *Hungry Horace* - *Sinclair*, *Fight Simulation* - *Sinclair*, *Arcaida* - *Imagine*, *Penetrator* - *Melbourne House*, *Spectres* - *Bug Byte*, *Space Zombies* - *Mikrogen*.

Also

Conversion Tape II Only £4.95 - Converts: *Orbiter* - *Silversoft*, *Escape* - *New Gen*, *Tank* - *DK Tronics*, *Centipede* - *DK Tronics*, *Spectral Invaders* - *Bug Byte*, *Cruising On Broadway* - *Sunshine*, *Frenzy* - *Quicksilver* (Early Versions).

SOLE UK DISTRIBUTOR

KEMPSTON

MICRO ELECTRONICS

Dept PCN/9, 180a Bedford Road, Kempston, Bedford MK42 8BL

I wish to order the following:

Hardware

- ☐ Spectrum joystick inc. interface £24.99
- ☐ Spectrum joystick interface £15.00
- ☐ VIC 20, Commodore 64, Atari 400/800 Joystick £14.50

Spectrum Software

- | | | |
|--|-------------------|-------|
| <input type="checkbox"/> Astro Blaster | 16K Quicksilver | £4.95 |
| <input type="checkbox"/> Blind Alley | 16K Sunshine | £4.95 |
| <input type="checkbox"/> Cosmic Guerrilla | 16K Crystal | £5.95 |
| <input type="checkbox"/> Cosmos | 16K Abbeys | £5.95 |
| <input type="checkbox"/> Cyber Rats | 16K Silversoft | £5.95 |
| <input type="checkbox"/> ETX | 16K Abbeys | £5.95 |
| <input type="checkbox"/> Frenzy | 16K Quicksilver | £4.95 |
| <input type="checkbox"/> Frogger | 16K DJL | £5.95 |
| <input type="checkbox"/> Galaxian | 16K Arctic | £4.95 |
| <input type="checkbox"/> Gallop | 16K Campbell Sys. | £4.95 |
| <input type="checkbox"/> Jet Pac | 16K Ultimate | £5.95 |
| <input type="checkbox"/> Joust | 16K Softalk | £4.95 |
| <input type="checkbox"/> Knot in 3D | 48K New Gen | £5.95 |
| <input type="checkbox"/> Mazeman | 16K Adensoft | £5.95 |
| <input type="checkbox"/> Meteoroids | 16K Softalk | £4.95 |
| <input type="checkbox"/> Night Flite | 48K Hewson Cons | £5.95 |
| <input type="checkbox"/> PSSST | 16K Ultimate | £5.95 |
| <input type="checkbox"/> 3D Tunnel | 1648K New Gen | £5.95 |
| <input type="checkbox"/> Time Gate | 48K Quicksilver | £6.95 |
| <input type="checkbox"/> Sluggery Sid | 16K Silversoft | £5.95 |
| <input type="checkbox"/> Spookymen | 16K Abbeys | £4.95 |
| <input type="checkbox"/> Conversion Tape I | Kempsoft | £4.95 |
| <input type="checkbox"/> Conversion Tape II | Kempsoft | £4.95 |
| <input type="checkbox"/> Spectrum joystick interface only £15.00 | | |

Please tick appropriate boxes.

Prices include P&P and VAT. Overseas prices add £4.00 P&P

Total £

Cheques/Postal Orders should be made payable to Kempston (Micro) Electronics Ltd.

Name _____ Signature _____

Address _____

Please debit my Access/Visa* Account No. *Delete as applicable



QUICK-SHOT JOYSTICK

(COMMODORE APPROVED)

In 3 months our Quick-Shot Joysticks have become the best sellers for VIC and Atari Home Computers. We now have a range of conversions allowing you to use the Quick-Shot for your BBC Computer, Oric, Spectrum and Dragon.

For more information contact
DAVE BISHOP on: 01-203 6366

VULKAN ELECTRONICS



Are your finances driving you mad?

Do you find that working out your finances makes your head buzz? Do you see red?

Don't worry, now you can have Hilton's **Personal Banking System** on your side, giving you a clear head start and (hopefully) putting you back into the black!

Maintain permanent records and fully detailed statements of your finances including:

- ★ All cheque book transactions and bank receipts
 - ★ All standing order payments
- Automatically Processed** (monthly, quarterly, six-monthly or annually and for set number of payments)

In addition the ability to search, locate, delete or correct previous entries. List by category facility is included. Additional **Bank Reconciliation** module available to automatically match your Bank Statement to your **Personal Banking System** account. Full instructions included and **guaranteed** after sales maintenance provided.

- ★ **PBS ZX81 £8.95 (16K)**
- ★ **ZX SPECTRUM £9.95 (48K)**
- ★ **DRAGON £9.95 (32K)**

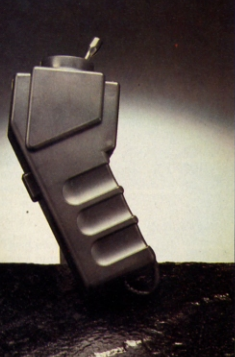
Bank reconciliation (for use with above) £5.
Ask for the PBS at your local computerstore.
(ORDER by POST (specifying machine))
OR at the POST OFFICE using
TRANSCASH ACCOUNT 302 9557

HILTON COMPUTER SERVICES

Hilton Computer Services Ltd
(Dept XX) 14 Avalon Road,
Orpington, Kent BR6 9AX

★ YOUR PBS IS NEVER OUT OF DATE ★

WORK TO RULE



The BBC joysticks are hand-held and offer good on-screen control, but the pistol grip is uncomfortable.

keep your stick movements oriented to what you expect to happen in the game.

Because these joysticks are hand-held, they use a different method to send information to the computer. Instead of the normal spring-loaded stick, which centres itself in a vertical position when left to its own devices, the BBC controller uses a pair of potentiometers to send information to the computer.

The computer interprets the signals from the potentiometers as directions for movement across an X-Y axis. To the user all this means is that the joystick moves evenly through about 90 degrees in two dimensions — there is no spring loading and this is eminently suitable for a hand-held controller.

It also gives the user more accurate control over the screen object. So much for the theory. In practice, we found that the joystick was fairly accurate, but comfort was another matter.

The pistol-grip area is a rectangular plastic moulding with little compromise for the shape of the hand. It is uncomfortable to use for any length of time, and the trigger mechanism is difficult to get to, unless you have the finger-reach of a concert pianist. The unit's construction can only be described as flimsy.

Although the BBC joystick is reasonably priced at £13, we would recommend 'hanging fire'. PCN will bring you other joysticks for the BBCs as they come to hand.

Item BBC Joystick Controller Interface BBC model A or B Price £13 per pair including VAT
Outlets Mail order from Acorn or through BBC micro dealers

At first sight, the subject of rulers seems an unpromising one for readers of PCN. But strange though it may seem, the humble ruler can be a valuable aid for many of the more mundane tasks users can find themselves up against.

Inmac is an American company which has been around long enough to concentrate on aids for programmers, and budding programmers, as well as on such things as disks and cables.

Perhaps the most obvious use for a ruler is during the study of program printout. The Data Hi-Lite Ruler is the simplest Inmac ruler, but is nonetheless a real help.

The Hi-Lite is 15 inches long, and is calibrated in sixteenths and tenths of an inch.

Read it right

Its main use, however, is the 'line window' which enables you to concentrate on one line at a time, when reading printout. This gives you an easy way of not misreading lines.

If you use a micro as a word processor, you may want to design a special format for your text. You will need to work out a way of getting the printer to follow it, and this can be a very tricky business.

The first time round, the tendency is to try the 'hit or miss' method — setting up the printer's parameters on screen and hoping that everything is going to come out the way you want it.

There is another way. The second of Inmac's aids, the Word Processing Ruler, enables you to work out the characters per inch, and see how they are going to come out on paper.

The Word Processing Ruler has seven scales in all. This is achieved by using both the front and back of the ruler, and by

leaving a transparent space along the middle.

Anyone who wants to design formats to set up documents on a word processor will save time with this ruler.

The scales include six, 12, and 15 characters to the inch, and each of the scales is numbered from 1 up, over a 14-inch length, and this gives 210 columns on 15 pitch as a maximum.

The third ruler, the Forms Design Ruler, is intended for systems analysts, programmers, and anyone who uses or designs computer printout for any purpose.

It is made of steel, and is 18 inches long, and considerable ingenuity has been used in its design. It has more facilities than the others which we have examined so far.

The Forms Design Ruler is calibrated in sixteenths and tenths, and holes have been made in the ruler which replicate exactly the 22 locations you must avoid if you are using standard 11 inch, 66 line paper.

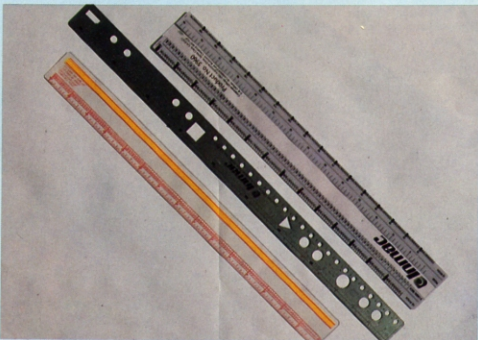
A punched card scale tells you how many cards there are in a set, to within five.

Handwriting scales are provided at 5, 4, and 3 characters to the inch. This makes it easier to design forms which are better human-engineered.

Various paper thicknesses are engraved on the ruler, so that you may adjust your printer more exactly. Metric scales are also provided, should you need them.

A square, circles, a triangle, and a punched card shape are all provided, to assist in minor flowcharting tasks, and standard (American) file hole spacing is also given, by perforation.

Items Data Hi-Lite Ruler, Word Processing Ruler, Forms Design Ruler Prices £2.50, £4, and £6 respectively Contact Inmac (UK) 09285-67551.



Inmac's rulers from right to left: the Data Hi-Lite, Forms Design ruler and Word Processing ruler.

Max Phillips picks up an IBM-compatible that approaches perfection — but then . . .

AJILE: PORTABLE STATE OF THE ART



The diminutive and sophisticated Ajile. 21lbs of IBM compatible computer that won't take up your desk.



The Ajile is state of the art personified. Anderson Jacobson's new machine is a superb IBM configuration in a sports bag that weighs less than an Osborne. An 8088, 246K RAM, twin 320K floppies, MS DOS, bundled software... this could just be the portable productivity tool.

First, a little background. The Ajile isn't really an Ajile. It's designed and built by the Canadian Dynalogue Infotech under the equally silly name of Hyperion. The established and much admired AJ became an OEM and was sole UK distributor. For three days.

Following a precedent set by DRG-Sirius and ACT business machines, who recently merged in order to sell a green and white striped machine called the Virius, Dynalogue, through Gulfstream (a subsidiary of its parent Bytec) is also selling the Hyperion here.

This explains at least half of the Hyperion name. And also why AJ is selling a machine with an 'Ajile' sticker on the front and the 'Hyperion' name throughout its documentation and software.

Presentation

The review Ajile arrived in its sporty carrying case plus a plastic bag full of manuals. The drawings therein tell of a well made shipping carton, complete with leads and so on.

One bright idea is the inclusion of a writable master disk as well as the usual notchless copy. So the novice can get on with the tutorial without having to plough through formatting and copying masters.

Documentation

The documentation is the first big letdown of the system, particularly if you read the manuals before using the machine. There are three big ring binders full — these are IBM-like in design, but not content. They're too big to carry round with the computer, so you also get a spiral bound pocket guide to stuff in the sports bag with the machine.

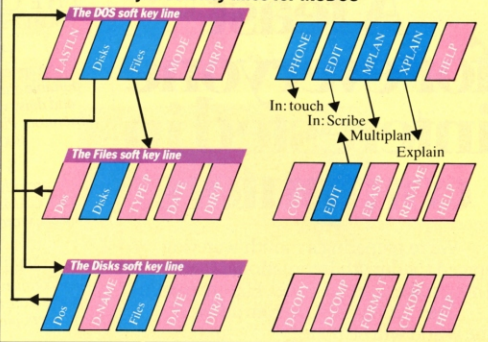
The whole lot looked as if it had been printed by a clapped out daisywheel running, I suspect, under Wordstar. It reads as if too little time was spent writing it. Artwork is limited to simple but helpful line drawings.

The manuals are aimed totally at the novice. There are some superb introductory pieces — at least three for each aspect of the machine — but they don't go on to give more helpful and advanced information.

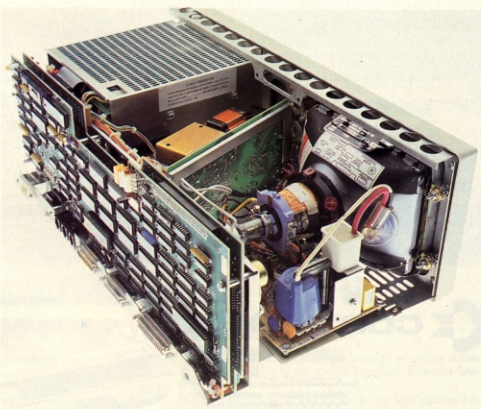
Thankfully, little has been done to the Basic and Multiplan manuals. The rest seem to run round in circles, and there are some lovely curiosities.

There's the inconsistent — a power light that changes from amber to red during the tutorial. There's the archaic — an octothorpe appears on the screen (prizes for the best drawing of an octothorpe on a postcard to...). Even the tragic — a page or two on Microsoft's inability to deliver GWBasic on time. It turned out to be on the disks! There's even a filler — 11 sides devoted to a table of the ASCII set.

Ajile soft key lines for MSDOS



A map of the Ajile's soft key lines for MSDOS



The Ajile's beautifully built and designed internals. It's awkward to open but it is built like a tank.

Nice computer, shame about the documentation. AJ and Gulfstream will do themselves a big favour if they sort out this mess.

Construction

But Dynalogue has produced a superbly designed and engineered portable. The Ajile is a single tiny unit incorporating screen, computer and disks. The detached keyboard slides underneath when not in use, and its tiny footprint is a real pleasure. The Ajile doesn't steal your desk and can easily be shifted on to the floor if you need the space.

AJ is proud that the design work was done by the team that did Lisa, and it certainly has the same ugliness. It's also a silly colour. Next time I change a printer ribbon I'll show you why.

Opening the Ajile proved to be something of a battle, involving at least six screws and two screwdrivers. But it is a portable, and needs to be well put together. Inside is quite a surprise — the monitor and disk drives take up most of the room, and the computer is tipped sideways on two boards at the back. There's plenty of air in the middle, complete with a small but not so silent fan.

A feast for everyone interested in computers.

We're preparing a mouth-watering spread for our 4th International Computer Show at the Cunard Hotel, Hammersmith.

Over 120 exhibitors from all over the world will be there.

Which makes this Show the biggest ever mounted in Britain by one computer manufacturer.

£3,000 WORTH OF EQUIPMENT TO BE WON

There's also £1000 worth of computer systems to be won every day at the Show.

COVER CHARGE

Admission to the Show costs only £1. Family tickets are also available for just £2.50.

And isn't that a small price to pay for a feast like this?

 **commodore**



I cannot attend but would like information on Commodore Computers (please tick box):

Personal ☐ Business ☐

Name

Address

Postcode

Post to: The Commodore Information Centre,
Dept. CS, 675 Ajax Avenue, Slough, Berkshire SL1 4BG.
Telephone Slough (0753) 79292.

Telephone

CSPCN0683

THE CUNARD HOTEL
HAMMERSMITH · LONDON W6 8DR

HARDWARE

An appetising array of new products, portable and hand-held computers, colour and daisy wheel printers, and full colour monitors. Plus the VIC 20, Commodore 64, 8000, 500 and 700 series.

SOFTWARE

A carefully chosen selection of games, CAD/CAM, information retrieval, spread sheets, word processors and educational software.

PERIPHERALS

As accompaniments to your main system, choose from the vast range of disk drives, printers, plotters, monitors and games accessories.



**THE COMMODORE
4TH INTERNATIONAL
COMPUTER SHOW**

THURSDAY JUNE 9TH · 2 PM - 6 PM
FRIDAY JUNE 10TH · 10 AM - 6 PM
SATURDAY JUNE 11TH · 10 AM - 5 PM

You were impressed by the unique portable Epson Computer that fits into your briefcase.



Now take a look at the one that sits on your desk.

The QX-10. A fully integrated Desktop Microcomputer System. A new member of the Epson family.

But there's more to the functional and stylish lines of this remarkable machine (just to prove that beauty isn't only skin deep).

The lightweight CPU, monitor and Keyboard units are very easy to use - even for a first time operator. You could say that our system takes all the hard work out of using software, and once used...you probably will.

What's more, when it comes to cost you'll find there's more power for your money.

Just look at these qualities.

192k upgradable to 256k RAM, Z80A CPU, RS-232C and parallel interfaces. CP/M and multifont BASIC comes as standard.

The QX-10 offers an incredible graphics capability. The 80 columns x 25 line display has 640 x 400 resolution and full bit image control for greater definition, 16:1 zoom and special effects.

Not to mention a unique split screen facility enabling different typesetters and graphics to be shown together. A major first for educational applications.

For even more power - simply slot in up to 5 optional interface cards for cassette, bar code reader, joysticks, sound generator, plus a Universal Interface card for developing your own interfaces. Clock, calendar and full battery back-up complete the system.

As with all the other respected Epson products, you are assured of high quality. (We even manufacture the slim line disc drives ourselves.)

So, at last there's a desktop microcomputer system that really works together. To really work for you.

See it soon. We know you'll be impressed.

QX-10

THE HUMAN COMPATIBLE BUSINESS MICRO

EPSON

Extraordinary product. Exceptional quality.

Epson (UK) Limited, Freeport,
Wembley, Middlesex HA9 6BR.
Freefone: 2730. Telex: 8814169

☐ I would like a demonstration of the QX-10.

☐ Please send me details and the name of my local stockist.

Name

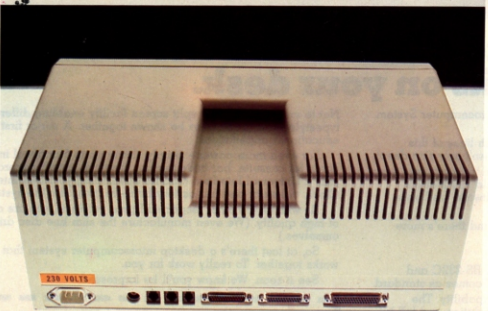
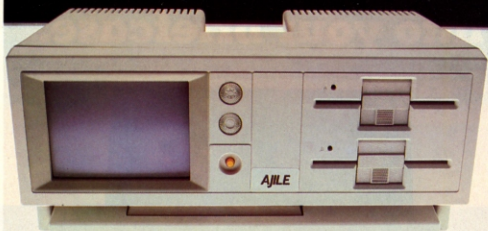
Position

Company

Address

Tel:

PCN 3-6



All around the Ajile. Top: the 7-inch screen, power light and twin disk drives. Middle: The PC-like keyboard with the vital ten function keys. Bottom: The curiously labelled interface ports. The slot in the top of the case is a convenient carrying handle for short trips.

Keyboard

The keyboard plugs into a little socket, which is at the back of a tiny hole, hidden in a dark recess in a slot underneath the machine. There's an access hole, apparently smashed in the case by an irate designer, but it still looks like something your dealer should fit. The manual hedges your issue, and says the keyboard should come plugged in.

It's one of those ghastly imitation PC keyboards that doesn't click and sags in the middle. It's like typing in a bowl of mushy peas. This is £3,000 worth of gear, but the keyboard makes it feel cheap and nasty.

The thing is nearly PC layout. There's two blocks of five function keys across the top, and these invariably correspond to the key labels displayed on the bottom line of the screen. In the gap in the label display there's a real time clock. An upwards arrow and octothorpe appear here to show when the keyboard is CAPS and NUM locked.

Screen

The screen is a 7in amber monitor, offering a fully featured 80 or 40 column screen and up to 640 x 250 high resolution graphics. There are brightness and contrast controls on the Ajile's fascia, and the display was perfectly workable, although the focus seemed a little off, with some characters a little blotchy and the left margin a little curved.

But it seems like heaven to an Osborne user. The screen times-out after three minutes without anyone touching the keyboard, and the Ajile goes into power down state, only to reawaken when you hit a key. This is presumably a safeguard against a bright image becoming a permanent feature of the monitor, and not an attempt to panic the user. You never see it when you are actually using the machine, but I hope that Dynalogue has remembered that mice don't use the keyboard!

Storage

The Ajile has two IBM compatible 320K floppies. In addition, Dynalogue has had a fiddle in the Bios to create a RAM drive configured as C:. This isn't as much fun as it sounds.

C: is normally 90K in size. A standard Autoexec batch file usually fills it on power on with standard MSDOS utilities. If you knock its size up to the maximum 160K, you run out of system RAM to run such trivia as the communications package and text processor. You also get around 13.5K free for Basic.

MSDOS 1 doesn't really understand RAM drives. So C: comes out only about ten times faster than floppies. If you had a one drive system, C: would be a great help. On a two drive machine, it's not that special.

Expansion

Round the back of the Ajile are seven numbered sockets. They are labelled like a washing machine, with ridiculous little drawings. Take your average new Ajile

owner and ask him to show you the parallel printer port. Is it two vertical lines next to each other? Or two vertical lines on top of each other? It's not that obvious, even if you *do* understand the difference between serial and parallel transmission.

There are three American phone jacks. Hyperions in the USport built in modems, and once the relevant blood sacrifices and daughters have been sent to you-know-who, AJ may be able to sort something similar out here.

Apart from an external monitor jack, the only other socket is the mysteriously labelled heap of dominoes. Yes! It's the expansion port. You'll be able to plug in a non-portable expansion bus, complete with IBM compatible slots, hard disks and so on.

Operation

The Ajile works, and works well. Switch on and it runs through 30 seconds of diagnostics and then boots MSDOS. This isn't your average common-or-Sirius MSDOS, but one that Dynalogic has done a fair amount of fiddling with.

Everybody else seems to be waiting for MSDOS 2 and its fabled — sorry, fabulous — user shell to give them a user-friendly computer. Dynalogic has put in a lot of work trying to make MSDOS 1 more presentable.

After C:, the most obvious tweak is the Ajile's reliance on soft key lines. The label line on the screen and the ten function keys are used to do most of the work, though the command line can be used normally. There's a mixture of MSDOS commands and keys that move to other soft key lines. CTRL and F10 (invariably the Help key) produces a complete map of all the current soft key lines.

Dynalogic has taken the soft keys right into the bundled packages, even throwing a label line across the bottom of Multiplan. Provided your hand to eye co-ordination is good enough, and you don't let your brain interfere, the soft keys work well.

It's not the world's friendliest system, but it does make life easier for the novice without destroying MSDOS's usual imitation CP/M command line. Dynalogic's version of the MODE command even lets you switch off the keys. It's certainly interesting to use a computer that goes the whole hog on soft keys — everyone else gave them up at least two weeks ago.

The Ajile is also rather good at Help. There's lots of it available, usually by pressing F10. Besides being able to get soft key and keyboard explanations, there's a full Explain command which will document most of the Ajile's features. Anyone who is reasonably confident can get away with Help and Explain and leave the manuals at home.

There have been other modifications to MSDOS: DISKNAME titles disks and ERASE replaces the usual DEL. ERASE has a P switch that prompts the user before deleting individual files. All in all, it's a competent and thoughtful implementation of MSDOS.

You get a complete set of development

tools, including the Macro Assembler that often gets lost somewhere between Micro-soft and the end user, and if it does turn up, usually does so with a price tag. As well as MASM, there's LINK, CREF, DEBUG, EXE2BIN and last and definitely least EDLIN.

There's a version of GWBasic, renamed BasicA to indicate that it's closer to IBM Basic than most GWs. The manual apologises for there being no BasicA, but an interim GWBasic instead. But it's nice to see that Dynalogic has kept its promise to supply BasicA when it becomes available.

There will never be an IBM compatible Basic, but Dynalogic BasicA is pretty close. No matter what its compatibility status, BasicA is one of the most powerful and useable interpreted Basics you can get your hands on.

Bundled applications packages include Multiplan, a communications package called In:Touch, and In:Scribe, ominously billed as a text processor.

Multiplan is very safe ground. Until 1.2.2 1/2 makes it to the UK in big numbers, Multiplan is as good a spreadsheet as you'll get both in ability and ease of use.

It's a bit strange to have the ten function keys thrown in as well — using Multiplan becomes a bit like flying the flight simulator. Thank heavens for mice.

In:Touch would be a lot more fun if I had a modem to try it out with. It combines the role of a phone book cum auto-dialler as well as more normal data communication facilities. When AJ sorts out a modem for the Ajile, I hope it throws in a Prestel/feletext emulator as well.

But the big mistake is In:Scribe. People who've copied the Osborne 'bundled software' tradition have frequently missed a vital point — Osborne doesn't bundle just software. It bundles good software, and In:Scribe just isn't what you'd expect it to be.

It's a superb on-screen text editor. It does amazing things like on-screen boldface, underline, sub- and super-scripting. It's fast, and provided you can work the soft keys, a relative doddle. But it's not a word processor. It can't print finished documents onto that old fashioned paper stuff.

I finally found out how you are supposed to print the documents. Drop back into MSDOS, stick CTRL-P on and TYPE the file! You can say goodbye to minor things like underlining, sub's n' supers, headings, page breaks and so on. You've also got to

be fast with the On-line/Off-line button on the printer, unless you want to finish your love letters with the note 'Press any key to continue'.

Very 2001 this. I want to take it into the street and hit it with a piece of bone. Why isn't In:Scribe a word processor? Maybe the print formatter isn't ready. Perhaps you are supposed to buy an Ajile for your friend and send him the file with In:Touch.

Whoever heard of a portable without a word processor? Come to think of it, whoever heard of a system text editor that could do on screen sub- and super-scripting? Buy an Osborne, it comes with Wordstar. Or at least add the price of Wordstar to the price of an Ajile.

One fish and many days of joy/prosperity for the first distributor, Gulfstream or AJ, to do something about this laughable mistake.

Support

This is the key to the Ajile's success. Its high price is only justifiable because it leaves margins for proper support. And proper support is what Anderson Jacobson is all about.

The Ajile will be supported by the same established nationwide network that handles AJ terminals. Contracts will include on-site repair and replacement. The Ajile can be bought outright, or leased.

Software is, of course, no problem. MSDOS and heavy IBM ability put it right where all the best software is, and is going to be. Not all IBM packages will run first time, but modifications should not be so major that they stop everything from being available.

Verdict

The Ajile is the real state of the art. It's not a revolution that's coming soon to a dealer near you. It's flesh and blood, 8088-based, IBM-compatible reality. It's a shame that mistakes like the cheapo keyboard, 24 hour documentation and In:Describable have to be made.

And the Ajile does need to be without mistakes. Its high price can be explained away, since it's roughly equivalent to a similar IBM set-up. But you don't compete with IBM, you undercut it. Machines like the Compaq and Corona are going to grab mass market status first. . . provided IBM itself doesn't beat them to it.

The Ajile will have to move, and move fast — on performance if not price. Simply to survive.

SPECIFICATIONS

Price: £4,100 inc VAT

Processor: 8088, 4.7MHz

RAM memory: 256K

ROM memory: 2K

Text screen: 80 x 25

Graphics screen: IBM resolutions, 320 x 250 and 640 x 250

Keyboard: 95 keys, detached, 10 functions keys, numeric keypad cum cursor cluster

Storage: Twin 320K IBM format floppy drives

OS/Language: MSDOS

Distributor: Anderson Jacobson, Slough 25172. Hyperion from Gulfstream, 04026-4926

Software supplied: Macro-Assembler, Basic, Communications package, non-printing word processor, Multiplan



GAMEPLAY

Each week in this section PCN tests the latest games for you to play.

ADVENTURE

SPECTRUM

Uphill struggle

Name Everest Ascent **System** 48K
Spectrum Price £6.50 **Publisher**
Richard Shepherd Software,
0628-21107 **Format** Cassette
Language Machine **Code** Outlets
Mail order from Richard
Shepherd Software, Freeport,
Maidenhead, Berks SL6 5BY.

Everest Ascent is described as an adventure-type game, but this is perhaps an overstatement. It lacks the complexities of a true dungeons and dragons adventure, and is relatively easy to crack. But it will still provide hours of entertainment and frustration.

Objectives

The object of the game is to climb Everest. You have an initial £1,000 to finance your expedition, and you can buy equipment and supplies, hire sherpas to carry it and build up to three base camps.

First impressions

It takes 20 days to scale the mountain, and play takes the form of two moves a day. There are numerous hazards to overcome, such as crevasses, rock-falls, thin ice, avalanches, and an abominable snowman. Different equipment is needed to deal with the hazards and you will find that above certain heights you need oxygen and heat pads.

As play progresses, your expedition gains international

recognition and donations come flooding in. The snag is that you have to return to the sherpas' village to collect the cash. But this does give you the chance to recruit more sherpas and buy more supplies.

Your strength rating is the key to the game. Too low and you could find a message flashing up telling you that the expedition is exhausted because of your dynamic leadership. You can increase your strength rating by hiring additional sherpas — some have higher ratings, but they expect to be paid more.

As seems typical for low cost games software, the cassette comes with the minimum of explanation. One irritating problem was the **LOADING** instructions, which were inadequate.

In play

Once **LOADED**, the program draws an animated picture of Everest with snow falling. I don't know what falling snow should sound like, but I'm sure it's nothing like the clicking coming out of the Spectrum's speaker.

Pressing any key takes you through a couple of pages of brief instructions. There then follow three pages that allow you to hire sherpas, buy equipment and buy supplies.

This takes you to the morning of the first day. Throughout the rest of the game, any response to a question leads to a graphic superimposed with text offering four options of what to do next.

My first expedition came to a grinding halt at the end of the



first day. I forgot to buy a tent. Returning to the village I tried to buy a tent only to be told that I had no money left! End of the first game, and a dawning realisation that careful planning was essential to success.

The next expedition fared a little better. At the start of the second day I ran into the first hazard. Needless to say I didn't have the required piece of equipment. Returning to the village I bought it and had carefully calculated that I should have £86 left. As I left the village, a message flashed up on the screen to say that I had run out of money.

In fact this problem was to happen again — on several occasions. This was no fault of mine, and I can only conclude that there was a fault in the program.

The other annoying problem I came across also lay with the way the program was written. I found that it was possible to get trapped by a hazard that appears where it should not be.

To give an example, I discovered that above a certain height, heat pads were required. In a subsequent game, I planned to build a base camp immediately below this height, and carry the heat pads up to it before returning to the village.

Everything went well. I reached the predetermined overnight point, and went through the procedure for setting up a base camp. The following morning I attempted to retrace my steps back down the mountain only to be confronted by a message 'heat pads required above this height'.

The aforementioned heat pads had of course been left at the base camp, so I tried going back, only to be told 'heat pads

required above this point'. No matter whether I tried going up or down the mountain, the same message flashed up on the screen. In the end that expedition collapsed exhausted 'because of my dynamic leadership'.

Further expeditions suggested alternative strategies, and eventually I stormed up the mountain accompanied by virtually all the sherpas available and carrying all the equipment I could buy. Incidentally, because of the international recognition, the expedition ended up with a nice £7,000 profit!

Having done it once I tried different permutations to do it quicker and more cheaply. It absorbed many happy hours of frustration as I tried to unravel the logic of the programmers. My only lasting disappointment was that no matter how hard I tried, I couldn't find a way of climbing the mountain single-handed without oxygen!

Verdict

The game is based on the challenge of climbing Everest using a big support team. It's easy to master the basic technique of playing the game while you're thinking out the winning strategy. Having found a solution the game could, for some people, lose its appeal, but you may enjoy trying to find different ways to reach the top.

A lot of thought has gone into the game, so it's a shame it's partially spoiled by some quirky features.

Ralph Bancroft



RATING
Lasting Appeal
Playability
Use of machine
Value for money



Sell your unwanted Software!

**80% of original price paid!
Any home micro!**

**Special opportunity to get into
games programming will be
enclosed with details sent!**

**Spectrum 16/48K - ZX81 - VIC 20 - Commodore 64
Dragon 32 - BBC A/B - Oric - Acorn Atom - Lynx
and Newbrain.**

Send for full details to:

COMPUTERHOUSE PCN

FREEPOST

ILFORD

ESSEX IG12BR

Name _____

Address _____



FOX ELECTRONICS

Presents Products:

For the Spectrum, The VIC-20, The Jupiter Ace and the ZX-81



The Fox **Spectrum Upgrade Kit** (for issue 2 machines only) takes your machine to 48K, no soldering required and full instructions supplied.

Unbeatable value at £24.00

Improve your games with the Spectrum **Joystick**. Professionally built from strong nylon and steel. A must for all games lovers. **ONLY**

£25.00
+ £1.00 P&P

New Sounds for your Spectrum with the **New Programmable sound generator**.

£19.95
+ 50p P&P

or inexpensively enhance existing sounds with a sound expansion for only £8.95 + 50p P&P.

Or let your Spectrum do the talking with the **Chatterbox** phonetic synthesis, unlimited vocabulary complete with

speaker/-amplifier and housed in a smart black box. **Also at**

£56.00
incl. P&P

New from FOX the Vixen RAM Cartridge for the VIC 20. Switchable between 16K or 8K + 3K gives you the option of full 16K RAM or 8K and 3K RAM in one pack.

Simply plugs into rear expansion port no re-addressing of existing basic programs needed only



£39.95 incl. P&P

Let your VIC 20 talk to you with the **New Chatterbox** speech synthesizer with an infinite vocabulary of spoken words.

Fully programmable and simply plugs into VIC or Motherboard. Includes a series of software routine in Eprom to facilitate the programming.

£57.00 incl. P&P

Coming shortly from FOX

THE TANDEM

Expandable expansion system, gives 4 expansion slots for VIC 20 cartridges. Custom designed case, plugs directly into computer. Further expanded by using Tandem system ROM socket. No extra power supply needed. **£33.00**

THE PACER

Uniquely expandable 16K RAM pack for the **Jupiter Ace**. Similar concept to ZX Panda. For more power to **Faster Forth** you need a **Pacer**. 16K expandable RAM £29.95 16K Module £19.95 incl.

Improve your Memory with the ZX Panda. The **uniquely expandable 16K RAM** pack. Simply expanded to 32K by insertion of a plug in module. Specially designed to eliminate wobble,

and complete with LED power indication 16K expandable RAM pack £19.95 incl. P&P 16K expansion module £14.50 incl. P&P or 32K complete for £34.45 incl. P&P



or go for the **Big Big** pack 64K only £50.00 **ZX81 Keyboard** (identical to Spectrum keyboard opposite again with ZX81 PCB fitting inside, again without soldering. A great buy at only **£29.95** + £2.50 P&P

ZX81 Keyboard No 2.

Alternatively, go for the stylish and efficient, pushbutton, precision moulded (ABS as per your ZX81) 3 coloured keyboard at an incredibly low price of Unit adheres direct to ZX key- **£10.00** board. No soldering required. incl. P&P

Coming Shortly

The Spectrum Echo. Volume and tone control. Load and Save without switching leads. Looks good, sounds good.

£23.50 incl. P&P

Send now to FOX Electronics 141 Abbey Road, Poppley 4, Basingstoke, Hants Catalogue available. Send SAE. All products guaranteed 1 yr. Overseas customers add a further £1.50 P&P to all items. Delivery 10-14 days.

OSBORNE

BUSINESS PACKAGES

- * Osborne 1 with double density disk drive
- * Printer
- * Amber/Green screen monitor
- * All leads
- * Free Software

INCLUSIVE OF MAILMERGE, WORDSTAR 3, SUPERCALC BASIC

SPECIAL OFFER £1,599 (plus VAT)

* Card Sort — this program will sort your cardbox files on any field of a card **£49.95**

GEM SYSTEMS LTD

(DEPT MCS)

2 CRAWFORD ROAD, HATFIELD,
HERTS AL10 0PG
TEL: (07072) 66148

For further information send coupon to:
GEM SYSTEMS LTD (Dept MCS)
2 Crawford Road, Hatfield, Herts AL10 0PG

NAME

ADDRESS

TEL:

PCN 1



Genie uncorked

The Colour Genie is just starting to roll off the production lines and into the living rooms of the nation. By a remarkable coincidence PCN suddenly finds itself with, if not a flood, at least a large trickle of software for the machine.

So, here's a round-up of what's on offer.

PONTOON

A This is a strong contender for the Worst Pontoon title — anytime, anywhere, for any computer. It is supposed to be the classic game dressed in science fiction trappings — a battle between the computer and a humanoid (that's you).

Even at the LOADING stage this game is on shaky ground. The first part of the programme LOADs under Basic control, but then the player must turn off the computer, turn it back on while holding down the MODSEL key and LOAD the remainder.

Not a good technique.

Once it's running, the game starts by displaying a dreadful title and shuffling the cards. To see your hand you press T for 'twist' then, if you wish, twist again, or S for 'stick'.

The computer then makes its selections until you are either beaten or you win. Unfortunately the program logic does not follow the standard rules of pontoon (as claimed). During play, I landed a Royal Pontoon — ace and queen — but the computer contemptuously claimed a win with a pair of eights and a five.

A game that would benefit from a total rewrite. A risky purchase until it's had one.

EXTERMINATOR

A Definitely not one for the ornithologists among you. The object is to kill a flock of hawkish birds in the first part, and then to destroy their eggs in the second.

Written in machine code, this game is fast, graphically good

and with sound in the arcade manner.

You move your laser about the screen, firing as you go, but control is a bit difficult because the authors chose some awkward keys for the operation. As if that were not enough, these unearthly birds unleash a rain of indestructible missiles.

Assuming you manage to get through this part, the second phase requires even greater skill. You must nip out of a safe area, grab an egg, dash back, destroy it, then repeat this performance.

Sound easy? It isn't — the eggs are protected by a variety of defences too numerous to mention.

Even though I didn't become too skilful at this game, I found it enjoyable and worth a go.

BLITZ

A This is yet another version of the arcade and pub standard in which you must land your crippled plane safely by bombing to smithereens an innocent city.

One, if not the only, good feature of this game is the chance to set your own skill level by varying the height of the city buildings and the number of planes with which to attempt your landing.

Essentially, it's all boringly repetitive and I am lost as to why a gravestone should greet your success.

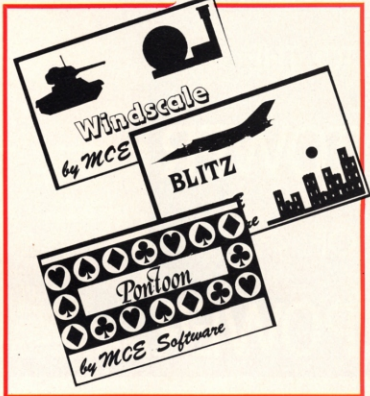
It's a shame that what was such a hit in the arcades should be reduced to the mundane by sluggish operation and limited graphics.

It would have been much better written in machine code instead of Basic.

GALACTIC

A As you might expect, this turns out to be a better Space Invaders type game with wave after wave of intergalactic manies dropping out of the sky.

What they are dropping on is you — the last surviving human in your Starfighter (fortunately



not the German version).

A comprehensive instruction page tells you all you need to know to play the game and the position of the operating keys is sensible, making it easy to play.

The aliens appear in the now obligatory wave formation at the top of the screen, dropping bombs all the while. However, not content with the old sideways shuffle, individuals in this bunch peel off and whizz about, adding to the hazards.

Things get increasingly difficult, the graphics and sound are excellent but games of this type have all but had their day.

WINDSCALE

A A simple game, this is a maze with a difference. You have to drive radio-active tanks around the screen and crash them into nuclear reactors without colliding with the trail they leave behind them on screen.

Skill levels can be set between 1 (hard) and 9 (easy) and you can choose the number of tanks and reactors. Although the game is simplicity itself, the variations make it quite challenging.

As the tanks move about, a

nice realistic geiger-counter sound is emitted, but eventually it becomes a bit wearing.

A good starter game with all the right features, graphics, sound and variation and at about the right price.

KONG

A I'm sure everyone has seen the arcade versions of this game which features a mad gorilla hurling barrels at the unfortunate, lovestruck wretch trying to rescue the damsel in distress at the top of the building.

To all intents and purposes this is identical to the arcade version with excellent graphics and sound and the whole gamut of ridiculous situations from which you must extract yourself and the Fay Wray caricature.

Nuff said?

Algray Software Algray House, 33 Bradbury Street, Barnsley, S Yorks. Exterminator Part 1 — The Birds, £7.95; Kong, £8.95. **MCE** 79 Ratcliffe Gate, Mansfield, Notts NG18 2JB, 0623-31202. Pontoon, £3.95; Blitz, £5.95; Windscale, £6.95. **Microbyte Software** 18 Hilgrove Road, Newquay, Cornwall, 06373-6886. Galactic Attack, £7.95.

PERSONA ZX

YOUR KEY

TO THE

TOWER

OF

POWER



You simply choose the following modules you want and plug them into the PERSONA and turn your ZX81 or ZX SPECTRUM into a total computing package ... into an ORGANIC MICRO.

PERSONA ZX81	£30.35
PERSONA ZX SPECTRUM	£45.00
RAM 08 (2K)	£24.50
RAM 16	£26.75
RAM 64	£76.25
MINIMAP	£35.95
DROM (2K)	£39.50
TOOLKIT	£22.20
PERICON a	£27.90
PERICON b	£33.75
PERICON c	£41.75
SONUS	£30.15

Options: USERFRONT	£8.00
Additional 2K for RAM 08	£6.50
Additional 2K for DROM	£7.50

Prices include VAT, Postage and Packing for U.K. deliveries. Overseas Orders: please add 15% to price for surface mail.

Post to: BASICare MICROSYSTEM LTD
12 Rickett Street, London SW6 1RU.
Tel: 01 - 385 2135



**BASICare
MICRO
SYSTEM**

**BASICare
OFFERS**

**RAM SWOP
OR £10.00 OFF**

Facility to reset a crashed system without pulling the plug

Reliable power connection plus battery back-up points for fail-safe operation

Controller to co-ordinate all peripherals

Circuitry to supervise and maintain memory add-ons

Power drivers to minimise loading on ZX81. More expansion with no troubles

Extra lines for one megabyte expansion

Extra sources of power supplies to eliminate overheating on the ZX81

Din 41612 standard connector. Perfect contacts for 64 gold plated connections

Gold plated connector for firm connection to the ZX81

4" of high quality ribbon cable at no extra cost

"...just 10 reasons why you need a ZX81 PERSONA"

ORGANIC MICRO BETTER_{by} DESIGN

Visit our stand (No.606) at the "COMPUTER FAIR" in Earls Court, London between 16 - 19th June, and take advantage of one of these special offers! *

1. We will exchange your Sinclair or Memotech 16K RAM pack for our RAM 16 module, when you purchase a PERSONA.
2. If you have a 16K RAM pack of any other make, we will pay you £16.75 for your RAM pack, if you purchase a PERSONA module.
3. If you do not have a RAM pack, we will allow you £10.00 discount on the PERSONA module.

*These offers are available to personal callers at our stand. Your RAM pack must be presented at the stand and be in working order and reasonable condition. We reserve the right to reject any equipment deemed to be unsuitable for the purpose of these offers.

GRID STRATEGY

JUPITER ACE

Tightly Packed

Name Micro Maze System Jupiter Ace 3K **Price** £6.50 **Publisher** Hi-tech Computer Software **Format** Cassette **Language** Forth **Other versions** None **Outlets** Mailorder from Hi-tech, 42 Cranleigh Drive, Whitfield, Dover, and dealers

It's a real challenge to produce a reasonable game for a 3K Ace. But Micro Maze from Hi-tech isn't just reasonable. It's something of a challenge. For £6.50, you get a good fraction of Pacman on your very own Ace.

Packaging is neat, complete with cover illustration. The cassette bears the name 'Micro-soft' as well as Hi-tech. Surely not the Microsoft? Instructions are complete enough to get you over the rather devious LOAD-ing procedure.

One slight hitch, though. 'LOAD GRAPHICS' should be in lower case. Beyond that, Micro Maze loaded and ran first time.

Objectives

Your sole aim in Micro Maze is to gobble as many radioactive dots as possible. Why radioactive I don't know. They look like perfectly ordinary dots to me. You're pursued, accurately if not relentlessly, by a couple of alien-looking aliens.

There's no power/pep pills and no chasing baddies. That's the bit that got sacrificed to the Ace memory shortage. But there are four levels of play.

If you're tough enough, clearing a whole screen of dots produces another, each with ever smarter aliens. And Hi-tech has been kind enough to include a couple of extra mazes on the tape once you've eaten the first.

In play

Micro Maze does play well, considering the space it's playing in. Typing 'RUN' starts you off in the top left hand corner and you rush round under the slightly chaotic control of the four arrow keys.

Graphics are fast and smooth, though sound is limited to a regular unchanging bleep for every square moved, plus an unglamorous raspberry when you lose. This could do with the odd pep pill.

There is a running score in the corner of the screen so a test for dots being eaten must be being made.

Even though it is an utterly simple game, it is fun and challenging. The only letdown was my ability to jam the terrible twins in the tight corners of maze 2. I could clean up before being forced to go close enough to coax them back.

Verdict

Micro Maze is a fun 3K. If you can't afford a RAMPack, it's worth more than a five-minute novelty. Hopefully, when you get a RAMPack, Hi-tech will put as much care into some 16K programs.

Max Phillips

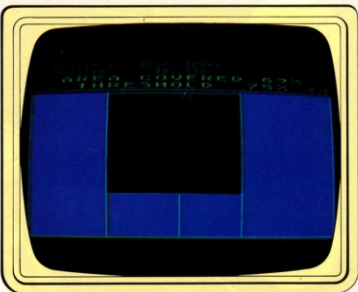
RATING

Lasting appeal

Playability

Use of machine

Overall value



ATARI

Lines of defence

Name Qix System Atari 400 and 800 **Price** 29.99 **Format** Cassette **Language** machine code **Other versions** None **Outlets** All Atari dealers.

Qix is the latest in a long line of Atari releases based on popular arcade games. Its appearance as a cartridge for the Atari 400 and 800 computers comes after the traditional year or two of bench-testing in the country's arcades.

Objectives

You control an Etch-a-Sketch type line on the screen and must manoeuvre it to capture territory. You do this by drawing rectangles at either fast or slow speeds, and the territory you capture is 'painted' in red or blue on the screen.

Opposing this voracious video imperialism are the Qix and the Spax. The Qix are spikey balls which roll around the screen and the Spax are little sparks which travel along the lines you have drawn. If the Qix 'hits' you while you're trying to fill in a square of territory, you lose a life.

If you hang back from capturing territory to avoid the Qix, the Spax will travel along your video trail and again end your on-screen dynasty.

When you capture 75 per cent or more of the screen, you get bonus points and a new screen. After two such screens you have to combat two Qix at once and the pace of the game quickens. The closer you get to capturing

100 per cent of the territory before the screen changes the more bonus points you get.

First impressions

Although it's a marketing gimmick the company uses on many of its packages, I still object to having a 3in x 2 1/2in game cartridge enclosed in a box three times that size.

In play

I experimented with a number of the wilder playing possibilities to begin with. I tried drawing slowly a line straight across the screen to capture territory in the higher-scoring red colour. I was battered by the Qix and lost a life.

I then reverted to the conservative incremental strategy where you build up small blocks of territory before making a big sweep to one of the screen walls and capturing a big chunk.

It didn't take more than an hour or so before I hit on a guaranteed, rock-solid way of getting high scores. I simply drew a short vertical line, and then a long horizontal line—an 'L' turned 90 degrees to the left.

I then trapped the Qix in the 'L' and completed the capture of the territory at the top and right of the screen.

Verdict

Qix gets boring pretty quickly once you have the time to figure it out at home. This is one of those rare beasts that makes a great arcade attraction because it holds your interest for the short periods but fails when you play it at length in the home.

Geoff Wheelwright

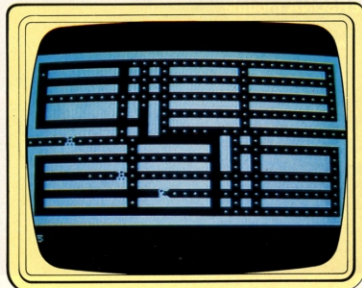
RATING

Lasting appeal

Playability

Use of machine

Overall value



The Cheapest Rampacks In The World

Available Now

ZX SPECTRUM 32K RAMPACK

Simply plugs into user port at rear
of computer and increases your
16K Computer instantly to 48K

£39.95

- Fully Compatible with all accessories
- No need to open computer and invalidate guarantee
- Why send your computer away and wait weeks for upgrade
- Fully cased, tested and guaranteed.

ZX81 16K RAMPACK £19.75
ZX81 64K RAMPACK £44.75

**JUPITER ACE
16K RAMPACK £24.95**

All Units: Fully Cased and Guaranteed. Secure No Wobble Design.
Fully Compatible with all accessories.

ZX SPECTRUM HOLDALL
to protect your computer from dust, dirt
and grime. During storage and transport. **£7.99**

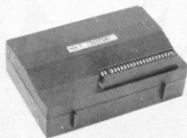
PRICE INCLUDES VAT and P&P. Delivery normally 14 days. Export orders at no extra cost.

Send cheque/P.O. Payable to:-

CHEETAH

MARKETING LTD.
DEPT PCN.
359 THE STRAND
LONDON WC2R 0HS
Tel: 01-240 7939
Telex: 8954958

16K ZX81 Ram Packs now available at larger branches of **John Menzies**



BAUST COMPUTING CONSULTANTS

31 Peak Lane • Fareham • Hants • PO14 1RX
Tel: Fareham (0329) 281480

PROGRAMS FOR TRS-80

(Please state model (I or II) and memory size. Level 2 only)

GAMES

MONOPOLIST: Let an extra player, timorous or daring, join in playing the famous family game 'MONOPOLY'. Note that the MONOPOLY game is not included with the program. Instructions include cassette **£7.95** ssd/d mini-disk **£12.95** inclusive of packing, post & VAT.

WHAT NEXT? MOTH'S NEW WORLD: Three games to excite, tantalise, amuse you and your friends. **WHAT NEXT?** Helps you predict your opponent's next move. Think about the opportunities that presents! **MOths:** With a fitting moth eat your basket threadbare before it builds up its home!

NEW WORLD: Populates a hemisphere with new continents and islands. Each new world is different. Three in-one price. Instructions include: cassette **£3.95**, ssd/d **£6.95**, ssd/d **£7.45**. Prices include packing, post & VAT.

EDUCATION

ARITHMETIC: Irresistible supply of test problems; program adapts to your weak points. Set your own difficulty limit. Scores displayed every ten tests. Instructions include: cassette **£7.95**, ssd/d mini-disk **£12.95** inclusive of packing, post & VAT.

SPELL-IT: Let your children learn spelling at their own pace. Build-up your own question pages, have what subjects you wish, add more whenever you like. Instructions include: cassette **£7.95**, ssd/d mini-disk **£12.95** inclusive of packing, post & VAT.

BUSINESS

QUICK-CHANGE: Price list editor: prices of single entries or whole lists changed by user chosen factors. Minimum system required: 16K level 2. Prices state memory size for diskette system. Instructions include: cassette **£3.95**, ssd/d mini-disk **£12.95** inclusive of packing, post, VAT extra.

COMMISSE-82: Calculates commission pay for those in small businesses. No statutory deductions. Instructions include: cassette **£3.95**, ssd/d mini-disk **£12.95** inclusive of packing, post, VAT extra.

BSQUOTE-81: Business quotations, improve them, extend with consistency yet have flexible adjustment factors. Comes with a 30 line library page with built-in masks, create others as you need. Recalibrate/cancel any pages. Run WHAT-C analyses, optimisation questions, maximise profits. Requires 48K, twin disk systems. Program and operating instructions. Mini-diskette **£79.95** plus VAT.

NEWS-80: Purpose written **NEWSAGENTS'** retail accounting package. All practical features for 280 to 2600 accounts. BILLING, CHARGES, INVOICES, HOLDING COSTS, B&O, D&B, etc. Use in the office or at the counter. System requirements: 48K, twin ssd/d diskettes and printer/Model or III. Program and operating instructions for version 2 (other versions available) Mini-diskette **£39.95** plus VAT.

OPERATING SYSTEM

MINORS: Authorised subset of Apparat's NEWOS®. This can be supplied if required to run above 40 track disk packages; model only. Includes NewDOS. Included ssd/d mini-disk **£15.00** price includes packing, post & VAT.

BUY THE BEST TWILLSTAR COMPUTERS



ORIC-1
THE REAL COMPUTER
SYSTEM 48K ONLY £155.00
INC VAT

NEW
EPSON FX80 ONLY £395 + VAT
EPSON MX100 ONLY £395 + VAT
SEIKOSHA GP 100A £185.00 + VAT
SEIKOSHA GP 250X £230.00 + VAT
CP80 £299.00 + VAT

IN STOCK

BBC

BBC MOD A 299.00
BBC MOD B 399.00

DISK DRIVES

ONLY £195.00

Disk Interfaces
Business Software
Education Software
Entertainment Software

BBC Software from:
Acorn Soft, Gemini,
Bugbyte, IJK, Superior
Software, Program
Power, MP Software

Dragon 32 ONLY £195.00
INC VAT

NEW SPECIAL OFFER
Now connect a Daisywheel
Typewriter/Printer to your BBC
SILVER-REED £344 ONLY
£395.00 + VAT
(inc. serial or parallel interface)

commodore COMPUTERS

Printer Cables, Leads, Disks, Stationery,
Cassettes, Ribbons, Dust Covers and
Wide Range of Software for all
Computers.

COLOUR MONITORS
14" IBM/itek £250.00
GREEN MONITOR
Zenith £95.00 inc VAT

**COMPUTER BOOKS & ELECTRONIC MAGAZINES
SOFTWARE, HARDWARE SUPPORT/SERVICES/RENTALS**

CALL IN FOR FURTHER DETAILS
TWILLSTAR COMPUTERS LTD
17 REGINA ROAD, SOUTHALE, MIDDX
TEL: 574 5271 (24 hours)
OPEN 10am-8pm SIX DAYS A WEEK



THE WIZARD'S WARRIORS: A fast moving game that matches developments in your skill as a player by becoming increasingly more devious. By offering to you the full range of options you can choose how to control your warrior through the maze. A full implementation of this program enables such features as a continuous series of sound effects, arcade quality graphics, double-point scoring, and-for the very artful-bonus lives

FORTH: A full implementation. Ideal for writing fast moving arcade type games. Allows the full colour and sound facilities of the Spectrum to be used. Future Microdrive enhancements will be made available.

ADVENTURE ONE: Features a save game routine as the game can take months to complete.

"A remarkably good version ... well worth the money." ...*Sinclair User*...

MAZEMAN: A fast action m/c game that reproduces the spirit of the original "is very accurate and fast." ...*Which Micro?*...

CHESS 1.4: Ten levels of play with this m/c program. Good graphic screen display.

"In a class of it's own." ...*Your Computer*...

INVADERS: Very fast m/c action. Includes mystery ship and increasingly difficult screens.

Spectrum £4.95

Spectrum £14.95

ZX81 £5.95

Spectrum £4.95

ZX81£4.45

ZX81 £5.95

ZX81£4.45

7 MAES AFALLEN, BOW ST., DYFED, SY24 5BA

24hr Ansaphone 0970 828851



TRS 80 MOD II OWNERS

Turn your 8-Bit into a 16-Bit machine for £699 + VAT

Add CPM86 and CPM86 applications software becomes available £799 + VAT (inc board)

Easy to install

Complete documentation

8MHZ 8088 Processor with option for an extra 8087 Co-Processor

128K standard RAM expandable to 256K

CBasic available
£941 + VAT (inc board + CPM86)

Supercalc available

MICROWRITER HAND WORDPROCESSOR £485 + VAT

DATAPOWER

24 hr

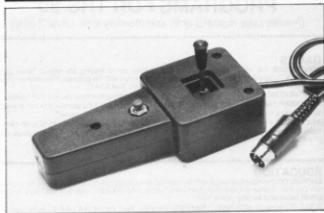
01 437 5994

01 439 9967

21 CORK ST LONDON W1X 1HB

From the people who really know.....

JOYSTICKS



NOW AVAILABLE

Joysticks for:

Dragon

BBC

Tandy

Vic

Atari

ZX81

Spectrum etc.

Self centring microswitch joysticks in the same case as our popular pot types. Available with a variety of plugs to suit most popular micros, and interfaces (shortly) for, Spectrum and ZX 81, these light action precise mechanism give rapid, ultra reliable control of all your favourite games.

Ask at your local dealer or distributor, or in the event of any difficulty contact us direct.

Features: Compact size, precise action, long life, and competitive prices. Made in England by Flight Link, specialist manufacturers of joysticks for nearly 20 years.

UK and export enquiries invited



FLIGHT LINK CONTROL LTD

UNIT 12, THE MALTINGS, TURK STREET,

ALTON, HANTS.

Telephone: Alton (0420) 87241 Telex: 858623 Talbur

PCN ProgramCards

A bumper bundle of PCN ProgramCards this week — 11 cards for you to cut out and keep.

It's nice to see that you've taken us up on our request for more diverse programs for a wider range of machines. This is reflected in the first Atari program to find its way into this section.

This week

From a far-flung outpost of the computer world — well, Wiltshire really — comes an entertaining program for the 48K Oric-1. Tim Green, aged 16, of Trowbridge, will no doubt manage to tug at the heartstrings of most of you with his all-action game Cupid.

This will set all you sentimentalists and romantics pounding away at your keyboards, and you'll be glad to know that the Programs Editor, a somewhat less than romantic character, was none too clever at this one.

In stark contrast is the Dragon 32 game from MP Croucher, of Havant, Hants,

called Alien. This program is primarily designed for joystick use, but for those without this facility the modifications necessary to convert it to keyboard operation are included in the program notes at the end of the last card.

The program requires the player to negotiate his/her way through randomly generated stars to destroy half-a-dozen aliens. The variable skill levels in the program make life somewhat difficult with the creation of up to a hundred stars to avoid.

How many of you, we wonder, got caught up in the tension of the television programme *Danger — UXB* — all about defusing bombs? If you enjoyed that and feel that you have the 'right stuff' then Time-Bomb from the deft fingers and furtive mind of P Lister, Bradford, is just for you.

Written for the Atari 400/800 range of machines it combines both joystick and keyboard controls for the player to produce an exciting arcade-type game.

The first two ProgramCards of this game are included this week and it will be completed next week. Something to look forward to, eh?

There's money in them programs

Are we to assume that most of you are not interested in receiving financial rewards for the fruits of your computerised labours? Surely not!

Well, the answer is to send in your program, on disk or cassette, with a plain paper listing and brief notes.

Once this is done you can look forward to seeing it in print, thereby increasing your economic standing at our standard rates.

Give us a RUN for our money.

Contributions should be sent to: Programs Editor, *Personal Computer News*, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

All disks and cassettes will be returned, at our expense, after consideration or publication.

PCN ProgramCards

Cupid

Card 1 of 5

8313C1/5

An entertaining game for romantics

```

1 CLS: DIM NW(11): DIM LL(11): GOSUB 4000
2 GOSUB 5000
3 GOSUB 5090
4 PRINTCHR$(17)
5 S=0: L=3
6 IF A$="N" THEN LET M=10
7 IF A$<>"N" THEN CLS:M=3
8
9 PLOT 9,W,"WHAT SKILL LEVEL (2-9)"
10 PLOT 12,W+2,"2=EASY 9=HARD"
11 GET A$: H=VAL(A$)
12 IF H<2 OR H>9 OR H=INT(H)<>0 THEN 1000
13 CLS:PAPER0: INK3
14 X=0: Y=1: B=13: P=0: W=0
15 FOR U=1 TO 24
16 PLOT U+1,1,"1"
17 PLOT 1,U,"1": PLOT 25,U,"1"
18 PLOT 0,1,4
19 IF UC>1 THEN PLOT 0,U,4: PLOT3,U,23: PLOT24,U,16
20 NEXT U
21 U=93
22 FOR E=1 TO 10+H: GOSUB 2000: B=INT(RND(1)*4)+1
23 FOR J=1 TO INT(RND(1)*8)+1
24 LET Y=Y+(B*2)-(B=1): LET X=X+(B=4)-(B=3)
25 IF SCRN(X,Y+1)<>32 AND B<3 THEN Y=Y+2
26 IF SCRN(X+1,Y)<>32 AND B>2 THEN X=X+2
27 IF X>23 THEN X=4
28 IF X<4 THEN X=23
29 IF Y<3 THEN Y=23
30 IF Y>24 THEN Y=3
31 PLOT X,Y,"2"
32 NEXT J:NEXT E
33 FOR A=1 TO H
34 GOSUB 2000
35 PLOT X,Y,"8"
36 SOUND 1,130-(Y*5),15:PLAY 1,0,5,2500:WAIT 10
37 NEXT A
38 PLAY 0,0,0,0
    
```

Oric-1 48K

Oric Basic

Application: Game

Author: Tim Green

- | | |
|---------|--|
| 1-3 | Dimension arrays for notes, lengths; define characters, display title and instructions |
| 4 | Turn off cursor |
| 5-7 | Set score and lives, work out print position |
| 9-12 | Get skill level |
| 15 | Clear screen |
| 16 | Initialise variables |
| 20-60 | Print border in blue, background black |
| 65 | Code of down arrow |
| 70-86 | Loop to print trees up/down/left/right, not in same place |
| 87-90 | Keep tree on screen |
| 99-100 | Finish loops |
| 170-191 | Loop displays men at random positions, random sound |

The TI 99/4A Home Computer

This microcomputer is based on TMS9900 16 bit microprocessor. It includes 16K RAM, 16 colour high resolution graphics (192x256). The screen display is 32 characters, 24 lines TI-BASIC. Full size keyboard. For Software there are about 1,000 Programs to choose from. There are a lot of peripherals available e.g. Disk Drives, Disk Interface, Speech Synthesiser, Extra RAM, Additional Languages (PASCAL, TI-LOGO, ASSEMBLER).

TI 99/4A for just £149.95
TWO SPECIAL OFFERS
OFFERS END JULY 2nd 1983

WHEN YOU BUY SIX SOFTWARE MODULES TEXAS INSTRUMENTS WILL SEND THE SOLID STATE

FREE!

SPEECH SYNTHESISER OR THE

T.I. PROGRAM TAPE RECORDER
Hurry! This Offer Ends on 2.7.1983

PLEASE
 SEND A
 LARGE
 S.A.E.
 FOR
 DETAILS

WHEN YOU BUY A TI 99/4A HOME COMPUTER TEXAS INSTRUMENTS WILL SEND YOU

FREE!

A PAIR OF JOYSTICKS,

Connect Four Games Cartridge and Beginners Basic Tutor Cassette. (approx value £50)
 Hurry! This incredible offer ends on 2.7.1983

TI SOFTWARE

ENTERTAINMENT SOFTWARE

	Media	Inc VAT
Paras	Module	£25.95
Tri-Investors	Module	£17.95
Blackjack 1	Module	£20.95
Mini-Challengers	Module	£12.95
A-Maze-Ing	Module	£17.95
Connect-It	Module	£17.95
Soccer	Module	£20.95
Fortnite City	Module	£20.95
Wumpus	Module	£17.95
Zero Zap	Module	£17.95
Attack	Module	£17.95
Blade	Module	£17.95
Hustle	Module	£17.95
Yarforce	Module	£17.95
Blackjack Poker	Module	£17.95
Car Wars	Module	£17.95
Munchman	Module	£25.95
Chess	Module	£34.95
Adventure & Pirate	Module	£25.95
Othello	Cassette	£25.95
Alpiner	Module	£25.95
Christmas Trail	Module	£25.95

ADDITIONAL ADVENTURE PROGRAMS TO BE USED WITH THE ADVENTURE MODULE

Adventureland	Cassette	£17.95
Mission Impossible	Cassette	£17.95
Voodoo Castle	Cassette	£17.95
The Court	Cassette	£17.95
Strange Odyssey	Cassette	£17.95
Mystery Fun House	Cassette	£17.95
Pyramid Fun House	Cassette	£17.95
Pyramid of Doom	Cassette	£17.95
Ghost Train	Cassette	£17.95
Savage Island 1&2	Cassette	£17.95
Golden Voyage	Cassette	£17.95

TI APPLICATIONS

Speech Editor (speech required)	Module	£17.95
Statistics	Module	£44.95
Terminal Emulation II	Module	£44.95
Programming Aids I	Cassette	£17.95
Programming Aids II (contains text to speech)	Disk	£11.50
Programming Aids III	Disk	£17.95

TI HOME COMPUTER HARDWARE

Title	Description	Price Inc VAT
-------	-------------	---------------

TI99-4A Complete with UHF modulator and power supply £149.95

PERIPHERALS When used with selected modules will produce electronic speech £41.95

Speech Synthesizer This unit takes all card peripherals and on internal disk drive £144.95

System Disk Drive - Internal 52K formatted drive, mounts internally in Peripheral Expansion System £199.95

Disk Controller Card Controls up to 3 Disk Drives, complete with Disk Manager Command Module £149.95

Disk Drive Double Sided 52K formatted capacity per side acts as 2 drives DSK1 & DSK2 total capacity 184K bytes £219.95

Disk Drive External Complete with own case, power supply & connecting cables £259.95

RS232 Expansion Card Provides 2 Serial RS232 Ports, and one parallel port for interfacing £109.95

RAM Adds 32K bytes extra RAM bringing total capacity to 48K bytes £124.95

P-Code Card Includes the UCSD-PASCAL P-Code interpreter £189.95

Matrix Printer 80 column matrix printer with RS232 and centronic parallel interface £219.95

GP25X Printer 80 column, 100 CPS matrix printer £320.85

Accessories Wired remote controls £19.95

Cassette Recorder Wirelessly record to computer via £25.95

Cassette Lead Allow Connection to cassette recorder £9.95

TI 99/4A Complete with UHF modulator and power supply £149.95

PERIPHERALS When used with selected modules will produce electronic speech £41.95

Speech Synthesizer This unit takes all card peripherals and on internal disk drive £144.95

System Disk Drive - Internal 52K formatted drive, mounts internally in Peripheral Expansion System £199.95

Disk Controller Card Controls up to 3 Disk Drives, complete with Disk Manager Command Module £149.95

Disk Drive Double Sided 52K formatted capacity per side acts as 2 drives DSK1 & DSK2 total capacity 184K bytes £219.95

Disk Drive External Complete with own case, power supply & connecting cables £259.95

RS232 Expansion Card Provides 2 Serial RS232 Ports, and one parallel port for interfacing £109.95

RAM Adds 32K bytes extra RAM bringing total capacity to 48K bytes £124.95

P-Code Card Includes the UCSD-PASCAL P-Code interpreter £189.95

Matrix Printer 80 column matrix printer with RS232 and centronic parallel interface £219.95

GP25X Printer 80 column, 100 CPS matrix printer £320.85

Accessories Wired remote controls £19.95

Cassette Recorder Wirelessly record to computer via £25.95

Cassette Lead Allow Connection to cassette recorder £9.95

We are the official dealers for Texas Instruments, BBC Microcomputer/Acorn Computers, Y.E. Data Business System and Torch Computers. We also stock wide range of printers, monitors and disk drives. Please Phone 0279 443521 for our lowest prices.

AKHTER INSTRUMENTS LTD.

DEP PCN, EXECUTIVE HOUSE, SOUTH ROAD, HARLOW, ESSEX, UK CM20 2BZ
 TEL: HARLOW (0279) 412639 OR 443521. TELEX: 995801-A18

ORDERING INFORMATION

All orders which accompany a cheque or cash are CARRIAGE FREE (UK ONLY). A carriage charge of 3% of invoice total is applicable to BARCLAYCARD & ACCESS orders. We accept VAT FREE Export orders. Please phone or write for shipping cost. We accept official Government and Education authority orders.

PCN ProgramCards

Cupid

Card 2 of 5

8313C/5

```

192 FOR D=2 TO 24:B=INT(RND(1)*4)+1
193 IF B=1 THEN G$="["
194 IF B=2 THEN G$="]"
195 IF B=3 THEN G$="{"
196 IF B=4 THEN G$="}"
197 PLOT D,25,G$:NEXT D
199 PLOT 13,26,"["
200 PLOT 1,0,"SCORE:      TIME= 100 [["
205 PLOT 23,L,0,"
206 PLOT 7,0,STR$(S):PLOT 7,0,3
210 GOSUB 2050
220 FOR T=100 TO 0 STEP-1
223 IF R=1 THEN 340
225 P$=STR$(T)+ "
230 PLOT 18,0,P$:PLOT 18,0,3
240 FOR CC=1 TO 9-INT(H/2)
250 GOSUB 400
260 FOR DEL=1 TO 5-INT(H/3):NEXT DEL
270 NEXT CC
280 PLOT X,Y," ":X=X+X:Y=Y+Y
290 IF X>23 THEN X=4
293 IF X<4 THEN X=23
296 IF Y<2 THEN Y=24
300 IF Y>24 THEN Y=2
310 IF SCRN(X,Y)=35 THEN GOSUB 940
320 IF SCRN(X,Y)=64 THEN GOSUB 1100
325 IF P=H THEN R=1:E=T
330 PLOT X,Y,CHR$(U)
340 NEXT T

```

```

350 IF R=1 THEN 6000
360 GOTO 6200
400 K$=KEY$
410 IF K$="" THEN 480
420 PLOT G,26," "
430 IF K$=" " THEN 510
440 IF K$="v" THEN S=G-1
450 IF K$="h" THEN S=G+1
460 IF G<2 THEN G=24
465 IF G>24 THEN G=2
470 PLOT G,26,"["
480 RETURN

```

192-199 Loop displays arrows at bottom of screen

200-206 Display score, time, lives left

210 Start game
220 Time loop
223 All men shot? Loop again
225-230 Display time left
240 Start delay loop
250 Check for key pressed
260-270 End previous delay, start new loop
280 Erase arrow, calculate new position
290-300 Keep arrow on screen

310 Hit tree? Execute explosion routine
320 Got him! Execute bonus routine
325 If all men shot, set variables
330 Print appropriate arrow
340 Decrease time and loop again if not finished
350 All men shot? Execute cleared sheet routine
400-420 Get key pressed, erase arrow at bottom
430 Change direction
440-450 Move arrow at bottom left or right
460-480 Keep on screen, print arrow and end routine

PCN ProgramCards

Cupid

Card 3 of 5

8313C/5

```

510 IF W=23 THEN 6200
520 JJ=SCRN(G,25)
530 IF JJ=93 THEN XX=0:YY=1
540 IF JJ=91 THEN XX=0:YY=-1
550 IF JJ=125 THEN XX=-1:YY=0
560 IF JJ=123 THEN XX=1:YY=0
570 IF JJ>33 THEN W=W+1
575 IF JJ>33 THEN U=JJ
580 PLOT G,25," "
590 GOTO 470
940 EXPLODE:FOR DEL=1 TO 50:PLOT X,Y,"X":PLOT X,Y,"_":NEXT DEL
950 PLOT X,Y," ":L=L-1:PLOT 23+L,0," "
960 IF L=0 THEN 6200
970 GOSUB 2050
980 RETURN
1000 MUSIC 1,2,1,15:PLAY 3,0,5,2500:WAIT 5:PLAY 0,0,0,0
1010 GOTO 9
1100 FOR I=1 TO 50:PLOT X,Y,"\":PLOT X,Y," ":NEXT I:PLOT X,Y,CHR$(U)
1110 P=P+1:S$=P:H$=S+SS:PLOT 29,2,"BONUS OF":PLOT 31,4,STR$(SS)
1120 PLOT 31,4,3:PLOT 28,2,3
1130 FOR I=0 TO 30
1140 FOR K=I*7 TO 30
1150 SOUND 1,K,15:PLAY 1,0,5,2500
1160 NEXT K
1170 NEXT I
1175 FOR K=50 TO 1 STEP-1:SOUND 1,K,15:PLAY 1,0,5,2500:NEXT K
1178 PLAY 0,0,0,0
1180 WAIT 1000:PLOT 29,2," ":PLOT 31,4," ":PLOT 7,0,STR$(S)
1185 PLOT 7,0,3
1190 RETURN
2000 X=INT(RND(1)*22)+5:Y=INT(RND(1)*22)+3
2010 IF SCRN(X,Y)<>32 THEN 2000
2020 RETURN
2050 GOSUB 2000:IF SCRN(X,Y)<>32 THEN 2050
2060 PLOT X,Y," ":X=0:YY=1:U=93
2070 PLOT 28,2,"PRESS 'F'":PLOT 29,4,"TO FIRE"
2075 PLOT 27,2,7:PLOT 28,4,7
2080 GET A$
2090 IF A$="F" THEN PLOT 28,2," ":PLOT 28,4," "
2097 IF A$<>"F" THEN 2080
2098 RETURN

```

510 All arrows used? End game
530-575 Change direction and arrow

580-590 Erase direction arrow and end routine
940-950 Explosion, lose life
960 As510
970 Fire new arrow

1000-1010 Make rude noise if bad input
1100-1120 Print flashing heart and bonus. Update score

1130-1178 Bonus noise

1180 Erase words and continue game

2000-2020 Select random empty position

2050-2098 Select new arrow position and fire arrow

ORIC
SOFTWARE

TANSOFT

NEW

ORICMON

A complete machine code monitor including memory assembler/disassembler, block move and verify, trace and slow-motion run and full cassette handling, plus manual.
£15.00 inc VAT and 90p postage and packing
16k or 48k

ORIC MUNCH

Our best arcade game yet. Can you fight off the ghosts, eat the power pills and catch the elusive fruit. An exciting game that will keep you amused for hours.
£7.95 inc VAT and 40p postage and packing
48k

3D LINK 4

A set of new exciting and challenging games: Hammer, Moonlander, Substrike, Roadrace and 3D Noughts and Crosses.
£9.90 inc VAT and 40p postage and packing
48k

HOUSE OF DEATH

If you were baffled by Zodiac you will be terrified by House of Death. Can you discover the secret of the haunted house and escape with your life?
£9.99 inc VAT and 40p postage and packing
48k

ORIC BASE

This is a database system used for the maintenance of personal and small business information. It is supplied on cassette with a comprehensive manual. A sophisticated query language is used to manipulate data and allow reports to be printed, data to be sorted or moved about and running totals to be kept. A Macro command facility allows the creation of application specific command strings which can be used easily by non-technical personnel. Requires a 48k machine.
Price: £14.50 including VAT and 90p postage and packing

ZODIAC

A traditional adventure game in which the player has to find the 12 cunningly hidden signs of the Zodiac which lead him to greater treasures. The player manipulates objects through simple sentences which the program can understand and can ask for his score at any time. A save game feature is also included. Requires a 48k machine.
Price: £9.99 including VAT and 40p postage and packing

ORIC-CHESS

Using high resolution graphics to display the chess board this package will play a challenging game of chess with five levels of skill. The computer looks ahead for its own moves plus its opponent's. The skill level dictates how far the computer looks ahead although at the expense of more time. All chess rules including Castling and En Passant are obeyed. Requires a 48k machine.
Price: £9.99 including VAT and 40p postage and packing

ORIC FORTH

This is a cassette-based implementation of FC-FORTH, the language distributed by the Forth Interest Group in the United States. It has been extended to utilise the graphics and sound capabilities of the Oric. It is supplied with an editor and a full Forth assembler. A 90-page manual is included in the package. A demonstration music program is also supplied. Requires a 48k machine.
Price: £15.00 including VAT and 90p postage and packing

ORIC OWNER MAGAZINE, £10

Why should you subscribe to **ORIC OWNER**? Your Oric 1 is one of the most powerful low-cost computers on the market today. **Oric Owner** is the only magazine totally dedicated to the Oric and its supporting hardware and software. From issue to issue **Oric Owner** is able to bring you in-depth information on the Oric, advance news on the latest add-ons, superb programs to try and, behind the scenes' interviews with the engineers who designed it. If you wish to keep ahead of the latest developments and news on the Oric then **Oric Owner** is essential. At only £10 for a year's subscription of 6 issues (£15 for overseas readers) can you afford to be without **Oric Owner**? **SUBSCRIBE TODAY!**

Calling all Software Writers.

If you can write top quality games, business or utility software we want to hear from you. Haven't got an Oric? Convince us of your capability and we will supply one!

Dealer Enquiries Welcome

Please send me	Quantity	Total
ORIC FORTH at £15.00		
ORIC BASE at £14.50		
ZODIAC at £ 9.99		
ORIC-CHESS at £ 9.99		
ORICMON at £15.00		
HOUSE OF DEATH at £ 9.99		
3D LINK 4 at £ 6.90		
ORIC MUNCH at £ 7.95		
ORIC OWNER MAGAZINE at £10.00		
TOTAL		

● Please include money for postage.

This amount varies with each item.

Please allow 28 days for delivery

All cheques payable to:

TANSOFT LTD

3 CLUB MEWS

ELY

CAMBS

CB7 4NW

Please send me latest price list

Name

Address

Cupid

Card 4 of 5

8313C4/5

```

4000 FOR Y=1 TO 10
4001 READ A:FOR I=A TO A+7
4005 READ F:POKE I,F
4010 NEXT I:NEXT Y
4015 DATA 46344,63,63,63,63,63,63,63,63
4020 DATA 46360,4,14,4,31,4,63,4,4
4030 DATA 46592,31,21,31,4,31,4,10,17
4040 DATA 46808,0,4,14,21,4,4,4,0
4050 DATA 46824,0,4,4,4,21,14,4,0
4060 DATA 47064,0,4,2,31,2,4,0,0
4070 DATA 47080,0,4,8,31,8,4,0,0
4080 DATA 46816,0,10,31,31,14,4,0
4085 DATA 46376,33,18,8,35,8,18,33,12
4090 DATA 46840,9,42,24,2,49,4,19,33
4100 FOR Y=1 TO 8:READ NT(Y):READ TS(Y):READ LT(Y)
4110 NEXT Y
4120 DATA 10,4,15,10,4,15,8,4,12,5,4,12,3,4,12,1,4,12,10,3,18,10,5,
15
4130 FOR Y=1 TO 11:READ NN(Y):READ LL(Y)
4140 NEXT Y
4150 DATA 8,15,5,5,10,6,8,8,5,8,8,5,8,5,5,4,10,4,8,10,5,11
4160 RETURN
5000 CLS:PAPER:IN#3
5005 PLOT 13,10,"CUPID'S ARROW":PLOT 13,9,"CUPID'S ARROW"
5010 PLOT 12,10,10:PLOT 12,9,10
5011 WAIT 300
5015 RETURN
5090 CLS:PAPER:IN#3
5100 PLOT 7,1,"DO YOU WANT INSTRUCTIONS":PLOT 15,3,"Y" OR "N"
5110 GET A$:IF A$="Y" THEN 5130
5120 RETURN
5130 FOR DEL=1 TO 20:READ SI:READ I#
5140 FOR IN#0 TO LEN(I#)-1:PLOT IN+SI,DEL+4,MID$(I#,IN+1,1)
5150 FOR NN=1 TO 10:NEXT NN:NEXT IN:NEXT DEL
5160 DATA 1,In this game you are Cupid the famous,2
5170 DATA god of love.You have come down from,1
5180 DATA the heavens on a mission to shoot your,2
5190 DATA arrow through the hearts of many men,3
5200 DATA turning them into romantic Romeos.,1
5210 DATA You are equipped with three arrows for,1
5220 DATA the complete game.You lose 1 each time,2
5230 DATA it hits a tree.But beware because if,1
5240 DATA you don't convert all of the men into,1
5250 DATA Romeos within the time limit then,1
5255 DATA you will be sent back up to heaven.If,3

```

4000-4090 Routine to define characters

4100-4160 Read notes and lengths for notes

5000-5015 Routine for title page

5090-5250 Print instructions if required

5255-5310 Remainder of instructions

Cupid

Card 5 of 5

8313C5/5

```

5260 DATA you do then you will stay down on,1
5270 DATA Earth a bit longer so as to reconvert,1
5275 DATA even more men.You can change direction,1
5280 DATA by putting the arrow at the bottom of,3
5285 DATA the screen behind any arrow that is,1
5290 DATA pointing in the required direction and,7
5295 DATA then press the space bar.,4
5295 DATA Key V.....Moves cursor left.,4
5297 DATA Key M.....Moves cursor right.
5300 PLOT 8,25,"PRESS ANY KEY TO CONTINUE":GET K$
5310 RETURN
6000 SS=INT((E/2)+H)
6020 S$=S$S
6025 PLOT 27,1,"*****":PLOT 27,5,"*****"
6030 PLOT 27,2," MISSION ":PLOT 27,4,"*COMPLETED*"
6033 PLOT 27,3,"* " :PLOT 26,3,3
6035 PLOT 26,2,3:PLOT 26,4,3:PLOT 26,1,3:PLOT 26,5,3
6040 PLOT 27,8,"SUPER-BONUS":PLOT 32,9,"OF"
6045 PLOT 26,8,6:PLOT 31,9,6
6046 IF SS>99 THEN LET R=30
6047 IF SS<100 THEN LET R=31
6050 PLOT R,11,STR$(SS):PLOT R,11,7
6055 R=0:H=H+1
6060 FOR TT=190 TO 140 STEP-1:SOUND 1,TT,15:PLAY 1,0,5,2500:NEXT TT
6070 FOR M=1 TO 8
6080 MUSIC 1,TS(M),NT(M),15:MUSIC 2,TS(M)-1,NT(M),15:PLAY 3,0,5,250
0
6090 WAIT LT(M)/2:PLAY 0,0,0,0
6100 IF M=2 THEN WAIT 12
6110 IF M=7 THEN WAIT 25
6120 NEXT M
6140 WAIT 500:CLS:GOTO 15
6200 PLOT 23,0," " :PLOT 28,2,"GAME OVER":PLOT 27,4,"AGAIN (Y/N)"
6205 PLOT 27,2,6:PLOT 26,4,2
6206 WAIT 15
6210 FOR M=1 TO 11
6220 MUSIC 1,4,NN(M),15:MUSIC 2,3,NN(M),15:PLAY 3,0,5,2500
6230 WAIT LL(M)/2:PLAY 0,0,0,0
6235 IF M=6 OR M=7 THEN WAIT 2
6240 NEXT M
6245 PLOT 26,6,7
6250 GET A$
6260 IF A$="Y" THEN 5
6270 IF A$<>"N" THEN 6250
6280 PLOT 27,6,"OK GOODBYE."
6290 PLOT 26,6,7
6380 END

```

6000-6055 Display Mission Completed and bonus. Update score

6060-6120 Play tune for sheet cleared

6140 Wait, then start new sheet
6200-6206 End of game

6210-6240 Play tune for game over

6245-6300 Play new game or finish

AMDEK BY Roland DG

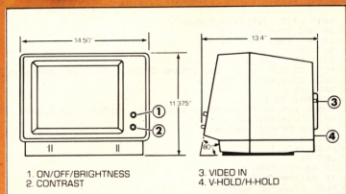
**The clear
choice for text
and high
resolution
graphics!**



Everything about the Amdek 12" Video-300 monitor is designed for easy reading and operation. It's compatible with practically every computer or word processing system including the popular Apple & IBM computers.

Video-300 Fact Sheet

ITEM	SPECIFICATIONS
CTR	12" diag. 90° deflection angle
CTR	Etched non-glare, green or amber
Signal	Composite video input
Input Signal	1.0 Vp-p, sync negative
Input Impedance	75 ohms
Scan Frequencies	Horizontal: 15.75 KHz. Vertical: 50/60 Hz
Display Size	210 (W) x 158 (H) mm
Deflection Linearity	Horizontal: 10% Max. (refer to EIA ball chart and dot pattern). Vertical: 8%
Video Response	18 MHz (± 3 dB)
Resolution	Centre: 900 lines. Corners: 800 lines
Power Source	120/220 V Convertible 50/60 Hz
Controls	See diagram (focus, sub-brightness, H-size V-linearity and +B adjustment are on PCB)



Alien

8313A1/4

Card 1 of 4

A full arcade-type game with joystick use. For keyboard operation see end of card 4. These instructions allow cursor controls and space bar for "torp" firing. NB: SAVE this program before running.

```

10 REM *****
20 REM % ALIEN %
30 REM % FOR %
40 REM % DRAGON 32 %
70 REM *****
80 CLS
90 PRINT @ 237,"ALIEN"
100 SCREEN0,1
110 FOR T= 255 TO 1 STEP -10
120 SOUND T, 1
130 NEXT T
140 CLS
150 PRINT PRINT" THE OBJECT OF THE GAME IS"
160 PRINT PRINT" TO DESTROY ALL SIX ALIENS."
170 PRINT PRINT" THE ALIENS ARE IN THE ",CHR$(239)," SHIPS"
180 PRINT PRINT" YOU CONTROL THE ",CHR$(207)," SHIP"
190 PRINT PRINT" YOU HAVE 300 GALLONS OF FUEL &"
200 PRINT PRINT" 10TORPS TO COMPLETE THE MISSION"
210 GOSUB 1550
220 PRINT PRINT"YOU SCORE TEN POINTS FOR EACH"
230 PRINT PRINT"ALIEN DESTROYED.A BONUS IS"
240 PRINT PRINT"GIVEN IF ALL THE ALIENS ARE"
250 PRINT PRINT"DESTROYED"
260 PRINT PRINT"THE MORE TORPS AND FUEL LEFT"
270 PRINT PRINT"AFTER DESTROYING THE ALIENS"
280 PRINT PRINT"THE HIGHER THE BONUS"
290 GOSUB 1550
300 PRINT PRINT TAB(12),"BEWARE"
310 PRINT PRINT " HITTING A STAR WITH A TORP"
320 PRINT PRINT " OR COLLIDING WITH A STAR OR"
330 PRINT PRINT " ALIEN WILL DESTROY YOU"
340 GOSUB 1550
350 PRINT PRINT" THERE ARE TEN LEVELS OF PLAY"
360 PRINT PRINT" LEVEL ONE IS THE EASIEST"
370 PRINT PRINT" TO START GAME PRESS ANY KEY"
380 PRINT PRINT" AFTER ENTERING SKILL LEVEL"
390 GOSUB1550

```

Dragon 32
Dragon Basic

Author: M P Croucher

```

80          Clear screen prior to start
90          Initial heading
100         Set screen initial attribute
110-130     Annoise!

140         Clear screen again
150-390     Display instructions for game and
            start

```

Alien

8313A2/4

Card 2 of 4

```

400 CLS:PRINT:PRINT:PRINT:PRINT
410 GOTO 1480
420 POKE65495,255
430 DEF FNB(C)=&H3FF+&C
440 DEF FNB(C)=PEEK(FNB(C))
450 DEF FNC(C)=PEEK(&FF00)
460 LET B=&6:LET F= 10: G=1
470 AS=&"CDEFGH":BS=&"T25501V31"
480 FORT=1T010
490 S=&B+&AS
500 NEXT T
510 CLS0
520 FORT=1T0 (SL*10)
530 S= RND(470)
540 IF PEEK(1056+S)<>128 THEN 530 ELSE POKE1056+S,42
550 NEXT T
560 FOR T=0 TO 6
570 AKT)=(RND(400)+60)
580 IFT=0 THEN S=&HC2 ELSE S=&HE2
590 POKE 1023+AKT),S
600 NEXT T
610 PRINT @ 0,"FUEL TORPS ALIENS"
620 TI=TIMER
630 IF G=1 THEN TI=0
640 IF F=0 OR TI>3000 THEN 1260
650 TI=300-INT(TI/10)
660 S=INT(TI/100)*POKE1023+6,112+S
670 S=INT(TI/10)*S+(S/10-INT(S/10))*10
680 POKE1023+7,112+S*(S/10-INT(TI/10))*10*POKE1023+8,112+S
690 IF F=10 THEN S=1 ELSE S=0
700 POKE1023+16,112+S
710 IF F=10 THEN S=0 ELSE S=F
720 POKE1023+17,112+S
730 POKE1023+28,112+S
740 IF G=0 THEN 780
750 IF INKEY$="" THEN 750
760 G=0
770 TIMER=0
780 C=RND(8)
790 POKE&H7D00,RND(4)
800 POKE FNB(C),&H80
810 LET AK(7)=&C
820 GOSUB 970

```

```

400         Clear screen and move cursor
            down 5 lines
410         Perform "skill level" input
            routine
420-500     Define functions and assign
            variable initial values

510         Clear screen and set
            background colour.
520-550     Place stars (by skill level)
            randomly

560-600     Place Alien ships

610         Heading line
620-730     Sets initial values and displays
            them

740-770     Routine to start game after
            parameters setup

780-810     Select alien ship to move and
            move it

820         Perform routine to move ship

```

OSBORNE

BEAT THE PRICE RISE

DOUBLE DENSITY £995
80 COLUMN D.D. £1195

EPSON FX80 £365
DAISYWHEEL from £425
MONITOR £89

(Prices + VAT & Delivery)

DISCOUNTS ON 2 OR MORE

WE SPECIALISE IN OSBORNE AND
WE ARE AUTHORISED MAIN DEALERS

Fraser Associates Ltd.

1 Brasse Hill Buckingham Bucks MK18 1EZ
Tel. Buckingham (0290) 816087

DON'T MISS THIS INCREDIBLE OFFER!

50 GAMES



YES, 50 GAMES! on cassette for all
the following:

FOR YOUR MICRO

GALACTIC ATTACK
SPACE MISSION
LUNAR LANDER
FLAHERTY
STARTER
RADAR LANDING
ATTACKER
GALACTIC DOGFIGHT
ZION ATTACK
IVASIVE ACTION
DND
BUGGLES
MONTY
SKI JUMP
HANGMAN
OLD BONES
THIN ICE

MAZE EATER
DRETTIN
MOTORWAY
FORCE FIELD
WIN
TUNNEL ESCAPE
BARREL JUMP
CANNONBALL BATTLE
OVERTAKE
SMASH THE WINDOWS
SPACE SHIP
JET FLIGHT
PHASE
INTRUDER
INFERNO
GHOSTS

SUBMARINES
ROCKET LAUNCH
PLANETS
BLACK HOLE
DYNAMITE
DO YOUR SURV
DEMY DASH
SPACE SEARCH
UNIVERS
RATS
TANKER
PARACHUTE
JETTABLE
HIGH RISE
THE FORCE
EXCHANGE

Sinclair
SPECTRUM
ZX81 LYNX
DRAGON
ATARI
VIC-20

Apple (ON DISC & CASSETTE)
BBC A/B
ORIC-1
CASCADE/UTS
GROUP



U.T.S.

P.O. BOX 96,
53 LINCOLN GROVE,
HARRIGATE,
N. YORKS.
YO3 2UZ.

SUPPLY CASSETTE 50 FOR _____ COMPUTER
I enclose cheque/P.O.

Name _____
Address _____

MAIL ORDER ONLY

ORDER NOW!

THE HOME COMPUTER

We specialize in Micro-Computers for
home and business

CURRENTLY IN STOCK

BBC MODEL 'B'	£399.00	ORIC-1 (48K)	£169.95
DRAGON 32	£199.95	ZX SPECTRUM (16K)	£125.00
NEW/BRAIN MODEL A	£269.10	ZX SPECTRUM (48K)	£175.00
NEW/BRAIN MODEL AD	£299.00	ATARI 400	£159.99
		ATARI 800	£399.99

In addition we stock a huge range of software for the Dragon,
Newbrain, BBC Micro, VIC20, and ZX 81/SPECTRUM.

We also have a large varied selection of books.



COMPUTASOLVE LTD.

MICRO COMPUTER SYSTEMS FOR THE MODERN BUSINESS

8 Central Parade, St. Marks Hill, Surbiton, Surrey.

Telephone 01-390 5135

Open 9.30 - 18.30 Monday-Saturday

All about the MICRO

100s of latest books for
everyone from beginners
to professionals.

- Programming from Machine Code to High Level.
- Games and Graphics, techniques and programs.
- Hardware technology and design.
- Operating Systems.
- Business applications and many more
- Fast Service

Books Books Books!

Free Catalogue

to: **Book Choice**, Dept WK, 1 Melling Road,
Southport, Merseyside PR9 9DU Tel: 0704 32230



Alien

Card 3 of 4

8313A3/4

```

830 IF FNB(C)=&H2R THEN R(C)=R(7)
840 IF FNB(C)=&HC2 THEN 1260
850 POKE FNB(C),&HE2
860 LET C=0
870 IF JOYSTK(0)=&H3F THEN POKE&H7D00,1
880 IF JOYSTK(0)=0 THEN POKE&H7D00,2
890 IF JOYSTK(1)=&H3F THEN POKE&H7D00,3
900 IF JOYSTK(1)=0 THEN POKE&H7D00,4
910 IF PEEK(65280)=126 OR PEEK(65280)=254 THEN 1060
920 POKE FNB(C),&H80
930 GOSUB 970
940 IF FNB(C)=&H80 THEN 1260
950 POKE FNB(C),&HC2
960 GOTO 620
970 ON PEEK(&H7D00)GOTO 980,1000,1020,1040
980 R(C)=R(C)+1: IF INT(R(C)/32)-(R(C)/32)=0 THEN R(C)=R(C)-31
990 RETURN
1000 R(C)=R(C)-1: IF INT(R(C)/32)-(R(C)/32)=0 THEN R(C)=R(C)+32
1010 RETURN
1020 R(C)=R(C)+32: IF R(C)>&H1E0 THEN R(C)=R(C)-&H1E0
1030 RETURN
1040 R(C)=R(C)-32: IF R(C)<&H40 THEN R(C)=R(C)+&H1C0
1050 RETURN
1060 LET R(7)=R(0): LET C=7: LET F=F-1
1070 FOR U=1 TO 5
1080 IF FNB(C)=&HC2 THEN POKE FNB(C),&H80
1090 GOSUB 970
1100 SOUND 100,1
1110 IF FNB(C)=&HE2 THEN 1170
1120 IF FNB(C)=&H2R THEN 1260
1130 POKE FNB(C),&H2E
1140 NEXT U
1150 POKE FNB(C),&H80
1160 GOTO 620
1170 POKE1023+R(C),128
1180 IF B=1 THEN 1340
1190 FOR X=1 TO B
1200 IF R(7)=R(X) THEN Y=X
1210 NEXT X
1220 IF R(Y)>R(B) THEN R(Y)=R(B)
1230 B=B-1
1240 PLAY B#
1250 GOTO 620

```

830-850 Print new ship position

860-920 Move player's ship and fire options by joystick. See end of card 4 for keyboard replacement lines

930-940-960 Perform routine to move ship
Print ship in new position

970-1050 Routine to work out new positions of all ships and torps

1060-1160 Routine to fire torp and check for hit

1170-1250 Routine to remove Alien from array to suppress print

Alien

Card 4 of 4

8313A4/4

```

1260 FOR T=50 TO 1 STEP -4
1270 SOUND 2:NEXT T
1280 CLS
1290 PRINT TAB(7); "YOU WERE DESTROYED"
1300 PRINT:PRINT "YOU MANAGED TO DESTROY";(6-B);"ALIENS"
1310 PRINT:PRINT TAB(7); "YOUR SCORE WAS";(6-B)*10
1320 IF (6-B)*10>HS THEN HS=(6-B)*10
1330 GOTO 1430
1340 FOR S=1 TO 5
1350 FOR T=1 TO 50 STEP 4
1360 SOUND T,1
1370 NEXT T:NEXT S
1380 CLS
1390 PRINT TAB(4); "WELL DONE YOU DESTROYED:" PRINT:PRINT TAB(8); "ALL THE ALIENS"
1400 S1=(TI*F)+60+TI*F
1410 PRINT:PRINT TAB(7); "YOUR SCORE WAS" S1
1420 IF S1>HS THEN HS=S1
1430 PRINT:PRINT TAB(8); "HIGH SCORE IS ";HS
1440 PRINT:PRINT TAB(11); "PLAY AGAIN"
1450 SCREEN0,1
1460 T$=INKEY$: IF T$="" THEN 1460
1470 IF T$="N" THEN END
1480 PRINT:PRINT TAB(2); "ENTER SKILL LEVEL NOW (-)"
1490 SCREEN0,1
1500 S1$=INKEY$: IF S1$="" THEN 1500
1510 S1$=INKEY$: IF S1$="" THEN 1510
1520 S1$=S1$+S1$
1530 SL=VAL(S1$): IF SL<1 OR SL>10 THEN 1480
1540 SCREEN0,0:GOTO 420
1550 PRINT @ 482; "PRESS ANY KEY TO CONTINUE"
1560 SCREEN0,1
1570 IF INKEY$="" THEN 1570
1580 CLS
1590 RETURN

```

1260-1330 Routine to play sound and display message plus score when player's ship is destroyed

1340-1420 Routine to play sound and display message plus score when 'mission' complete

1430-1470 Display highest score, option to play again or end

1480-1540 Routine to allow the input of skill level. NB must be input as 2 digits

1550-1590 Routine to allow key-stroke for continuation of game

The succeeding lines of program are only to be used for keyboard operation. Cursor controls move ship, space fires torp

```

865 S1$=INKEY$: IF S1$<>" " AND S1$<>CHR$(32) THEN S2$=S1$
870 IF S2$=CHR$(9) THEN POKE &H7D00,1
880 IF S2$=CHR$(8) THEN POKE &H7D00,2
890 IF S2$=CHR$(10) THEN POKE &H7D00,3
900 IF S2$=CHR$(94) THEN POKE &H7D00,4
910 IF S1$=CHR$(32) THEN 1060

```

ELEWATER™ the DRAGON 32 Word Processor

TELEWRITER

The Elewater is the powerful word processor designed specifically for the DRAGON 32 computer. It can handle almost any word processing job and is extremely easy to use. It has all the advanced features you need for reports, letters, memos and print and format of text. With Elewater you can quickly produce perfect, finished copy for letters, reports, memos, articles, technical documentation, letters, notices, certificates, reports, etc. It is also a flexible and efficient way to take notes or organize ideas and plans.

51" x 24 DISPLAY

The DRAGON 32 is an incredible personal and portable computer, but for text editing it has some major drawbacks. The small 12 character by 16 line screen format shows you too little of the text and, combined with lack of lower case letters, hampers readability for the user. Look no further than the page. Reserve value in place of lower case letters.

Elewater eliminates these shortcomings with its **hardware modification** required. By using software alone, Elewater creates a screen format that has **full lower case letters**, and puts 24 lines of 71 characters on the screen. That's more than twice the screen space of the DRAGON 32. That's more than double the DRAGON 32's standard display.

FULL SCREEN EDITOR

The Elewater editor is designed for maximum ease of use. The commands are simple and single key strokes (most are F, J, and C) and easy to remember. There is no need to switch between menu modes and delete mode and cursor movement modes. You simply type. What you type is inserted into the text at the cursor, on the screen. What you see on the screen is what you type. You can move quickly through the text with one key command at all 4 directions, or previous key commands for key, auto-repeat. You can jump to the top or bottom of the text, and beginning or end of a line, move forward or backward a page at a time, or scroll quickly up or down. When you reach the end of the line, the wordwrap feature moves you cleanly to the next line. You can move or delete any block of text, search repeatedly for any pattern of characters, then insert, delete or replace with another. Elewater does it all.

With a price of just £199.00, Elewater is the most powerful word processor available for the DRAGON 32.

The only one with all these features for your DRAGON 32

51 column x 24 line screen display
Sophisticated full screen editor
Full lower case characters

Powerful text formatter
Works with any printer
Special MX80 driver

Requires absolutely no hardware modifications
+ Tandy colour version also available

Now, right into your screen space you have text in numbers, and words when the buffer is full.

FORMAT FEATURES

When it comes time to print out the finished manuscript, Elewater lets you specify left, right, top, and bottom margins, line spacing and lines per page. These parameters can be set before printing or they can be dynamically modified during printing with simple format codes in text.

Elewater will automatically number 44 pages of text and create lines. It can then print any number of two sided pages without user intervention. You can tell it to start a new page anywhere in the text or at the end of the page. You can print at any part of the text buffer, about the printing at any point, and there is a "typewriter" feature which allows you to type straight to text printer. Because Elewater lets you input numbers, control codes directly from the menu or during printing, it works with any printer (Tandy, Telebit, VDU, etc.).

Elewater, Smith & Corona (P) Ltd., is the only special driver for the DRAGON 32. It is the only one that can do 12 lines and do interfacing with a simple modifying change.

CASSETTE INPUT/OUTPUT

Because the Elewater makes using cassette almost painless, you can still have a powerful word processor without the major drawback of a disk. The software cassette handler will search in the forward direction till it finds the first valid file, then it will keep repeating a load command when you are low on text.

The VDU controller checks your cassette save to make sure they're good. You can save all or any part of the text buffer to cassette and you can append existing files from those you have in the buffer already.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

Elewater is the only word processor for the DRAGON 32 that can do all this.

OSBORNE

BEAT THE PRICE RISE

**DOUBLE DENSITY
80 COLUMN D.D.** £995
£1195

**EPSON FX80
DAISYWHEEL from
MONITOR** £365
£425
£89

(Prices + VAT & Delivery)

DISCOUNTS ON 2 OR MORE

WE SPECIALISE IN OSBORNE AND
WE ARE AUTHORISED MAIN DEALERS

Fraser Associates Ltd.

1 Beale Hill Buckingham Bucks MK18 1EZ
Tel. Buckingham (0298) 816087

Put Your Micro In Control

The R2 mains controller give you two 13 Amp mains sockets under the control of your home micro. You don't need any special knowledge to get the system working - and appliances are easily switched using simple BASIC statements. The controllers are supplied with full, easy to follow, instructions and example programs.

R2 is ideal for disco and theatre lighting rigs, heating control - and for deterring potential burglars!

Adaptors are available for all popular micros: BBC, Sinclair ZX80, ZX81 and Spectrum; and many others - just contact us at the address below.

	Code	Price
Two-channel relay with 13 Amp sockets, indicator LEDs, control connection and instruction manual:	R2	£28.95
Connectors for four units (8 channels):		
for BBC model A:	R2A	£14.75
for BBC model B:	R2B	£9.95
adaptor for the Sinclair range (ZX80, ZX81 or Spectrum):	R2C	£18.50
Please add postage and packing to all orders		£1.50

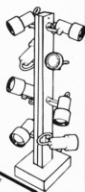
(All prices include VAT)

...Coming soon... The Intelligent Controller - up to 1000 channels with a variety of special effects and fully compatible with R2 units. Contact us for details of our Econet® products too.

S research

Philip, Spence-Jones & Associates Ltd.,
108 Mill Road, Cambridge, CB1 2BD
Telephone: (0223) 69927

As featured in BBC's
"Making the
Most of the Micro"



FOR BBC MICROCOMPUTER

Software

FORTH ROM and documentation £34.72 + VAT
Manual (for newcomers to FORTH) £6.75

Hardware and Accessories

TORCH drives and operating system £780.00 + VAT
Printers, drives etc Please phone for quote

FOR EPSON HX20

Software

FORTH ROM + documentation £34.72 + VAT
(Manual available shortly)

Hardware and Accessories

EXPANSION UNIT, VDU Interface etc
..... Please phone for quote

COMING SOON FOR BBC MICRO

FORTH FLOATING POINT EXTENSION (ROM)
COMPUTER AIDED LEARNING PACKAGE

OTHER MACHINES:

Dragon 32, Colour Genie, Apple, SWTPC

H.C.C.S. Associates
533 Durham Road, Low Fell
Gateshead, Tyne and Wear NE9 5EY
Tel: (0632) 821924

Time Bomb Card 1 of 5

8313TB1/5

An entertaining game using full graphics capability with sound. Where "E" is printed type "#".

Atari 400/800

Atari Basic

Requirements: 16K, Joystick.

Author: P Lister

```
100 GRAPHICS 18:POSITION 5,0:7 E61"TIME BOMB":POSITION 4,2:7 E61" "16
GOSUB 9300:SOUND 1,80,0,11
130 FOR A=0 TO 15:FOR B=15 TO 0 STEP -1:SETCOLOR 0,A,B:SETCOLOR 2,B,A:NEXT B:NEXT
T A
140 FOR A=0 TO 15:SETCOLOR 4,0,A:NEXT A:GOSUB 9100:GOSUB 7200:GOSUB 7300:GOSUB B
000:DIM Z(20),X(20)
340 GOSUB 9300:SCORE=0:ROUND=0:LIFE=3:LP=11
350 GRAPHICS 18:SETCOLOR 0,3,8:SETCOLOR 1,0,12:SETCOLOR 2,15,8:SETCOLOR 3,10,10:
SETCOLOR 4,0,0:TIME=99:F1=0:F2=0:F3=0
360 CAT=0:GOSUB 6000:POKE 756,56
370 FOR A=0 TO 15:FOR B=0 TO 8:POSITION A,B:PRINT E61"Z":NEXT B:NEXT A
390 GOSUB 7000:BX=2(7):BY=X(7)
410 POSITION Z(1),X(1):7 E61"V":POSITION Z(2),X(2):7 E61"V":POSITION Z(3),X(3):7
E61"V"
450 FOR A=1 TO 5:POSITION Z(0),X(0):7 E61" "16:GOSUB 9200:POSITION Z(0),X(0):7 E61
"t":GOSUB 9510:NEXT A
500 IF LIFE=3 THEN POSITION 7,9:7 E61"t":POSITION 9,9:7 E61"t":POSITION 11,9:7 E
61"t"
510 IF LIFE=2 THEN POSITION 7,9:7 E61"t":POSITION 9,9:7 E61"t":POSITION 11,9:7 E
61"t"
520 IF LIFE=1 THEN POSITION 7,9:7 E61"t":POSITION 9,9:7 E61"t":POSITION 11,9:7 E
61"t"
1000 B=STICK(0):TICK=BOMB:TIME=TIME-1:BOMB=INT(TIME/10):POSITION BX,BY:7 E61BOMB
1100 IF BOMB=0 THEN 3000
1010 IF TICK<>BOMB THEN SOUND 0,20,10,15
1020 IF Z(0):19 THEN Z(0)=0
1030 IF Z(0)<0 THEN Z(0)=19
1040 IF X(0)>8 THEN X(0)=0
1050 IF X(0)<0 THEN X(0)=8
1060 HUM=TIME+30:SOUND 0,0,0,0:SOUND 2,HUM,10,3:SOUND 3,HUM+7,10,3
1100 SK=INT((12-ROUND)*RAND(1))+1
1125 IF SK=1 THEN SX=Z(4):SY=X(4):GOSUB 1500:POSITION SX,SY:7 E61"U":Z(4)=SX:X(4
)=SY
1130 IF SK=2 THEN SX=Z(5):SY=X(5):GOSUB 1500:POSITION SX,SY:7 E61"U":Z(5)=SX:X(5
)=SY
```

100-140 Set initial display and Dimension arrays and variables

340 Game start point. Score and other values set to zero

350 Start of new round. Set flags and new bomb

360 Set catches to zero, print score and set alternative characters

370 Print pathways

390-410 Set random positions of bomb and flags

450 Flash robot on screen

500-520 Display robot lives at base of screen

1000-1050 Adjust bomb timer etc and print new value or explode. If OK then check screen wrap-around and enact

1060 A bit of background music (?)

1100-1130 Allow for movement of first and second "skulls" randomly

Time Bomb Card 2 of 5

8313TB2/5

```
1140 IF SK=3 THEN SX=Z(6):SY=X(6):GOSUB 1500:POSITION SX,SY:7 E61"U":Z(6)=SX:X(6
)=SY
1170 IF SX=Z(0) AND SY=X(0) THEN 4000
1309 POSITION Z(0),X(0):PRINT E61"t"
1310 IF B=7 THEN GOSUB 2000
1320 IF B=11 THEN GOSUB 2050
1330 IF B=13 THEN GOSUB 2100
1340 IF B=14 THEN GOSUB 2150
1360 IF PEEK(764)=6 THEN GOSUB 2200
1370 IF PEEK(764)=7 THEN GOSUB 2300
1380 POSITION Z(4),X(4):7 E61"U":POSITION Z(5),X(5):7 E61"U":POSITION Z(6),X(6):
7 E61"U"
1400 IF F1=0 AND Z(0)=Z(1) AND X(0)=X(1) THEN GOSUB 5000
1405 IF F2=0 AND Z(0)=Z(2) AND X(0)=X(2) THEN GOSUB 5050
1410 IF F3=0 AND Z(0)=Z(3) AND X(0)=X(3) THEN GOSUB 5100
1450 IF Z(0)=BX AND X(0)=BY THEN 2400
1460 IF Z(0)=Z(4) AND X(0)=X(4) THEN 4000
1470 IF Z(0)=Z(5) AND X(0)=X(5) THEN 4000
1480 IF Z(0)=Z(6) AND X(0)=X(6) THEN 4000
1490 SOUND 2,0,0,0:SOUND 3,0,0,0:GOTO 1000
1500 POSITION SX,SY:7 E61"Z"
1514 IF SX=Z(0) THEN 1517
1515 IF SX=Z(0) THEN 1530
1516 IF SX=Z(0) THEN 1520
1517 IF SY=X(0) THEN 1550
1518 IF SY=X(0) THEN 1540
1520 SX=SX+1:IF SX>19 THEN SX=0
1522 LOCATE SX,SY,C:IF C<>218 AND C<>116 THEN 1530
1529 RETURN
1530 SX=SX-1:IF SX<0 THEN SX=19
1532 LOCATE SX,SY,C:IF C<>218 AND C<>116 THEN 1520
1539 RETURN
1540 SY=SY+1:IF SY>8 THEN SY=0
1542 LOCATE SX,SY,C:IF C<>218 AND C<>116 THEN 1550
1549 RETURN
1550 SY=SY-1:IF SY<0 THEN SY=8
1552 LOCATE SX,SY,C:IF C<>218 AND C<>116 THEN 1540
1559 RETURN
2000 POSITION Z(0),X(0):7 E61" "
2020 Z(0)=Z(0)+1:IF Z(0)>19 THEN Z(0)=0
2030 LOCATE Z(0),X(0),C:IF C=32 THEN Z(0)=Z(0)-1:RETURN
2040 POSITION Z(0),X(0):7 E61"t":RETURN
2050 POSITION Z(0),X(0):7 E61" "
2060 Z(0)=Z(0)-1:IF Z(0)<0 THEN Z(0)=19
2070 LOCATE Z(0),X(0),C:IF C=32 THEN Z(0)=Z(0)+1:RETURN
```

1140 Third "skull" movement

1170 OOPS! Robot dead!

1309-1340 Scan joystick for action and enact

1360-1370 Scan keyboard for action and enact

1380 Display "skulls"

1400-1490 Check for flags collected and robot "skull" hits

1500-1559 Move the "skulls" about screen chasing the robot

2000-2070 First part of routine to move the robot about screen

AQUARIUS



technology equipment, as well as their game programming expertise which is evident from the advanced games which have been produced for the Intellivision. Aquarius costs £79 and comes with microfilm basic built in. It is so simple to use that you'll be writing your first programs within minutes of taking the machine out of its box. You can even record the programs on your own cassette recorder at home, so you can use them again at a later date. Most available domestic tape recorders are compatible with the Aquarius.

A POWERFUL MACHINE: For all its simplicity, it is also very sophisticated. It has a Z80A processor and 8K of built in ROM as well as 4K of RAM, which is user expandable to 52K. It has a display of 40x24 characters, and a graphic resolution of 320x192 with a total character set of 256 (including the complete ASCII set with upper and lower case letters, numbers and additional graphic symbols). The keyboard has 49 full stroke moving keys, unlike some of the cheaper machines which have membrane keyboards. The size of the machine (excluding any of the additional peripherals), is 13"x30"x2".

PERIPHERALS: It is very easy to increase the capabilities of your Aquarius as all the peripheral plug straight into one another. You can add a Printer, a Modem, a Data Recorder, Mini Expander and other items. All of the peripherals are very easy to install and what is more, they're easy to use. But the best news of all is, they're easy to afford.

CPM OPERATING CAPABILITY: The Aquarius is capable of being expanded to 52K RAM and later in 1983 a disk drive will be available for it, with the commercial CPM business operating system. This will allow you access to one of the largest software libraries in the world, with literally hundreds of programs available for you to use.

CARTRIDGES: Various sophisticated programs will be launched on plug in cartridges such as a Visicalc type spreadsheet and a word processor. In addition there will be dozens of games and utilities and alternative languages such as Logo, which combined with the built in microfilm basic gives an unbeatable combination of high quality programming ability.

MATTEL AQUARIUS - £68.70 + VAT = £79

£79

ATARI 400/800



NEW LOW PRICES

ATARI 400/800: With the Atari Personal Computers, you can play the ultimate in T.V. games, teach yourself new subjects or skills, balance budgets, and even write your own computer programs in Basic.

SPECIFICATIONS: Both the Atari 400 and 800 can display in up to 16 colours, each with 16 intensities. They have four independent sound synthesizers for music tunes/game sounds, giving four octaves with variable volume and tone control on your T.V.'s speaker. Display graphics

are of amazing quality, having a detailed resolution of 320 x 192, comprising 24 lines of 40 characters. Atari personal computers have a standard 10K ROM operating system. In addition the standard Atari 400 (£140) comes with 16K of RAM, and the expanded version with 48K (£198). The Atari 800 (£299) comes with 48K as standard. Both the 400 and 800 are now supplied with a FREE 40 Basic Programming Kit, which includes the Basic Programming Cartridge, as well as a 120 page Basic Reference Manual and the 194 page Self Teaching Manual by Bill Carris called 'Inside Atari Basic'; so you can begin programming straight away, without buying any 'extras'. Even a mains plug is supplied!

OVER 500 PROGRAMS AVAILABLE: The Atari computers are supported by well over 500 programs available for your use, a larger selection than you will find on any other television game or home computer! The wide selection puts Atari way ahead of the competition. Just fill in the coupon and we will be pleased to send you a full price list which gives details of our range of software available for entertainment, home education, programming and home office use. We think you'll agree when we say it's quite impressive.

100 FREE PROGRAMS FROM SILICA SHOP: If you buy your Atari Home Computer from Silica Shop, you will receive a FREE presentation pack of 6 cassettes, containing 100 programs including games, utilities and demonstrations. 16 pages booklet giving full details of all these programs is available on request. If you have already purchased your computer elsewhere you can buy the set of 6 cassettes for £2.99. What's more, Silica Shop offer a two year guarantee on all computers as well as a FREE joystick. This adds up to a great offer that we believe can't be beaten or matched by any of our competitors.

ATARI 400 16K - £129.57 + VAT = £149
ATARI 400 48K - £172.17 + VAT = £198
ATARI 800 48K - £260.00 + VAT = £299

£149

VIDEO GAMES

COLECOVISION



THE SYSTEM: The CBS Colecovision offers new standards in video game play. The excellent graphics are well implemented with arcade titles such as Zaxxon, Lenny Bug, Gorf, Wizard of Wor, Carnival, Mouse Trap and the lovable Smurfs. The console comes supplied with a three screen arcade quality version of DONKEY KONG. Parker and other companies have also announced ranges of cartridges for Colecovision, to further enhance the wide range of quality titles available for this new television games machine.

THE CONSOLE: The CBS Colecovision video games system has advanced technology which produces superlative graphics resolution and excellent sound effects. The styling of the console and hand controllers has been carefully researched; the console is designed to complement modern hi tech equipment, and has clear features for easy operation. The hand controllers allow fingertip control in the 8 direction joystick, and feature 2 independent fire buttons. The push button keyboard is used for game selection and for game control with some cartridges. The hand controllers are detachable and are connected to six feet of telephone coil cable, storing neatly away in the console when not in use.

ATARI EXPANSION MODULE: The Atari converter module allows Atari VCS software cartridges to be played on the Colecovision console, allowing owners the freedom to purchase from the extensive range of Atari compatible cartridges. It also means that existing Atari owners can buy the CBS Colecovision games system without discarding their software library. Silica Shop offer part exchange facilities if you wish to upgrade.

TURBO EXPANSION MODULE: The Turbo Drive Expansion Module allows you to actually drive the vehicle that appears on your T.V. screen. The module consists of a steering wheel, dashboard and accelerator pedal. One hand controller is mounted on the dashboard to provide a gear change unit. The module comes complete with a Turbo Drive cartridge, the first of several cartridges to make use of the module, which provides all the action of sitting in the driving seat. This facility is unique to CBS Colecovision.

HOME COMPUTER EXPANSION MODULE: The Home Computer Module scheduled for late 1983, allows conversion of the games unit into a sophisticated Home Computer. This flexibility of design is an important feature of the CBS Colecovision System.

COLECOVISION - £127.82 + VAT = £147

£147

VECTREX



THE SYSTEM: Vectrex is a totally unique Home Arcade System, which has been exclusively designed and engineered to duplicate real arcade game play. Complete with its own monitor display, Vectrex won't cause any arguments over the use of the family's television because it has its own built in screen.

THE SCREEN: Vectrex does not use ordinary display technology, instead, it uses a vector scanning process to scan the images on the screen. With this scanning method, the gun only updates the area of the screen that has changed, whereas a normal T.V. re-transmits the ENTIRE screen 50 times a minute. It is this that gives Vectrex its speed, and means that very little computer power is required for screen control, and the results provide very fast responding and clear images. These 'Vector Graphics' are used in several arcade games such as Asteroids and Battlezone, to give you incredibly high resolution and quality. Vectrex brings all of this from the arcade right into your living room. The Vectrex screen is capable of displaying 80 columns by 40 lines, which is significant to the extensive developments planned for the system.

EXCITING SOUNDS AND ELECTRONICS: Vectrex has an advanced microprocessor with more speed and power and exciting effects than many home video games systems.

REAL ARCADE CONTROLS: Vectrex has a unique control panel, similar to those used in many real arcade games, with 4 concave action buttons and a full 360° self centering joystick. This control panel has a 4 foot detachable cord for maximum player freedom.

REAL ARCADE GRAPHICS: Vectrex has its own 9 inch vertical screen and unlike a conventional T.V. screen, uses advanced display technology to achieve brilliant high resolution imagery and superb game play never before possible. The Vectrex display provides special effects too, such as 3-D rotation and zooming in and out, which a regular T.V. cannot match. Using a black and white monitor, each Vectrex game comes supplied with its own coloured plastic screen overlay to add to the excitement of game play. The range of Vectrex cartridges (£21.95 each), gives a good selection of arcade games such as Break, Scramble, Flip-Off and Bomber Attack. Vectrex comes complete with a fast paced 'Minestrom' game built into memory.

VECTREX: Vectrex has an advanced state-of-the-art microprocessor with more speed than other T.V. games.

VECTREX - £129.57 + VAT = £149.00

£149

WHO ARE SILICA SHOP?

Silica Shop are one of the leading computer specialists in the country, offering a complete service, to those who already own or to those who are interested in any products in our range, cannot be matched by any other supplier. Just look up what we have to offer.

• RANGE OF PRODUCTS: We stock a wide range of products from the most popular to the most advanced. We have a large stock of software, hardware and peripherals for the Atari, Commodore, Intellivision, and other popular systems. We also have a large stock of video games, including the latest titles from Atari, Intellivision, and other popular systems. We also have a large stock of video games, including the latest titles from Atari, Intellivision, and other popular systems.



01-309 1111

SILICA SHOP LIMITED, Dept ZPCN 0683,
1-4 The Mews, Hatherley Road, Sidcup, Kent, DA14 4DX
Telephone: 01-309 1111 or 01-301 1114

Clubnet keeps you in touch with the microcosm of personal computer enthusiasts throughout the UK. It is divided into two sections — clubs and user groups.

We publish a list of these two groups on alternate weeks. This week it is the turn of user groups, which are listed alphabetically by machine and special interest.

What's in a name?

The North and Mid-Essex BBC Micro Users Group (Namebug's story) held its first meeting last October. Originally the regional Microelectronics Education Programme set up the group specifically for teachers, but now anyone can join.

On the night I visited the group, 30 members gathered in two rooms of a comprehensive school in Witham, for its monthly meeting.

They looked at printers in operation and listened to a Microvoc sound system (see *Monitor*, May 20-May 26) set up by local dealers. In addition, members had the chance to get hands-on a bunch of Bees on display.

Among the membership, which included husband-and-wife teams, schoolchildren and professionals, several projects were brewing — such as development of a toolkit program, building a modem

and various types of interfacing.

Andy Purkiss, Namebug's general secretary, said: 'We always intended our meetings should be more than just sessions for people to play Snapper. So far we've had a number of guest speakers on topics such as Basic program structure and the

Hands on the Beeb at Namebug



development of the micro, Wordwise and disk operating.

Recently group members lent their expertise to the Chelmer Mini-Marathon race organisers and they'll be writing a program for next year's race to keep track of performances. In the meantime, they plan to evaluate a Hobbist floppy tape from Ikon Computer Products.

Namebug is another group with community awareness. Dave Watts, the chairman, said: 'We're very anxious to give assistance to disabled people in the area who have an interest in micros. We're prepared to arrange transport to and from meetings or even visit housebound people.'

Name: Namebug Venue: Sixth Form Centre, Spinks Lane, Witham, Essex. **Meetings:** Second Thursday every month at 7.30pm **Contact:** Dave Watts, 0245 358127.

Sandra Grandison

USER GROUPS

Acorn

Country Acorn Atom User Group. Subs: 44. No meetings but quarterly newsletter. Contact Peter Frost, 18 Frankwell Drive, Coventry, 0203 251516.

Essex Acorn Atom User Group. Program magazine. Contact Alan Carl, 105 Fairholme Avenue, Gidea Park, Romford, Essex.

Kent Midway Acorn User Group. Meets at St John Fisher School on last Monday of month at 7pm. Session at 9pm Thursday at the Fox and Hound, Chatham. Contact Clem Rutler, c/o St John's Fisher School, Ordance Street, Chatham, Kent, 0634 42811 (day), 0634 374599 (even).

Manchester Acorn User Group. Meets at AMC, Crescent Road, Crussall, Manchester 8 on Tuesday except school holidays, fees: £1. Contact John Ashurst, 192 Venture Close, Fallowfield, Manchester, 061-681 4962.

Apple

Bristol Apple Users and Dabblers. Meets at 10 Waring House, Redcliffe Hill, Bristol BS1 6TB, once a month. Newsletter. Contact Ewa Dabkowski, c/o Datalink, 10 Waring House, Redcliffe Hill, Bristol BS1 6TB, 0272 213427.

Buckinghamshire Apple User Group. Contact Steve Proffitt, The Granary, Hill Farm Road, Marlow Bottom, Buckinghamshire, 062 84 73074.

Croydon Apple User Group. Meets at Sidia House, 350 Lower Addcombe Road, Croydon, on second Monday of month. Subs: £5, £10 commercial members. Contact Paul Vernon, 60 Fulhamurst Way, West Wickham, Kent, 01-777 5478.

Hertfordshire British Apple Systems User Group. Meets at Old School, Branch Road, Park Street, St Albans, Hertfordshire, on first Tuesday and third Sunday each month. Tuesday and third Sunday each month. Annual subs: £12.50, joining fee: £2.50. Publishes magazine. Contact John Sharp, 09273 75093.

London Apple Music Synthesis Group. Contact Dr Davis Ellis, 22 Lennox Gardens, London SW1.

Milton Keynes Microcomputer User Group. Meets every Tuesday, 7.30pm. Contact Brian Pain, Sir Frank Markham School, Woughton Centre, Chaffron Way, Milton Keynes.

Atari

Birmingham User Group. Meets at the Malaga Grill, Matador Public House, Bell Ring shopping centre, Birmingham, on second and fourth Thursday every month at 7.30pm.

Subs: £5. Meetings: 25 members, 50 non-members. Contact Mike Aston, 42 Short Street, Wednesbury, West Midlands.

Carlisle Atari User Club. Contact Paul Deegan on 01-642 5232.

Hull Atari Users Local Group. Proposed new user group. Contact Harvey Kong Til, 546 Holderness Road, Hull HU9 3ES. Hull 7911094.

London Silica Atari 400/800 User Club. New club, plan planned, newsletter. Contact Richard Hawes on 01-301 1111.

Preston Atari Computer Enthusiasts. Meets at KSC Club, Merriam House, Beach Grove, Ashton, Preston, on third Thursday of month at 7.30pm.

Subs: £5. Contact Roger Taylor, 0253 738192.

Atom

Liverpool BBC and Atom User Group. Meets at Old Swan Technical College, Room C33 on first Wednesday of month at 7.30pm and at Birkenhead Technical College on third Tuesday of month at 7.30pm. Contact Nick Kelly, 051-525 2934 (evenings).

BBC

Laserbug is an international user group for the BBC micro. Produce monthly magazine. Subs: £12 for one year, £6 for six months. Contact Paul Barbour, 10 Dawley Ridge, Colnbrook, Slough, Berks, 02812 38614.

Beesbug. Ten magazines with programs. Discount deals, library and query service. Contact Sheridan Williams or David Graham at PO Box 50, St Albans, Hertfordshire AL1 2AR.

Bournemouth BBC User Group. Meets at Lansdowne Computer Centre, 5 Holdenhurst Road, Bournemouth on first and fourth Wednesday of month at

7.30pm. Contact Norman Carey on 0202 749612.

Brent/Barnet User Group. Meets on last Sunday of month. Subs £3. Newsletter. Contact Joseph Fox, 4 Harman Close, London NW2 2EA.

North London BBC Micro Users Group. Meets at The Prince of Wales, 37 Fortune Green Road, on Tuesdays at 7pm. Wide range of skills and expertise. Contact Dr Leo McLaughlin, Department of Chemistry, Westfield College, University of London, Kidderpore Avenue, London NW3 7ST, 01-405 0109.

Preston Area BBC Micro User Group. Meets at Boatmans Arms, Marsh Lane, Preston, on last Thursday of month. Subs: £5. Contact Duncan Coulter, Membership Secretary, 8 Briar Grove, Ingol, Preston, Lancashire, 0772 725793.

Witham BBC Micro User Group meets at comprehensive school, Witham on second Thursday each month at 7.30pm. Contact Dave Watts after 7pm, 0245 358127.

Comal

London Comal User Group. Meets at Polytechnic of North London, Holloway, second Wednesday of month, term time. Subs: £7.50. Contact John Collins, 75 74111.

Commodore

ICPIG **Barnsley**, Subs: £7.50. Contact Bob Wool, 13 Word Green, Barnsley, South Yorkshire, 0226 85084.

Blackpool, Meets at Arnold School, Blackpool, on third Thursday of month. Contact David Jarrett, 197 Victoria Road, Thornton Cleveleys, Blackpool FY5 3ST.

Canterbury SE. Meets at The Physics Lab, Canterbury University, on first Tuesday and Wednesday of month. Subs: £7 adults, £3.50 juniors. Contact R Moseley, Rosemount, Romney Hill, Maidstone, 0622 37643.

Carrickfergus, Contact David Bolton, 19 Carrickfergus Road, Carrickfergus, Co Antrim BT38 7ND, 09603 63788.

Cheltenham, Meets at The Cheltenham Ladies College on last Thursday of month at 7.30. Contact Alison Schofield, 78 Heaters Way Road, Cheltenham, Gloucestershire, 0242 580789.

Chwyd, Contact John Poole, 6 Ridgeway Close, Connah's Quay, Chwyd CF15 4LZ.

Corby, Contact Peter Ashby, 215 Wainohm Way, Corby, Northamptonshire, 05363 4442.

Coventry, Meets at Stoke Park School and County College at 7pm on fourth Wednesday of month. Subs: £2.50. August, December. Subs: £2.50. Contact Will Light, 22 Ivybridge Road, Steycheval, Coventry, Warwickshire.

Derby, Meets at Derby Professional Colour every other Tuesday at 7pm. Contact Robert Watts, 03322 72569.

Durham, North-East Pet and ICPU/G. Meets at Lawson School, Burnley at 7pm second and third Mondays of month. Contact Jim Cocalis, 20 Worcester Road, Newton Hall Estate, Durham.

Essex, No meetings, software library. Contact Simon Kniveton, 097 086 303.

Hainault, Meets at Grange Remedial Centre, Woodman Path, Hainault, Contact Carol Taylor, 101 Churchlands Avenue, Cranbrook, Ilford, Essex.

Glasgow, Contact Dr Jim MacBryne, 27 Daidymie Crescent, Newton Mearns, Glasgow, 041-629 5696.

Gloucester and Bristol Area, Meets at 23 Sheppard Leaze, Weston-under-Edge, Gloucester, on last Friday of month. **Hampshire**, Meets at 70 Reading Road, Farnborough, on third Wednesday of month. Contact Ron Geere, 109 York Road, Farnborough, Hants, 0252 54292.

Hertfordshire North, Meets at Provident Mutual Assurance, Purwell Lane, Hitchin, on last Wednesday of month. Contact B Granger, 73 Minchins Way, Stevenage, Herts SG1 2HS, 0438 727925.

Kilmarnock, Meets at Symington Primary School on first and third Thursdays of month at 7pm. Software library. Contact John Smith, 19 Brecklands Road, Symington.

Kilmarnock KA1 5BX, 0563 330407. **Liverpool**, Meets at The Merchant Taylor School for Boys, Crosby, on second Thursday of month at 7pm.

Software exchange. Contact Tony Bond, 27 Ince Road, Liverpool L23 4UE, 051-924 1505.

London, Contact Alan Barks, 135 Queen Alexandra Mansions, Judd Street, London WC1, 01-430 8025.

London North. Contact Barry Miles, Department of Business Studies, North London Polytechnic, Holloway Road, London N7, 01-607 2789.

Norfolk. Contact Peter Petts, Bramley Hale, Wretton, King's Lynn, Norfolk PE33 9QS, 0366 500692.

Northumberland. Proposed new club, Contact Graham Saunders, 22 Front Street, Guide Post, Northumberland.

Slough. Meets at Slough College on second Thursday of month at 7.30pm, visitors — 65p adults, 40p students.

Contact Brian Jones, 53 Beechwood Avenue, Woodley, Reading RG5 3DF, 0734 661494.

South-East. Regional Group. Meets at Church Darwin School, Jai Lane, Biggin Hill, Kent, on third and fourth Thursday of month at 7.30pm. Subs: £7.50. Free library, discount service, courses and networking. Contact Jack Cohen, 30 Brancaster Road, Newbury Park, Hford, Essex, 01-597 1229.

South Midlands. Meets at 12 York Street, Stourport-on-Severn on last Thursday of month. Help available with business programming problems. Contact M J Merriman at above address.

Staffordshire. Annual subs: £6.50. Group newsletter. Contact at 57 Clough Hall Road, Kidsgrove, Stoke-on-Trent.

Teddington. Contact G Squibb, 108 Teddington Park Road, Teddington, Middlesex, 01-977 2346.

Watford. Meets on second Monday of month. Contact Stephen Rabaglia, c/o Institute of Grocery Dist. Grange Lane, Letchmore Heath, Watford, Herts, 01-779 7141.

Commodore Pet. Blackpool, West Lancashire Pet Users Club. Meets at Arnold School, Blackpool on the third Thursday of month. Contact D Jowett, 187 Victoria Road, East Thornton, Blackpool FY5 3ST.

Southern Users of Pets Association. Contact Howard Pilgrim, 42 Compton Road, Brighton BN1 5AN.

Pet User Group Crawley. Contact Richard Dyer, 33 Parham Road, Ilford, Essex, 01-261 4444.

Pet Users Education Group. Produces newsletter. Contact Dr Chris Smith, Department of Physiology, Queen Elizabeth College, Camden Hill Road, London W8 7AH.

UK Pet Users Club. Annual subs: £10, newsletter. Contact 360 Euston Road, London NW1 3BL.

Pet Users Group. Meets at Polytechnic of North London, Eden Grove, Room 320. On alternate Tuesdays, 6pm. Subs at Barry Miles on 01-607 2789.

Pet User Club. Contact Margaret Gulliford, 818 Leigh Road, Slough Industrial Estate, 0753 74111.

Independent Pet Users Group. Contact 57 Clough Hall Road, Kidsgrove, Stoke-on-Trent, Staffordshire.

Commodore Vic. Burnley, Proposed club. Contact John Ingham, 72 Ardwick Street, Burnley, Lancashire.

London. Vic Users Group. Meets on alternate Tuesdays at 6.30pm at Polytechnic of North London Community Centre. Contact Robin Barber.

Norfolk. Proposed club. Contact J Blair, 7 Beach Road, Cromer, Norfolk, 0263 512849.

Compucolour. Caversham, Compucolour Users Group.

UK. Meets at Community Centre, Caversham Park Village twice a year. Subs £15. Contacts with USA, Australia and Canada. Newsletter, program library. Contact Peter Hiner, 11 Pennycroft, Harpenden, Hertfordshire, 05827 64872.

CP/M. Irish CP/M Users Group. Subs: £5, meets monthly in Dublin area. Newsletter. Contact Doug Nottidge, Gardner House, Balldubh, Dublin 4, Dublin 66611.

UK CP/M Users Group. Subs: £7. Software library, newsletter, help service. Contact Lesley Spicer, 11 Sun Street, London EC2M 2QD, 01-247 0691.

COSMAC. COSMAC Users Group. Contact James Cunningham, 7 Harrowden Court, Harrowden Road, Luton, Bedfordshire, 0582 42934.

Digital Equipment. Digital Equipment Users Society, Program library. Contact The Secretary, PO Box 53, Reading, Berkshire, 0734 387725.

Dragon. Brixham Dragon Owners Club meets at Computer Systems (Thorp), Pump Street, Brixham, every Saturday at 2.30pm. Contact Ian Chippfield, 22 Brookdale Court, Brixham, Devon, Brixham 99224.

Education. Birmingham, Education ZX80/81 User Group. Subs: £2.50. Contact Eric Pearson, Highgate School, Balsall Heath Road, Highgate, Birmingham B12 9DS.

Birmingham. MUSE. Subs: £10, student £6.50. National body for co-ordinating activities in schools, colleges. Contact Lorraine Bewse, MUSE Information Office, Westhill College, Wesley Park Road, Birmingham, 021-471 3723.

Dublin. Computer Education Society of Ireland. Subs: £3. Contact Dairmaid McCarthy, 7 St Kevin's Park, Clonsilla, Blackrock, Co. Dublin.

Midlands. Educational Users Group. Offshoot of national TRS-80 Users Group. Contact Dave Fletcher, Head Tech, Beaconsfield First and Middle School, Beaconsfield Road, Southall, Middlesex.

Worcestershire. Mini and Microcomputer Users in Education. National organisation. Contact R Tringer, 48 Chadote Way, Catshill, Bromsgrove, Worcestershire B61 0UT.

Forth. Forth Users Group. Produces newsletters and covers a variety of machines. Subs: £7.50. Contact David Husband, 2 Gorleston Road, Branksome, Poole, Dorset BH12 1NW, 0202 764724.

Fullerford Group UK. Meets at Room 408, South Bank Polytechnic on the first Thursday of month. Subs: £7. Newsletter. Contact K Goldie-Morrison, 15 St Albans Mansions, Kensington Court Place, London W8 5QH, 01-937 3231.

Forum. Forum 80 Users Group. Contact Frederick Brown, 421 Endike Lane, Hull HU6 8AG.

FX-500-P. FX-500-P Users Association. Contact Max Francis, 38 Grymsdyke, Great Missenden, Buckinghamshire HP16 0LP.

Genealogists. Society of Genealogists Computer Interest Group. Subs: £3. Newsletter. Contact Anthony Camp, 01-373 0754.

Intel MDS. UK Intel MDS Users Group. Newsletter. Contact Lewis Hard, c/o S.P.A.C.E., The Old Coach House, Court Row, Upton-on-Severn, Worcester WR8 0NS.

Rhaca Audio S100. Rhaca Audio S100 Users Group. Software exchange, discount. Contact Dave Weaver, 41 Dore Lane, North Hykeham, Lincoln LN6 8LN.

Jupiter Ace. Jupiter Ace Users Group. Subs: £7. Newsletter, add-ons. Contact John Noyce, Remsoft, 18 George Street, Brighton BN2 1RH.

Mattel. Mattel Intellivision TV Game Group. Proposed group to organise games, competitions. Contact Warrington 62215 after 4pm.

Medical. Durham, Primary Health Care Group. Contact Dr Alastair Malcolm, British Computer Society, Chevelay Park Medical Centre, Belmont, Durham, 0585 64252.

London. Medical Micro Users Group. Newsletter. Contact Medicom, 1-2 Hanover Street, London W1.

Middlesex. TRS-80 Medical and Laboratory Users. Newsletter. Contact Dr Robinson, The Residency, Northwick Park Hospital, Harrow, Middlesex.

Nascom. Berkshire, Nascom Thames Valley User Group. Meets at Frogmore Hotel, Windsor, on Thursdays fortnightly, 8pm. Newsletter. Contact Mike Rothery, 37 Eaton Wick Road, Eton Wick, Windsor, Berkshire, Windsor 536.

Birmingham Nascom User Group. Meets at Davenport's Social Club, Granville Street, Birmingham on the last Thursday of month, 8pm. Contact Martin Sidebotham, 021-744 3993.

International Nascom Microcomputer Club. Subs: £5. Newsletter, program library. Contact 80 Oakfield Corner, Sycamore Road, Amersham, Buckinghamshire HP6 5EQ.

Merseside Nascom User Group. Meets at Mona Hotel, St James Street, Liverpool, on the first Wednesday of month, 7.30pm. Contact Mr T Seale, 051-526 5256.

Newbrain. Brighton Independent Newbrain User Group. Subs: £5. Monthly newsletter, SAE to J Hudson, 6 Swanborough Place, Whitehawk, Brighton.

Wakefield. Wakefield Independent Newbrain User Group. Contact Anthony Hodge, 15 St John's Court, Wakefield WF1 2RY.

Ohio. Ohio Scientific User Group. Subs: £5. Newsletter. Contact Tom Graves, 19a West End, Street, Somerset, 0458 45359.

Oric. Oric Owners Group. Subs: £10. Communicates through bi-monthly newsletter. Contact Paul Kaufman, 3 Club Mews, Ely, Cambridgeshire.

Osborne. British Osborne Owners Group. Subs: £18. Newsletter. Contact J Anglesa, Flat 19, Rowan House, Milton Road, Handsworth, Birmingham B20 2JR.

OSI. OSI UK User Group. Contact Richard Elen, 12 Benmerley Road, London SW10 6DS.

Pascal. Pascal User Group. Subs: £9. Contact Nick Hughes, PO Box 52, Pinner, Middlesex HA5 3FE.

PDP. Buckinghamshire, PDPs User Group. Newsletter. Contact Nigel Dunn, 21 Campton Road, Widmer End, High Wycombe, Buckinghamshire, 0494 714483.

Hertfordshire. PDP11 User Group. Information service. Contact Peter Harris, 119 Carpenter Way, Potters Bar, Hertfordshire EN6 5QB, 0707 52091.

Pilot. UK Pilot User Group. Contact Alec Wood, Wirral Grammar School for Boys, Cross Lane, Bebington, Wirral, Merseyside L63 3AQ.

Prestel. ACC National Prestel Committee. Administrates Cup Set 800 (hobbyists Prestel). Contact secretary, Rupert Steele, St John's College, Oxford OX1 3JP.

Research Machines. Birmingham, Research Machines 380Z. Contact Peter Smith, Birmingham Educational Computing Centre, Camp

Hill Teachers Centre, Stratford Road, Birmingham B11 1AR.

Leamington Spa. West Midlands RML User Group. Contact Spencer Instone, c/o 59 Avenue Road, Leamington Spa. Newcastle. NERML 380Z User Group. Meets monthly at Micro-Electronics Education Centre of the Polytechnic South Lane Campus, Leamington Spa.

Contact Mr Hatfield or Mr Reed, Computer Unit, Northumberland Building, Newcastle Polytechnic. 0632 326492.

Oxford. Research Machines National User Group. Contact RML, Mill Street, Osney, Oxford OX2 0BW, 0865 3606.

Durham. Research Machines Ltd National User Group. Contact M D Fisher, PO Box 75, Oxford OX4 1EY.

Sharp M280. Postal M280Z User Group. Contact Noel Williams, 07425 8858.

Aberdeen. International Sharp Users Group. Subs: £3. Newsletter. Contact Graham Knight, c/o Knights Computers, 103 Rosemount Place, Aberdeen, 0224 630526.

Essex. Sharp M280Z User Group. Contact Joe Street, 16 Elmsthorpe Drive, Hornchurch, Essex RM11 1PE.

Leeds. Sharp PC121 Users' Club. Subs: £5. Newsletter. Contact Jonathan Dacre, 281 Lidgett Lane, Leeds LS17 3AQ.

Somerset. Sharp M280 Users Club. Contact Tim Powell, Computer Centre, Yeovil College, Yeovil, Somerset BA21 4AE.

Sinclair. Brighton, ZX Users Group. Contact J Ireland, Hill Inn, 145 Gosdon Road, Grange, Brighton.

Aberdeen. Sinclair ZX Computer Club. General monthly meeting, newsletter. Equipment for hire, specialist meetings, library. Contact secretary, Ken Knight, 0226 5181.

Colchester. Sinclair User Group. Meets fortnightly. Contact Richard Lawn, 020 Preygate Road, Colchester, Essex.

Cardiff. ZX Club. Meets on last Sunday of month, 2pm. Subs: £5. Telephone service, see list of members. Contact Mike Hayes, 54 Oakley Place, Grange, Cardiff, 0222 371732.

Edinburgh. ZX. Meets at Clarendon Hotel, Clarendon Crescent, Edinburgh on second and fourth Wednesdays every month, 7.30pm. Subs: £5 adults, £3 juniors, students, OAP and unemployed. Newsletter. Contact John Palmer, 56 Meadowfield Drive, Edinburgh, 031-661 3183.

Glasgow. ZX80/81 User Group. Contact Ian Clark, 110 Greenwood Road, Larkston, Glasgow, 041-638 1241.

Liverpool. ZX Computer Club. Meets at ZX Computer Centre, 17 Sweeting Street, Liverpool, on Wednesday, 6.30pm. Contact Keith Archer, 051-260 4950.

London. National ZX User Club. Monthly magazine 'Interface'. Contact Ian Hartnell, Inf. Centre, 44-48 Earls Court, London W8.

London. Sinclair User Group. Meets at Polytechnic of North London, Room 2.5 Town Hall, Wood Lane, 6.30pm.

Contact Irving Brand, Polytechnic of North London, Holloway Road, London.

ZX Spectrum Club. Proposed new club for teenagers. Contact D Beattie, 63 Kingsley Crescent, Sawley, Long Eaton, Nottingham NG10 3DA.

Association. ZX80 National Software Association. Subs: £6. Newsletter, software available on cassette. Contact 15 Woodlands Road, Wombourne, Staffordshire WV5 0JZ.

UK. ZX Amateur Radio User Group. Newsletter. Contact Paul Newsum, 3 Red House Lane, Leiston, Suffolk, SAE essential. No telephone enquiries.

Survey. Guildford ZX81/80 Users Group. Meets Fridays, club magazine. Contact A Bond, 54 Farm Road, Guildford, Surrey GU2 5PE, 0483 62035.

Survey. ZX80/81 User Club. Newsletter. Contact David Bigden, PO Box 159, Kingston-upon-Thames, Surrey KT2 5JQ.

West Sussex. Hassocks ZX Micro User Club. Contact Paul King, 25 Fir Tree Way, Hassocks, West Sussex.

Sirius
Sirius User Group. Newsletter, program library. Contact Ray D'Arcy, Sirius User Club, The Microsystems Centre, Enterprise House, 7-71 Gordon Street, Luton, 0582 412215.

68XX
68XX Special Interest Group. Contact Tim Turner, 63 Millais Road, London E11 4HB, 01-558 3681.

Software
London. Software Group. Meets at Polytechnic of North London, Room 2-3 Tower block Thursday, 6pm. Contact Mike Duck at Polytechnic of North London, Holloway, London N7.
Oxford. Program of the Month Club. Discount programs, newsletter. Contact Mr Durrant, 55 St Thomas Street, Oxford OX1 1JG, 0859 250333.

Sorcerer
Liverpool European Sorcerer Club. Monthly meetings. Subs: £7.50, newsletter. Contact Colin Marle, 32 Wychard Avenue, Formby, near Liverpool L37 3JU, 070 48 72137.
Surrey. Exidy Sorcerer User Group. Newsletter, program exchange. Contact Andy Marshall, 44 Arbury Bridge Road, Woking, Surrey GU21 4NT.

Spreadsheet
International Electronic Spreadsheet Users Group. Newsletter. Contact UK Alpha House, 7th Floor, Rowlandway, Manchester M22 5RG.

Tangerine
Bristol. Tangerine Homebrew. Contact A Coates, 35 Mogg Street, St Werburghs, Bristol BS2 9UB.
Bournemouth. Tangerine Users Group. Hardware and software suppliers. Contact Bob Green, 16 Idlesleigh Road, Chartistmer, Bournemouth.

TeXs Instruments
Lexis. T199/44 User Group. Meets at 3 Gipton Wood Road, Leeds 8, Mondays 7pm. Subs: £6. Contact I Youden, 0532 401408.
Manchester. TI User Group. Proposed new club. Contact T Grimshaw, 21 Allingham Street, Longsight, Manchester.
Manchester. T19900 User Group. Software, data libraries. Contact Chris Cadogan, Department of Computer Science, University of Manchester M13 9PL.

Triton
Triton User Group. Subs: £4. Newsletter, software exchange. Contact Nigel Stride, Transam Ltd, 12 Chapel Street, London NW1, 01-402 8137.

TRS-80
Birmingham. National TRS-80 User

Group. Meets at Adam & Eve Pub, 1st Floor, Bradford Street, Birmingham on last Friday of month. Subs: £2.50. Newsletter, software library. Contact Michael Gibbons, 1 New Street, Castle Bromwich, Birmingham B38 9AP, 021-747 2261.

Chelmsford. TRS-80 User Group. Contact Michael Dean, 22 Roughtons, Galleyswood, Chelmsford, Essex.

Durham. North East TRS-80 User Group. Meets at Information Technology Centre, Gateshead on the third Wednesday of month, 7pm. Subs: £5. Newsletter. Contact J Dunn, 8 Ettrich Terrace, North Gateshead, County Durham.

Edinburgh. Scottish TRS-80 and Genie User Group. Meets at Mansion House Hotel, Milton Road, second Thursdays of month, 7.30pm. Contact Dick Mackie, 3 Warrender Park Crescent, Edinburgh EH9 1DX, 031-229 6032.

Isle of Wight. TRS-80 User Club. Meets at London Hotel, Ryde on last Friday of month, 7.30pm. Contact Sean Coulton, 0903 614589.

Kent. TRS-80 User Group. Contact Alan Reid, 22 Woodes Road, Rainham, Kent, 0634 367012.

Lepton. Northwest TRS-80 User Group. Meets at Barton Acro Club, Barton Aerodrome, Irlam, near Manchester on last Wednesday of month, 8pm.

Lepton. Sub: £8. Sub group meets at Crown Hotel, Blackfriars Street, on first and third Monday of month. Newsletter, software library. Contact Melvin Franklin, 40 Cowlees, Westhoughton, Bolton, Lancashire.

Liverpool. UK DOSPLUS User Group. Contact Peter Toothill, 101 Swanside Road, Liverpool L14 7NL.

Liverpool. Merseyside TRS-80/Video Genie User Group. Meets second Thursday of month, 7.15pm. Contact Peter Toothill, 101 Swanside Road, Liverpool L14 7NL, 051-229 7733.

London, SW. TRS-80 User Group. Contact Ron Everitt on 01-394 2123.

Merseyside. TRS-80 User Group. Subs: £5. Software library, newsletter. Contact N Rushby, 123 Roughton Drive, Northwood, Kirby, Merseyside.

Milton Keynes. National TRS-80 and Genie User Group. Fee £7 for site monthly, newsletter. Contact Brian Pain, 24 Oxford Street, Stony Stratford, Milton Keynes.

London. TRS-80 Genie Group. Meets at Central Common Room. The Residency, Northwick Park Hospital on first Sunday of month. Contact Dr Nick Robinson, Central Room, The Residency, Northwick Park Hospital.

Northants. TRS-80 Users Group. Meets at Welwyn Park Community Centre on alternate Thursday at 7pm. Subs: £12. Saturday workshop. Contact Neil Griffiths, 0858 65718.

Nottingham. East Midlands TRS-80 Users Group. Newsletter. Contact Mike Costello, 15 Langhaig Avenue, Rise Park, Nottingham NG5 5BU, 0602 751753.

Colour Genie
National Colour Genie User Group. Subs: £10. Products monthly newsletter, has software library and prepares national workshops. Contact Marc Leduc, 46 Highbank Avenue, Nottinghamshire NG6 9DB.

UCSD
Hants. UCSD System Users Society. Contact John Ash, Dicolli Data Systems Ltd, Bond Close, Kingsland Estate, Basingstoke, Hants RG2 0QB.

Oxford. UCSD Pascal UK Users Group. Contact Malcolm Harper, Oxford University Computing Laboratory Programming Research Group, 45 Banbury Road, Oxford OX2 6PE.

CUA
CUA UK User Group. Contact Adrian Waters, 9 Moss Lane, Romford, Essex.

6502
Bedfordshire. 6502 User Group. Contact Walter Wallenborn, 21 Argyll Avenue, Luton, Bedfordshire LU3 1EG, 0582 26927.

Hants. 6502 Users Club (Southern Region). Contact Steve Cole, 70 Sydney Road, Gosport, Hants.

Remember

Let us know about your micro club or user group so we can be sure the information printed here is up to date. Drop a card to Sandra Grandison, Listings Editor, at *Personal Computer News*, 62 Oxford Street, London W1A 2HG, or give her a call on 01-636 6890.

SPECTRUM FORTH

A price breakthrough in quality software: You can now run FORTH on your ZX Spectrum (16K or 48K) for just £5.95!!! Spectrum FORTH comes complete with an impressive new manual. It has full Spectrum graphics facilities, and is actually faster than the Jupiter Ace on many timings. Don't miss the revolution — order FORTH today for immediate attention.

£5.95

Order as SP48L (48K) or SP16L (16K). Cheques/POs

to
Mike Hampson
7 Hereford Drive, Clitheroe
Lancs BB7 1JP

32K Rampack For Your Vic 20 Special Offer

Choose any of the following Gemini software cassettes requiring 32K memory.

- | | |
|------------------|------------------------|
| 1. Database | 4. Invoice Statements |
| 2. Stock Control | 5. Home Accounts |
| 3. Mailing List | 6. Commercial Accounts |

And add a 32K Rampack by Plus 80
(Recommended Retail Price £69.95 for both)

SPECIAL PRICE £59.99 (Inclusive)

Send to: PLUS 80, 31-33 LOWER ROAD, HARROW, HA2 0DE.

SOFTWARE 1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐

32K RAMPACK ON ITS OWN £49.99 ☐

16K RAMPACK ON ITS OWN £37.99 ☐

**INDIVIDUAL SOFTWARE
PACKAGES £19.95 1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐**

Name Address

..... Tel. No.

Allow 10-14 days delivery. (Please tick appropriate boxes) Generic ☐ Dealer Discounts ☐

DATABASICS

This week PCN Databasics lists a selection of add-ons for your micro. PCN keeps you up to date in three-week cycles, listing peripherals, then software, followed by micros.

Printers are best categorised by print-head type. The two most common methods of transferring type to paper are the **Dot matrix** and **Daisywheel** techniques.

A dot matrix printer uses a row of pins which are programmed to strike the paper through a ribbon and form the character as a pattern of dots.

The daisywheel acts more like a conventional typewriter, the character set being pre-formed on a wheel with each character on a separate spoke. As the interchangeable wheel rotates it is struck by a hammer to form the character impression.

Dot matrix printers tend to be faster than daisywheel but offer lower print quality.

In selecting a printer make sure the **interface** on your computer is compatible with those available as standard or at extra cost on the printer.

The **●** sign means the interface is included in the price; **○** means you have a choice of interfaces included in the price; **+** means the interface will cost extra.

Max Baud rate indicates the approximate characters-per-second rate as they are fed into the printer.

The **buffer** stores characters sent by the computer. The printer can take characters in chunks, at a rate quicker than they are able to be printed, sometimes allowing the computer to be freed for further use.

Lines per inch indicates the maximum number of lines printed in a vertical inch. **Characters per inch** can be varied on some printers as the typesizes themselves can be adjusted.

Maximum print speed as indicated by the manufacturer tends to be a little optimistic. **Maximum print positions** tells you the optimum number of characters that can be printed in one line by the smallest character size on the printer. **Maximum paper width** is the widest paper the printer can take.

Size represents the space the printer takes up on a desk top. **The weight** of the printer is given in kilogrammes.

Maximum copies indicates the number of carbon copies that can realistically be produced at one time.

Underlining puts a line under characters while **bold type** thickens the characters to make them stand out. **True descenders** indicates that the print method allows for fully formed tails on letters such as p, g or q.

Proportional spacing puts the same space between characters whether they are a long 'm' or a short 'i'. **Block graphics** builds up pictures using rectangular blocks, while **High Resolution Graphics** uses smaller dots.

Bidirectional means the printer can save time by printing left to right and then doing the next line backwards right to left. Similarly, **Logic Seeking** enables the machine to save more time by printing the short lines without sweeping over the whole width of the page.

Feed methods comprise **fanfold** which uses continuous stationery sheets folded road-map style drawn into the printer by a tractor mechanism. The tractor cog fits into holes in the fanfold paper and takes the paper past the printer mechanism. **Roll** is a roll of paper that feeds into the printer, usually using **friction feed** where the paper is gripped between two rollers, typewriter-style. **Cut sheet** indicates the printer uses single sheets like a typewriter.

Distributor: to find which company distributes a particular add-on, use the code listed in this column to refer to the distributor table.

The table is at the end of the listings, and gives the distributor's name and telephone number.

PERIPHERALS

Make & Model	Price inc VAT	Print-head type (M = matrix)	INTERFACES ● inc in price, ○ = options at extra cost (+)					Max baud rate	Buffer Memory Size (in characters)	Lines per inch	Characters per inch	Max print Speed (CPS)	Max print positions	Max paper width in inches	Size (base area in cms)	Weight (in kgs)	Max Copies	Underlining	Bold Type	True Descenders	Proportional Spacing	Block Graphics	High Resolution Graphics	Bi Directional	Logic Seeking	Feed Method					Distributor	
			IEEE	Centronics	20ma	RS232	Others																			Others (+)						
PRINTERS																																
Adler TRD 170	£833	Daisywheel	●	●	●			9600	256	6,8	10, 12, 15	17	198	15.5	56×37	13	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	T2
Anadex DP 9000A	£1,397	M 7×9, 9×9	●	●	●			9600	2700	6,8	10, 12, 5, 15, 16, 7	200	106	9.5	40.9×57	13.6	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	I1
Anadex DP 9001A	£1,397	M 7×9, 11×9	●	●	●			9600	2700	6,8	10, 12, 5, 15, 16, 7	200	132	9.5	40.9×57	13.6	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	I1
Anadex DP 9500	£1,397	M 9×9	●	●	●			9600	700	6,8	10, 12, 13, 3	200	176	15.5	39×59.9	16	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	I1
Anadex DP 9500A	£1,397	M 7×9, 9×9, 13×9	●	●	●			9600	2700	6,8	10, 12, 13, 3	200	176	15.5	40.9×70.3	16	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	I1
Anadex DP 9500L	£1,295	M 7×9, 9×9	●	●	●			9600	700	6,8	10	150	132	15.5	39×59.9	16	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	I1
Anadex DP 9501	£1,397	M 7×9, 11×9	●	●	●			9600	700	6,8	10, 12, 5, 15, 16, 7	200	220	15.5	39×59.9	16	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	I1
Anadex DP 9501A	£1,397	M 7×9, 11×9	●	●	●			9600	2700	6,8	10, 12, 5, 15, 16, 7	200	220	15.5	40.9×70.3	16	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	I1
Anadex DP 9620A	£1,489	M 7×9, 9×9, 13×9	●	●	●			9600	1500	6,8	10, 12, 15, 16, 4	200	216	15.5	40.9×70.3	16	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	I1
Anadex WP 6000	£2,616	M up to 18×20	●	●	●			19200	4500	6,8, 12, 16	10, 12, 16, 7	285	220	15.5	46.7×74.9	25	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	I1
ASP 3500	£977	M 9×7, 9×9	○	○	○			9600	80	6,8	10, 12, 16, 5	180	217	14	61.5×40.5	19	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	M1
Brother HRI	£747	Daisywheel	○	○	○			9600	2000	4, 5, 6	10, 12, 15	35	198	16.5	38.1×71.2	16	8	●	●	●	●	●	●	●	●	●	●	●	●	●	●	J1
Canon AP400	£1,140	Daisywheel	●	●	●		1	19200	4000	4, 6, 8	10, 12, 15	25	197	15.5	50.8×48.2	18.5	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	D1
Centronics 159/4	£962	M 9×7		●				9600	768	6	5, 8, 18, 10, 16, 36	150	80	10	38×35.6	10	5	●	●	●	●	●	●	●	●	●	●	●	●	●	●	B1
Centronics 150/4	£682	M 9×7		●			1	9600	768	6,8	10, 12, 16, 36	150	132	9.5	38.1×35.5	9.1	3	●	●	●	●	●	●	●	●	●	●	●	●	●	●	R1
Centronics 152/4	£788	M 9×7		●			1	9600	708	6,8	10, 12, 16, 5	150	217	9.5	38.1×35.5	9.1	3	●	●	●	●	●	●	●	●	●	●	●	●	●	●	R1

PRINTERS

Centronics 154	E869	M 11×8		●	●		9600	2000	6,9,12,16		5,10,16,5	120	132	15	52,6×37,1	13	5	●	●	●	●	●	●	●	●	●	C1
Centronics 159/2	E881	M 9×7		●	●		N/A	768	6		5,8,16,10,16,36	150	132	10	38,1×35,6	10	5	●	●	●	●	●	●	●	●	●	B1
Centronics 351	E1,891	M 7×9		●	+	●	19200	2000	6,8		5,6,8,25,10,12,16,5	200	192	15	45,7×55,9	18	6	●	●	●	●	●	●	●	●	●	B1
Centronics 352	E1,966	M 7×8		●	+	●	19200	2000	6,8		5,6,7,5,8,25,13,2,15,16,5	200	218	14,5	55,9×45,7	18,1	6	●	●	●	●	●	●	●	●	●	C1
Centronics 353	E2,420	M 7×8		+	●		19200	4000	3,4,6,8,12		10,12,13,2,15,16,5	200	218	15	55,9×45,7	18,1	6	●	●	●	●	●	●	●	●	●	C1
Centronics 739/2	E710	M 11×9		●			2200	132	6		5,8,3,10,16,7	100	132	9	36,8×27,9	5,4	5	●	●	●	●	●	●	●	●	●	C1
Centronics 739/4	E786	M 11×9			●		9600	512	6		5,8,3,10,16,7	100	132	9	36,8×40,6	7,2	5	●	●	●	●	●	●	●	●	●	C1
Commodore 4022P	E454	M 6×7		●			N/A	N/A	2		5,10	40	80	10	36,8×33	9,9	3	●	●	●	●	●	●	●	●	●	C1
Commodore 8023	E1,029	M 5×8		●			N/A	N/A	2		5,10	150	250	15	51,4×36,8	11,6	3	●	●	●	●	●	●	●	●	●	C2
Data Products DP55	E1,687	Daisywheel				2	9600	1000	6,8		10,12,15	55	198	15	44,4×60,4	24	6	●	●	●	●	●	●	●	●	●	S1
Data Products M100	E1,790	M 9×9		+	+	1	N/A	N/A	6,8		5,8,10,16,5	140	218	16	67,5×59,4	27	6	●	●	●	●	●	●	●	●	●	S1
Data Products M120	E1,741	M 7×7		+	+	1	N/A	N/A	6,8		5,10,16,7	180	220	16	67,5×59,4	27	6	●	●	●	●	●	●	●	●	●	S1
Data Products M200	E1,979	M 7×7		+	+	1	N/A	N/A	6,8		5,10,8,16,7	340	340	16	67,5×59,4	27	6	●	●	●	●	●	●	●	●	●	S1
Data South DS180	E1,604	M 9×7		+	●	1	9600	2000	6,8		5,6,8,25,10,12,16,5	180	217	15,5	60,9×40,6	16	6	●	●	●	●	●	●	●	●	●	D2
Diablo SP1/P11	E2,127	Daisywheel		●	●		9600	256	6,8		10,15	40	198	16	56,9×46,3	27,2	6	●	●	●	●	●	●	●	●	●	M2
Diablo 630	E2,127	Daisywheel		●	●		9600	768	6,8,12		10,15	40	198	16,5	56,9×46,3	27	6	●	●	●	●	●	●	●	●	●	M2
DMP 100	E2,49	M 5×7		●	●		1200	2000	6,8		10,12,5	50	80	9,5	40,6×20,9	3,9	1	●	●	●	●	●	●	●	●	●	T1
DMP 200	E4,99	M 9×23		●	●		1200	2000	6,8		10	120	120	9,5	41,9×34,3	7,5	3	●	●	●	●	●	●	●	●	●	T1
DMP 400	E6,99	M 7×9, 9×9		●	●		1200	2000	6,8		10,12,16,7	140	220	15	61,9×40,4	19	5	●	●	●	●	●	●	●	●	●	T1
DMP 500	E1,099	M 23×9		●	●		9600	2000	6,8		10,12,16,7	220	220	15	58,4×33	12,7	5	●	●	●	●	●	●	●	●	●	T1
DMP 2100	E1,399	M		●	●		1200	2000	6,8,12		10,12,16,6	160	232	15	55,2×38,1	20	8	●	●	●	●	●	●	●	●	●	T1
DRE 0820	E895	M 9×7		○	○		9600	500	6,8		10,12,5,15,16,7	150	266	15,5	64,7×47,6	23	5	●	●	●	●	●	●	●	●	●	G1
DRE 0830	E1,300	M 9×7		○	○		9600	500	6,8		10,12,13,3,15,17	180	226	15,5	64,7×47,6	23	5	●	●	●	●	●	●	●	●	●	G1
DRE 0840	E1,370	M 9×7		○	○		9600	500	6,8		10,12,13,3,15,17	240	226	15,5	64,7×47,6	23	5	●	●	●	●	●	●	●	●	●	G1
DRE 8910	E1,585	M 9×7, 9×11		○	○		9600	500	6,8		10,12,13,3,15,17	160	226	15,5	64,7×47,6	23	5	●	●	●	●	●	●	●	●	●	G1
DRE 8925	E1,660	M 12×8, 12×20		○	○		9600	500	6,8		10,12,15,16,7	120	226	15,5	64,7×47,6	23	5	●	●	●	●	●	●	●	●	●	G1
DRH 80	E621	M 7×9		○	○		9600	256	6,8		10,12,5,15,17,5	80	140	8	41,5×30	7,5	4	●	●	●	●	●	●	●	●	●	T1
DRH 136	E776	M 7×9		○	○		9600	2000	6,8		10,12,15,16,5	120	224	15,5	48,6×30,3	10,5	3	●	●	●	●	●	●	●	●	●	T1
DRS 250	E1,431	M 7×9		○	○		19200	512	6,8		10,12,15	250	198	6	61×45	25	5	●	●	●	●	●	●	●	●	●	T1
DWP 410	E995	Daisywheel		●	●		9600	2000	6,8		10,12	25	160	16	60,3×19,6	16	5	●	●	●	●	●	●	●	●	●	T1
Epson MX80	E401	M 9×9		●	+	+	1	19200	256	6,8	5,8,25,10,16,5	80	132	10	40,6×38,1	5,5	3	●	●	●	●	●	●	●	●	●	E1
Epson MX80 FT/3	E447	M 9×9		●	+	+	1	19200	256	6,8	5,8,25,10,16,5	80	132	10	40,6×38,1	7,7	3	●	●	●	●	●	●	●	●	●	E1
Epson MX82	E470	M 9×9		●	+	+	1	19200	256	8	17,2	80	159	10	40,6×38,1	7,7	3	●	●	●	●	●	●	●	●	●	E1
Epson MX100FT/3	E574	M		●	+	+	1	19200	256	8	16,5	100	233	15,5	59,7×40	10	3	●	●	●	●	●	●	●	●	●	E1
Facit 4510	E672	M 9×7		○	○		9600	712	6,8		6,12,16,17,5	100	132	11,5	42,5×34,8	9	5	●	●	●	●	●	●	●	●	●	A2
Facit 4525	E1,150	M 9×9		○	○		9600	512	6,8		5,8,5,10,17	280	132	11,5	46,5×35,6	13,5	5	●	●	●	●	●	●	●	●	●	A2
Facit 4542	E2,300	M 9×14		●	+	+	9600	800	6,8		10,12,15	250	232	18	64×45,7	40	5	●	●	●	●	●	●	●	●	●	A2
Fujitsu 830	E2,179	Daisywheel		+	●	●	1200	256	3,6,8		10,12,15	80	204	15	59,7×44,9	18	6	●	●	●	●	●	●	●	●	●	Z1
General Electric 2030	E961	M 9×7			+	1	1200	640	2,4,6,8,12		10,13,16,5	60	218	15,5	54,6×47,6	9,9	2	●	●	●	●	●	●	●	●	●	Z1
General Electric 2120	E1,751	M 9×7			+	1	1200	640	2,4,6,8,12		10,13,16,5	150	218	15,5	54,6×47,6	9,9	2	●	●	●	●	●	●	●	●	●	Z1
General Printer GP300	E2,287	M 9×9, 18×25		●	+		2	19200	380	6,8	10,12,15	300	120	13,5	52×44,5	20	5	●	●	●	●	●	●	●	●	●	I2
General Printer GP300L	E2,490	M 9×9, 18×25		●	+	●	2	19200	380	6,8	10,12,15	300	132	13,5	63,5×51,5	24	5	●	●	●	●	●	●	●	●	●	I2
Integrex	E914	M 7×5, 9×6		+	●	+	N/A	37	6,8		10,12	125	80	10	38,7×32,5	9,6	1	●	●	●	●	●	●	●	●	●	D3
ITT Swift 3342	E1,719	M 9×7			○	○	1200	640	2,3,4,6,8,12		10,13,16,5	150	240	15,5	56×47	10,4	6	●	●	●	●	●	●	●	●	●	I3
ITT Swallow	E914	M 9×7			○	○	1200	640	2,4,6,8,12		10,13,16,5	60	240	15,5	56×47	10	6	●	●	●	●	●	●	●	●	●	I3
Lear Siegler	E1,667	M 9×9					19200	2000	6,8		10,12	180	218	16	68,6×50,2	22,7	5	●	●	●	●	●	●	●	●	●	I4
Logabax LX213	E1,840	M 9×9		+	●	●	9600	4000	6,8		10,12,16,5	180	218	15	57,1×43,2	17	5	●	●	●	●	●	●	●	●	●	I3

Make & Model	Price inc VAT	Printhead Type (M = matrix)	INTERFACES ● inc in price, ○ = options at extra cost (+)					Max baud rate	Buffer Memory Size (in characters)	Lines per inch	Characters per inch	Max print Speed (DPS)	Max print positions	Max paper width in inches	Size (base area in cms)	Weight (in kilos)	Max Copies	Undersliding	Bold Type	True Descenders	Proportional Spacing	Block Graphics	High Resolution Graphics	Bi Directional	Logic Sealing	Feed Method						
			I-EEE	Centronics	20ma	RS232	Others ●																			Others (+)	Fan Fold	Roll	Cut Sheet	Tractor	Frictional	Distributor
PRINTERS																																
Texas Instruments 781	£1,259	Thermal 7×5		●	●		9600	256	6	10,17	120	80	8.5	40.6×15.24	8.5	1							●	●	●	●	●	●	●	●	D5	
Texas Instruments 810	£1,369	M 9×7		+	+		9600	256	6.8	5,8,10,16.5	150	132	15.5	65.4×50.8	25	9								●	●	●	●	●	●	●	D5	
Texas Instruments 820	£1,438	M 9×7			○	○	9600	2000	6,8	5,8,10,16.5	150	218	15.5	64×45.7	40	5									●	●	●	●	●	●	D5	
Texas Instruments 840	£847	M 9×9			+	+	9600	256	6,8	10,16.5	75	220	15	57.6×43.2	11.3	3									●	●	●	●	●	●	R1	
TRD 170S	£834	Daisywheel			○	○	19200	256	6	10,12,15	17	132	15.5	50.8×33	13	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	T2	
Toshiba T1350	£1,898	M			○	○	9600	256	6	10,12	192	192	15	55×38	19.9	3	●	●	●	●	●	●	●	●	●	●	●	●	●	●	T4	
Walters WM2000	£477	M 9×9		+	●	+	19200	750	6,8,12	5,6,6.8,3,10,13,3,16.6	128	132	10	43.9×33.5	12	4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	W1	
Walters WM4000	£713	M 9×9		+	●	+	19200	1500	6,8,12	5,6,6.8,3,10,13,3,16.6	150	220	15	63×39	13	5	●	●	●	●	●	●	●	●	●	●	●	●	●	●	W1	
ZX Printer	£60	Electrical					1	N/A	N/A	9	32	50	32	4	14×4.6	N/A	1	●	●	●	●	●	●	●	●	●	●	●	●	●	S5	

MONITORS

These have been split into **colour** and **monochrome**.

Screen size is a diagonal measurement in inches. Nearly all monochrome monitors accept a **composite video** signal from the computer and most computers are equipped with composite video output. Colour monitors feature a wider range of **signal** systems than mono and it is important to match the output of your computer to the input of the monitor.

An **audio channel** will enable sound to be output from a speaker inside the monitor. **Mono tint** refers to the colour of the text on a mono monitor. Some monitors come with an **anti-glare filter** to relieve operator discomfort.

Band width refers to the frequency range of signals to which the monitor can respond in Megahertz. **Dot resolution** indicates the number of dots which can be displayed across the screen; the more dots, the sharper the picture.

Dimensions indicates the area the unit occupies on the desktop.

Make & Model	Price inc. VAT	Screen size (in inches)	Signal				Audio channel	Anti-glare filter	Band width (in MHz)	Dot resolution	Dimensions (cms)	Weight (kilos)	Distributor
			Modulated PAL	Unmodulated PAL	TTL RGB	75 Ohm linear							
Crofton C1401	£300	14	●						10	600	37x42	10	C4
HM 2713	£3,120	13	●						25	720	54x40	36	B1
HM 2719B	£2,553	19	●						25	960	50x49	46	B1
HM 2719C	£3,042	19	●						25	960	50x49	46	B1
HM 3619	£3,548	19	●						45	1280	50x44	48	B1
Lion Cub 1431-TTL	£286	14	●						7	585	65x57.5	11.5	S6
Lion Cub 1436	£316	14			●				7	585	65x57.5	11.5	S6
Lion Cub 1439	£339	14			●				7	585	65x57.5	11.5	S6
Lion Cub 1441-TTL	£546	14	●						15	585	65x57.5	11.5	S6
Lion Cub 1445	£633	14			●				15	585	65x57.5	11.5	S6
Lion Cub 1449	£604	14			●				15	585	65x57.5	11.5	S6
Lion Cub 1451-TTL	£430	14			●				10	653	65x57.5	11.5	S6
Lion Cub 1455	£483	14			●				10	653	65x57.5	11.5	S6
Lion Cub 1459	£459	14			●				10	653	65x57.5	11.5	S6
Lion Cub 2031-TTL	£344	20	●						7	585	65x57.5	11.5	S6
Lion Cub 2035	£431	20			●				7	585	65x57.5	11.5	S6
Lion Cub 2036	£390	20			●				7	585	65x57.5	11.5	S6
Lion Cub 2039	£371	20			●				7	585	65x57.5	11.5	S6

COLOUR MONITORS

Make & Model	Price inc. VAT	Screen size (in inches)	Signal				Audio channel	Anti-glare filter	Band width (in MHz)	Dot resolution	Dimensions (cms)	Weight (kilos)	Distributor
			Unmodulated PAL	TTL RGB	75 Ohm linear	32 bit 4 bit TTL							
Lion Cub 2051-TTL	£646	20		●					10	940	65x57.5	11.5	S6
Luxor Digital	£574	14		●					25	800	N/A	15.7	P1
Luxor Linear I	£597	14		●					25	800	N/A	15.7	P1
Luxor Linear II	£643	14		●					25	800	N/A	15.7	P1
Microtech 14	£402	14	●	●					18	585	33.7x40.8	12.6	M6
TM 22	£329	6		●					5.5	N/A	22x34.5	4.1	J3
VM 14 PSN	£378	14		●					5.5	300	47x40	13.6	J3
Wolf Cub 1435-TTL	£358	14		●					7	653	65x57.5	11.5	S6
Wolf Cub 1446-TTL	£587	14		●					15	895	65x57.5	11.5	S6
Wolf Cub 1456	£454	14		●					10	653	65x57.5	11.5	S6

Make & Model	Price inc. VAT	Screen size	Composite video	Audio channel	Mono tint	Anti-glare filter	Band width (MHz)	Dot resolution	Dimensions (cms)	Weight (kilos)	Distributor
AVT DM 210G	£138	12	●		Green	●	12	750	30.8x29.6	9.5	L1
EG 100	£77	12	●		Green	●	8	700	37.5x29	8	L1
EG 101	£91	12	●		Green	●	12	700	37.5x29	8	L1
LEDIM 091D	£99	9	●		B&W	●	12	750	22x24	5.4	L1
LEDIM 0910	£121	9	●		Green	●	12	750	22x24	5.4	L1
Luxor 10	£212	10	●		Orange	●	22	625	N/A	8	P1
Luxor 15	£283	15	●		Orange	●	22	625	N/A	13	P1
M9	£131	9	●		Green	●	15-22	650	22.4x25.7	5.7	P1
M12	£144	12	●		Green	●	15-22	800	29.3x30	9.3	P1
Novex	£114	12	●		Green	●	12	750	N/A	N/A	P1
N12 1003	£112	12	●		Green	●	24	800	23x26.5	7	P1
Prince	£126	12	●		Green	●	24	800	33x50	7	C4
PM 102	£126	9	●		Green	●	24	800	22x28	7	C4
PM 1201	£138	12	●		Green	●	24	800	33x50	7	C4
Zenith ZVM121	£99	12	●	●	Green	●	15	N/A	29x29	6.5	P2

MONOCHROME MONITORS

Make and Model	Price inc VAT	Capacity	No. of disks	Tracks	Sectoring	Sales and density	Connects to								Distributor	
							I-EEE	RS232	BBC	Apple II	St. Shugart	Nubus	Gemini	20ma		Others
EG 401AT	£370	102K	2	40	Soft	SS,DD					●					L1
Gemini 825	£403	400K	1	80	Soft	SS,DD						●				G2
Gemini 825	£518	800K	1	160	Soft	DS,DD										G2
Gemini 825	£661	800K	2	80	Soft	SS,DD							●			G2
Gemini 825	£776	1.6Mb	2	160	Soft	DS,DD								●		G2
Lowe EG 400AT	£426	200K	2	40	Soft	SS,DD								●		L1
Low EG 400T	£253	102K	1	40	Soft	SS,DD								●		L1
M 4853	£311	1Mb	1	80	Soft	DS,DD								●		A3
M 4854	£368	1.6Mb	1	77	Soft	DS,DD								●		A3
Megastore MIOS	£1,034	1.2Mb	2	80	Soft	DS,DD								●		V1
Multi Floppy Drive	£592	8Mb	5	770	Soft	SS,DD					●					H1
RIM MDS-1	£1,950	144K	1	40	Soft	DS,DD						●				R3
RIM MDS-2	£2,147	288K	2	40	Soft	DS,DD						●				R3
Scorpio 8	£863	8Mb	5	770	Soft	SS,DD										H1
Sharp MZ80 FB	£856	560K	2	70	Soft	DS,DD									●	S7
Tandy Colour	£449	175K	1	40	Soft	SS,DD									●	T1
Tandy 26-1160	£299	75K	4	40	Soft	SS,DD										T1
Tandy 26-3023	£299	156K	4	35	Soft	SS,DD										T1
Tandy Model 1	£389	90K	1	35	Soft	SS,DD										T1
Tandy Model 111	£369	175K	2	40	Soft	SS,DD									●	T1
TM 101-4	£282	1Mb	1	160	Soft	SS,DD					●					H1
TM 102-2	£393	2Mb	1	160	Soft	SS,DD					●					H1
TM 848-1	£389	800K	1	77	Soft	SS,DD					●					H1
TM 50-1	£147	250K	1	40	Soft	SS,DD					●					H1
TM 100-1	£158	250K	1	40	Soft	SS,DD					●					H1
TM 100-2	£221	500K	1	80	Soft	DS,DD					●					H1
TM 100-4/4M	£247	1Mb	1	160	Soft	DS,DD					●					H1
Tracker 1	£373	1Mb	2	80	Soft	SS,DD								●		D7
Tracker 2	£497	2Mb	2	80	Soft	DS,DD										D7

8" DISK DRIVES

Make and Model	Price inc VAT	Capacity	No. of disks	Tracks	Sectoring	Sales and density	Connects to								Distributor	
							I-EEE	RS232	BBC	Apple II	St. Shugart	Nubus	Gemini	20ma		Others
ACP 700 (AC)	£293	1Mb	1	77	Soft	DS,DD										E2
ACP 750 (DC)	£316	1Mb	1	77	Soft	DS,DD										E2
ACP 1500 (DC)	£403	2Mb	1	77	Soft	DS,DD										E2
Caldisk 142M	£465	500K	1	77	Both	SS,BD									●	E2
Caldisk 143M	£522	1.2Mb	1	77	Both	DS,BD										F1
Caldisk 143M-1	£465	500K	1	77	Both	SS,BD								●		F3
Commodore 8280	£2,760	987K	2	77	Soft	DS,DD					●					C2
Canon X 8330	£1,200	2Mb	2	153	Soft	DS,DD									●	C5
Control Data 9404B	£684	800K	1	77	Both	SS,BD										M5
Control Data 9406-4	£1,144	1.6Mb	1	77	Both	DS,BD								●		M5
Eicon FD8/1D/DD	£1,338	1Mb	1	77	Soft	SS,DD						●				E3
Eicon FD8/1D/SD	£1,397	500K	1	77	Soft	BS,SD						●				E3
Eicon FD8/2D/FBR	£1,740	1Mb	2	77	Soft	DS,SD									●	E3
Eicon FD8/2D/DD	£2,013	2Mb	2	77	Soft	SS,DD							●			E3
Eicon FD8/2D/SD	£1,972	1Mb	2	77	Soft	SS,SD							●			E3
Eicon FD8/1D/FBR	£1,240	500K	1	77	Soft	DS,SD									●	E3
F 311	£1,725	1.2Mb	2	76	Soft	DS,SD										B5

Make and Model	Price inc VAT	Capacity	No. of disks	Tracks	Sectoring	Slides and density	Connects to									Distributor	
							1-EEE	RS232	BBC	Apple II	St. Shugart	Nubian	Gemini	20ma	Others		
8" DISK DRIVES																	
F 320	£2,300	2.4Mb	2	76	Soft	DS.DD											B5
M 2894	£499	1.6Mb	1	77	Soft	DS.DD					●						A3
M 2896	£493	1.6Mb	1	77	Soft	DS.DD											A3
Megastor 11 DD	£1,133	2Mb	2	77	Soft	DS.DD					●						V1
Megastor 11SD	£1,018	1Mb	2	77	Soft	DS.DD											V1
Megastor 111	£1,121	2Mb	2	77	Soft	DS.DD					●						V1
R.M. FDS-2	£3,789	1Mb	2	77	Soft	DS.DD			●								R3
Tandy Model 11	£999	486K	1	77	Soft	DS.DD											T1
Tandy Model 16	£949	1.2Mb	1	77	Soft	DS.DD											T1
Tandy Model 16	£1,549	2.5Mb	2	77	Soft	DS.DD											T1

MODEMS

A modem interfaces a computer and the telephone system so computers can communicate over long distances. It converts data to electrical pulses or sounds that can be sent down the line. A modem can be connected to the line directly or acoustically. A **D** in the connection column represents direct link, while **A** indicates acoustic. The acoustic coupler is like a female telephone handset with a speaker in the coupler opposing the phone's mouthpiece and a microphone opposing the earpiece. A **B** in this column indicates that both methods of attachment are available. **Baud** rate shows the speed with which the data is transmitted.

The modem must be connected to the computer through an interface. The interface column lists the main interfaces featured on each modem. **Asynchronous** means that data may be transferred at intervals as available or as needed. **Synchronous** data is transmitted at regular intervals. **Simplex** transfers data in one direction, while **Half duplex** can transmit/receive in either direction, but not simultaneously. **Full duplex** transmits and receives information in both directions at once.

Some modems can **originate** a call or start a two-way conversation. **Answer** means they can respond to a call from another computer.

Make and Model	Price inc VAT	Connection	Data Rates (baud)	Interface	Others	Capabilities							Distributor Code
						Asynchronous	Synchronous	Simplex	Half Duplex	Full Duplex	Originate	Answer	
AJ 311	£320	B	300	RS232									A5
AJ 1222	£736	D	1200	RS232		●	●		●	●	●	●	A5
AJ A211	£263	A	300	RS232		●	●		●	●	●	●	A5
AJ 1234	£684	A	1200	RS232		●	●		●	●	●	●	A5
AJ 1256	£684	B	1200	RS232		●	●		●	●	●	●	A5

DISTRIBUTORS

A1 Appropriate Technology, 01-625 5575 A2 Advent Data Products, Melksham 706289 A3 Allex Microcomputers Ltd, Reading 791579 A4 Atari International (UK), Slough 33344 A5 Anderson Jacobson Ltd, Slough 25172
 B1 Bytech, Reading 61031 B2 British Olivetti, 01-785 6666 B3 Barron McCann, Biggleswade 316286 B4 Bencom Sendata (UK), 01-840 1386 B5 Baydel Ltd, Leatherhead 378811 B6 BASF, 01-388 4200
 C1 Centronics, 01-581 1011 C2 Commodore Business Machines, Slough
 D1 Diacom, Evesham 3591 D2 Datatrade Ltd, Northampton 22289 D3 DNCs Ltd, 061-643 0016 D4 DRG, Weston-super-Mare 415986 D5 Data Systems Division, Bedford 223889 D6 Data Efficiency, Hemel Hempstead 63567 D7 Data Tech Technology, New Milton 619650 D8 Diacom Systems, Milton Keynes 76787
 E1 Epson (UK), 01-900 0466 E2 Elicomatic, 041-861 5825 E3 Eicon, Barhill 81825 E4 Environmental Equipments Northern Ltd, Nantwich 625115
 F1 Fastlot, Reading 791557
 G1 Geveke Electronics, Woking 26331 G2 Gemini Motors, Amersham 28321
 H1 HAL Computers Ltd, Farnborough 517175 H2 Haywood Electronic Assoc, Ltd, 01-428 0111
 I1 Informex Ltd, 01-318 4213 I2 Intac Data Systems, Rotherham 547170 I3 ITT Business Systems, Brighton 507111 I4 ITT Consumer Products, Basildon 3040 I5 Intelligent Interfaces, Stratford-upon-Avon 296879

AM 211	£387	B	300	RS232											A5
Bermac 1200/1 Model A	£414	D	1800	RS232		●	●	●	●	●	●	●	●	●	B3
Bermac 1200/1 Model B	£460	D	1800	RS232		●	●	●	●	●	●	●	●	●	B3
CCITT CAT	£228	A	300	RS232/V24		●	●	●	●	●	●	●	●	●	D8
CDSV22	£719	D	1200	RS232/V24		●	●	●	●	●	●	●	●	●	D8
DSL2123	£329	D	300/1200	RS232/V24		●	●	●	●	●	●	●	●	●	D6
Sendata 700 Series A	£253	A	300	RS232, 20ma	1	●	●	●	●	●	●	●	●	●	B4
Sendata 700 Series B	£224	A	300	RS232, 20ma	1	●	●	●	●	●	●	●	●	●	B4
Sendata 700 Series C	£309	A	600-1200	RS232, 20ma	1	●	●	●	●	●	●	●	●	●	B4
Sendata 700 Series D	£309	A	75-1200	RS232, 20ma	1	●	●	●	●	●	●	●	●	●	B4
Sendata 700 Series E	£149	A	300-1200	RS232, 20ma	1	●	●	●	●	●	●	●	●	●	B4
Racal 126 LS1	£782	D	2400	V24		●	●	●	●	●	●	●	●	●	R2
Racal MPS 3021	£295	D	300	V24		●	●	●	●	●	●	●	●	●	R2
Racal MPS 1222	£678	D	1200	V24		●	●	●	●	●	●	●	●	●	R2

PLOTTERS

Plotters use a pen to put graphics or characters on paper under the command of a computer. They are usually one of two types—flatbed or drum. A **flatbed** holds the paper flat while the pen draws on it in two dimensions. A **drum** plotter turns the paper vertically on a cylinder while the pen moves horizontally. Most plotters can change pens during operation so a variety of colours and line thicknesses are possible. **Max pens** indicates the number of pens in operation or on standby. Dimensions of the paper to be used are listed under **paper size**. **Maximum plotting speed** measures the distance in millimetres per sec covered by the pen. **Interfaces** are included in the basic price or come at extra cost.

Make and Model	Price inc VAT	Type	Max Pens	Paper Size	Maximum Plotting Speed in secs	Interface (+/- extra cost)	Distribution
Calcomp 81	£3,392	Flat	8	A3	30cm	RS232 or IEEE	C3
HP 7470A	£1,317	Drum	2	A4	38.1cm	RS232 (IEEE +)	H2
PD4	£585	Flat	1	A4	700mm	(IEEE +)	J2
Strobe 100	£662	Drum	1	A4	7.6cm	(RS232, Parallel +)	D6
TRS-80 Pen Plotter	£1,399	Flat	6	A4	6.8cm	RS232	T1
Watanabe WX 4633	£2,772	Flat	10	A3	250mm	(Centronics, RS232, IEEE +)	E4
Watanabe WX 4634	£2,515	Flat	2	A3	250mm	(Centronics, RS232, IEEE +)	E4
Watanabe WX 4635	£2,301	Flat	1	A3	250mm	(Centronics, RS232, IEEE +)	E4
Watanabe 4636	£3,074	Flat	10	A3	400mm	(Centronics, RS232, IEEE +)	E4
Watanabe 4637	£2,862	Flat	2	A3	400mm	(Centronics, RS232, IEEE +)	E4
Watanabe 4638	£2,635	Flat	1	A3	400mm	(Centronics, RS232, IEEE +)	E4
Watanabe WX 4671	£1,129	Flat	1	A3	50mm	Parallel (RS232, IEEE +)	E4
Watanabe 4675	£1,638	Flat	6	A3	50mm	Parallel (RS232, IEEE +)	E4
Watanabe 4731	£1,761	Drum	4	A3	200mm	(Centronics, RS232, IEEE +)	E4

J1 Jones & Brother, 061-330 6531 J2 J J Lloyd Instruments, Locks Heath 4221 J3 JVC, 01-450 2621

L1 Lowe Electronics, Maitock 4995

M1 Mitsui & Co Ltd, 01-600 1777 M2 Modata, Tunbridge Wells 41555 M3 Mannesmann Tally Ltd, Reading 788711 M4 Micropute, Macclesfield 615384 M5 Microwave, 01-272 6237 M6 Microtech Leeds, Leeds 679964

N1 Newbury Data Recording, Newbury 48864

P1 Phoenix Technology, 01-737 3333 P2 Pete & Pam Computers, Rossendale 227011

Q1 Quime (UK) Ltd, Reading 584646

R1 Rair Ltd, 01-836 6921 R2 Riva Terminals, Woking 71001 R3 Research Machines Ltd, Oxford 249866

S1 Sinton Electronics, Reading 874664 S2 Sord, 01-930 4214 S3 Storton, Coventry 613521 S4 Systime, Leeds 702211

SS Sinclair Research, Camberley 681666 SE Silicon Express, Leicester 374917 S7 Sharp Electronics, 061-205 2333

T1 Tandy Company, Walsall 648181 T2 Triumph Adler, 01-250 1717 T3 Technology For Business, 01-837 1271 T4 Toshiba

Office International, Sunbury-on-Thames 85666

V1 Viasak, High Wycombe 448633

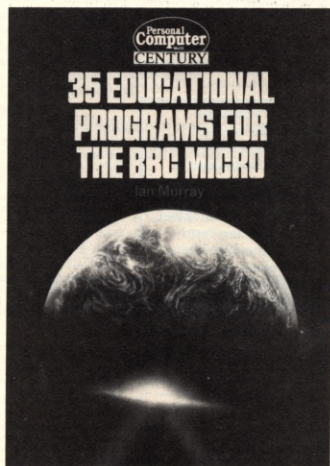
W1 Walters Microsystems Int Ltd, High Wycombe 445175

X1 X-Data Ltd, Slough 723331

Z1 Zygol Dynamics, Bicester 3361



YOUR SEARCH FOR FULLY TESTED EDUCATIONAL PROGRAMS FOR THE BBC MICRO IS OVER



35 EDUCATIONAL PROGRAMS FOR THE BBC MICRO

Ian Murray

Here is a selection of fully documented programs ranging from mathematics to geography, history and general science to spelling.

Designed for use in schools, colleges – all programs have been checked in a classroom environment – and at home, this book will allow you to put your BBC to work as soon as it is unpacked. Each program makes full use of the BBC micro's remarkable graphics capabilities and together they provide a useful insight into programming techniques.

£6.95 (paperback)

240 pp

Available through all good bookshops but if you experience any difficulty please fill in the form below.

ORDER FORM

To: Department EP 2
George Philip Services Ltd
Arndale Road,
Wick, Littlehampton,
West Sussex BN17 7EN

Please send me copy/copies
of 35 EDUCATIONAL PROGRAMS FOR THE BBC
MICRO by IAN MURRAY at £7.55 per copy (post paid)

I enclose my cheque/postal order for £ _____
(Please make cheques/postal orders
payable to George Philip)

Name _____

Address _____

Please allow 28 days for delivery

CENTURY

Philips 7000 videogame, 16 cartridges including Mucklin (Pac-man), Space Invaders, Satellite Attacks (asteroid), Black Jack and various others. Also included a dust cover and TV/aerial combiner. £200. Tel: Glasgow 041-883 3589.

BBC Model B, one month old with cassette cable and blank tapes, Acorn users magazines, mint condition, hence £400. Also Rocket-Raid and Monsters at all last price. Tel: Kang on 01-703 4621 evenings/weekends.

Sinclair ZX81 16K, with manual, leads etc. based, over 150K software on tape inc. Invaders, Scramble, Breakout, Football Manager, £75. Tel: Johnstone (Scotland) 24183.

Atari TV 48K + five cartridges, Combat, Space Invaders, Missile Command, Defender and Pac-man. Also cartridge box. £110 now. Tel: Bathgate (0596) 52599.

Video Edge 16K, Much software on tape inc. I basic, EDTASM, Datacube, etc. Also included printer interface, manuals, original packing, etc. £175 or exchange for DOT matrix printer. Tel: 01-761 1692 (Dulwich, S London).

Open University £175.00. Microprocessors and Product Design. 8085 based development system. Proper Keyboard, peripheral board with motor, speaker, thermostat etc to model virtually any product. Complete course work. £270. Tel: Paul on 01-991 0029.

48K Spectrum, perfect condition, £160 software including: Pimania, Schizoids, Hobbit, Timegate, Orbiter, Black Crystal, Assembler, Chess, Ground Attack, Intruders, Gnasher, Escape, Flight Simulator and many more. Only £180. Tel: Mark (Ruslip) 35966.

Good computer books, hardly used, eg Programming The Z80 and four other books about computing and Basic. Tel: 01-864 4581.

TRS-80 Level 2 plus high resolution graphics, monitor, cassette deck and over 40 programs. Total cost over £700. Sell for £350 now. 8 Woodlands Park Road, Maidenhead, Berkshire or Tel: Maidenhead 73707 after 5pm.

Atari VCS complete with 11 cartridges including Space Invaders, Basketball, Superman. Cost new around £320. Will accept £100. Might separate. Tel: Southampton (0703) 787036.

ZX81 and 16K RAM with Dean high quality keyboard and metal case with space bar and six extra keys, also £90 worth of best software available. Will accept £120. Tel: 01-654 6986 (Croydon).

Exchange Mattel Intellivision plus cartridges (all boxed as new) for Atari 400 or 800 computer. Tel: Wolverhampton (81) 759979.

Dragon 32K, plus £200 worth of software and joystick. Only £250. Tel: 01-9977908 after 7pm.

ZX81 16K two months old with computer tape recorder, sound box, manual and five games tapes. £100. Tel: 051-334 6316 after 5pm.

Centronics interface, 64 ASCII characters only. (No graphics). Standard Centronics interface. Will run on Dragon 32, BBC, Oric, Bi-directional industrial quality, with stand. £150. Tel: 01-856 1198 after 8.30pm.

ZX81, 16K plus power pack, leads, manual, very good condition. Worth £70, will accept £60-65. Robert Pearson, 11 Fernleigh Gardens, Dorey Fields, Stafford ST16 1HA. Tel: £2207 after 7.30pm weekdays. Plus magazines.

Pet 4032 computer, 2 Basic and 2 Basic 4. Textool ZIFs on main PCB. Comes with JCL eprom programmer, IEEE to Centronics interface, programs and manuals. £375. Nuttall, Guildford. Tel: (0483) 892217.

Vic-20 + 822N Switchable 10K-RAM Adventureland, Star Battle, River Rescue, Starquest and Encounter Program. Night, Blitz, and many more, with joystick, very good condition, only four

PCN Billboard

months old. Costs around £375. Will guarantee. £230. Tel: Lee on 01-941 0619 after 4pm weekdays.

Atari VCS with six cartridges—Pac-Man, Defender, Space Invaders, Asteroids, Combat and Tennis. Cost owner £230, good condition, paddles, joysticks and all extras. Only £150. Tel: (0793) 764338 (Swindon).

Vic-20 Software for sale, Frogger, Cosmaids, Shark Attack, Blitz, plus Getting Acquainted With Your Vic-20, £18 the lot. Wanted Super Expander or Programmer's Aid Cartridges. Tel: 061-368 6935 after 6pm.

Sharp MZ8001, 19 months old, excellent condition, four languages, Knight Commander, Copy File, plus approx 185 programs, dust cover, £430 or will swap for BBC B. Tel: 0264 58454 evenings.

Casio FX502P programmable pocket computer complete with cassette interface unit, manuals, case, overlay cards etc. Music facility. Cost about £100 originally, will accept £50. Phone: 01-531 2892 evenings/weekends.

BBC B two months old, mint condition, original packing, including Welcome package cassette lead £360 now. Telephone 0844 64545 office hours only. Ask for Idria. Can deliver Birmingham area.

ZX81 + 16KRAM also Kayde's 4K graphics board and high resolution

tractor feed up to 10-inch paper, £240. New £290, yours for £240. Tel: 08692-2831.

Casio-702P with manual and printer, good condition for use, £80. And Casio-3600P programmable with Integration. £10. Write to C Chan, 21 Bunbury Road, Northfield, B'ham B31 2DR.

UK101 8K each 1-2MHz new monitor 300 and 600 baud rates, large quantity of software £75 now. Ring March 55871 evenings only.

Tandy Colour Computer? Five games written in Basic. Learn programming techniques, includes Lander. Tel: Mark Davies (0922) 691618. Requires 16K or 32K extended memory.

Atari VCS perfect condition, complete with all accessories. 14 cartridges including star raiders, Warlords, Missile Commander, Adventure, Indy 500, Asteroids, Basic Programming. £200. Ring 01-578 5933 evenings + weekends.

MPF II computer 64K Applesoft compatible 3 months old, hardly used. Cost £284. Will sell for £175 now. Telephone Skelmardale 25190 after 6pm or weekends.

48K Spectrum, Modeller, Supervisor, Masterfile, Spectrumsound, Timegate, Meteors, Horizons, Print 'n' Plotter Jotter, +2 demo tapes; all excellent

joystick and £400 worth of software. £350 now for quick sale. T. Wilson, 21 Cheriton Field, Fulwood, Preston, Lancs. PR2 3WH.

ZX81 16K RAM professional keyboard, £25 of books, £60 of software, plus ZomX81 sound board, worth £200, sell for £100 now. Contact 720-4531 after 4pm. Complete with leads.

Swap or sell two-month-old VIC-20 + books, £105 or swap for 16K Spectrum with tapes or preferably 48K Spectrum. Quick sale. (See prosbook). Tel: 01-889 4307 ask for Neil.

Will swap — a 6ft x 3ft snooker table and accessories, new unwanted Xmas gift, for Vic-20 expanded or unexpanded. Phone: 01-300 3073.

ONE BBC Computer for quick sale. Excellent condition, seven cassettes, including magazines, and manuals. Accept £175 now. Tel: 444 1580 after 6pm, ask for Roger.

Eprom HX-20 complete with micro cassette and case bought £480 sell practically unused £350 including cables, manuals, extra ribbon and cassettes. Tel: 01-883 5153 all day.

Acorn Atom 12K + 12K F.P. PSU. Software: Pacman, Invaders, Galaxian, Scramble, Asteroids, Startrick, etc. £200. Tel: Southend (0702) 202142.

Sharp MZ80K 48K RAM with SP5025, Xtal Basic and manuals, also software including Startrek, Valley, Dark Star, Mame Adventure, Wizards Castle and many more. £300. Tel: Bradford 0274 668247 after 6pm please.

Do you write space games or adventure games for the ZX81 or Spectrum? I'm a beginner and would like some hints. A Bone, 138 Singlewell Road, Gravesend, Kent, England.

Wanted. Any Spectrum software for 16K or 48K. Especially The Hobbit and Flight Simulation. Phone Gravesend (0474) 332477 after 5pm and ask for Andy. Many thanks.

16K ZX81. Games for sale: Scramble £1, Asteroids £1, Flight Simulation £1.50, Breakout £1. Phone Gravesend (0474) 332477 after 5pm and ask for Andrew. Great Bargains!!! (copies).

ZX81 64K and seven games tapes. Cost around £140 going for only £90. Tel: Hornead 595304.

ZX81 1K plus cassette with six games £30 now. Also super programs 1 and 20 £4 each. Also, Nigel Magowan, 46 Drum-lough Road, Hillsborough, Co Down BT26 6PX.

For sale. Atari video computer system, two joysticks, two paddles, plus two free cartridges Pacman and Combat. Tel: 63609 Jason Boswell, The Chase (PH) Thetford, Norfolk, England.

Texas TI-59 magnetic card programmable calculator, C/P printer Aviation module, separate power supply/charger & manuals. Tel: 01-958 5600 any time.

ZX81 plus 16K RAM pack, software plus another 140+ 1-16K games on six cassettes. Sinclair books and magazines plus Sinclair recommended tape recorder with tape counter. Will accept first offer of £90. Tel: Southampton 60079.

Oric-A game-tapes The Castle and Oric Flight as new. £12 only. Computer's best sold. C Kong, 24 Horton Park Avenue, Bradford BD7 3BL, West Yorkshire.

Atari VCS and eight cartridges: Space Invaders, Pacman, Asteroids, Startrick, Dragster etc. All leads and controllers, £130 now. Tel: Hertford 551173 (after 6pm).

Pet 4032, all manuals, software cassette unit, lots of extras, £300 now. Tel: 0908 677931.

Acorn Atom 12K+12K, V.I.A. Floating Point, colour board (not fitted), manuals and data sheets, software includes Bagammon, Invaders, 3D Maze, Minefield, adventure-type game and more. PSU included. £200. Tel: 0480 212904.

I've got a huge collection of software for the BBC, Dragon, Spectrum, ZX81 or

The overwhelming response to PCN's Billboard service is causing delay in publication of some advertisements. To solve this growing backlog and to cover some of the publication costs we propose to make a small charge for each ad. So to take advantage of the free service while it lasts get your completed form to PCN's offices at 62 Oxford Street, London W1A 2HG by Friday, June 10. Every form received after this date must be accompanied by a postal order or cheque for £1.50 made payable to VNU Business Publications. And remember — we can publish only non-business advertisements sent in on the Billboard form provided.

toolkit. Games and book. Total worth £130, still under guarantee. Bargain at £60. Telephone 021-360 1896, after 3pm.

16K ZX81 all leads, books including games like Defender, Gold, Island and more books etc. The lot £65. Also wanted Texas TI99/4A complete, please phone Tenterden 4726.

48K Spectrum, printer, software £50. Magazines 3 rolls of printer paper. 7 months guarantee, original packing, worth £350. Sell for £230. Telephone Farn 58497 after 6pm.

789-48 software modules, Tombstone City £15. Addition and Subtraction £15. Also Editor/Assembler manual £12 and Teach Yourself Basic (two cassettes) £5. Phone: 01-206 0796 evenings/weekends.

Spectrum, Software swap: Arcadia, OS Chess Player, OS Meteor Storm, Great Britain Ltd., Ground Attack (Silver-soft), for other Spectrum software. Tel: Michael 01-340 2630 (Archway/Highgate).

Free booklet with ZX81 1K gamespack: Defender (three attack waves), Ono and Pontoon (play computer), Horse Racing (exact simulation) and many more. Only £1.50. C Parkes, 18 Field View, York, YO3 6EJ.

Wanted Dragon 32K, plus leads and any software, preferably in Yorkshire area. Details please and price to Paul 0535 272726 after 5pm urgent.

Star DP 8480, High res graphics friction

condition; all available documentation, just £215 now. Amazing offer! Phone: 01-866 1444 after 7pm.

WANTED BBC Model B in good condition. Tel: Holywell 713531 eves or weekend.

48K Spectrum for sale excellent condition + plenty of software (Hobbit + time-gate + Pimania etc.). Manual misplaced but Spectrum book, therefore only £120. Phone: 0832-74559 (Dunfermline) and ask for David.

ZX81 unwanted cassettes include Flight Simulation, £3.50. Gulp £1.50. 3D Monster Maze, £3. 1K Breakout, £1 or all for £8. Tel: Neil on Fareham 27806 after 6pm.

Atari 400 software original 16K tapes, excellent condition. Caverns of Mars £12, Ghost Hunter £10, Recharge £7, Sunday Golf £7, Chicken Road £10. Phone Swanley 69281.

BBC Model B (OS 1.2) + disk interface + drive, cassette player, manuals, leads etc. Also tons of software inc. Machine Code monitor in ROM. Only £699, sell disk separately if required. Phone Uxbridge (0895) 35129.

Sell swap Sony TC7377 open reel stereo recorder D1761, Denton speakers Avo 7 needs repair, £70. Leads, £25, each or want computer etc. Mel Saunders, 7 Drumcliff Rd, Leicester.

VIC-20 cassette, Machine Code monitor 8K RAM expansion, 3 slot motherboard, Machine Code and Basic books,

V-Genie computers. Ready to swap? Call: 01-455 5743.

ZX Spectrum unwanted present 16K, with 8 game tapes and cassette recorder, program games book, worth £190. The lot for £130. Phone: 578 4961 after 7pm. Greenford, Middx.

BBC software to swap for other software, particularly utilities and adventures but anything considered. Tel: 061-225 2769, ask for Paul.

Intellivision TV game with voice module and B17 Bomber, plus 12 more games and £100. For quick sale only £225 one. Tel: 01-891 3079.

Newbrain word processor options include save/load to tape, paged organisation, directory look-up, full error detection, advanced text packing. Most normal w/p functions. Manual, cassette, £5. K. Polston, 19 Marshalls Drive, Romford, Essex RM1 4JR.

ZX81 16K0 keyboard, gamebook, ZonX sound unit, music book, £20 worth of software and manual, leads etc. Worth £170. Bargain at £127 one. Phone: S. Kenton on 600-6007 after 4.15 pm. Inc Spectrum Extension board.

Wanted urgently, Sharp MZ80B cash waiting, good price paid. Watford 646955. **Sharp** converter tapes. MZ-80A to MZ-80K and MZ-80K to MZ-80A etc. Other cassettes also. For details phone 061-439 4841 or sac. 38 South Parade, Bramhall, Stockport.

Sharp MZ80K 48K, Basic, Zen Assembler, Machine Code, all manuals, 150+ programs including Toolkit, Arcade Games, Adventures, utilities and machine code floating point routines. £400. Nantwich (0270) 628587.

Adventure cartridges for Vi-20 available for swap. Adventureland available in exchange for any other. Ring Lichfield (0543) 55555 evenings.

ZX81 joysticks for sale. Twin micro-gen joysticks complete with interface plus instructions cost £45. Bargain at £20 one. Tel. Bridgend 68371.

Sinclair ZX81 1K perfect condition with Kempston Click keyboard and JRS £5 software voucher. £40 one. Tel: Steve Churchill 852-4085, evenings and weekends only.

ZX81 16K with flexisity buttons; 3 software cassettes; 3 books; leads £45. Tel: 0656 62804 (6pm).

Spectrum Programs on cassette Yates £3. Compass Logo draws pictures and teaches compass directions £4. Cheques to £100. Dolphin, 8 The Handbridge, Highgate Park, Fulwood, Preston, Lancashire PR2 4LE s.a.e. for details.

Sinclair ZX81 with 16K RAM. Basic manual and power pack. Good condition, only £50. Tel: Medway 369557, evenings.

Wanted: for 16K ZX81 tapes and possibly books. Pay and reasonable price. Write: David Bunce, The Boarding House, O.E.S., Kirby Lonsdale, via Carnforth, Lancs. LA6 2HJ. Phone after 4pm. Kirby, Lonsdale, 71061.

Atari software for sale or exchange. See for list. Hepburn, 4 Cardinal Avenue, Clonsilla, Surrey KT2 5SB.

PC1500 software — send for list. Clifford, 47 Carters Way, Wisborough Green, West Sussex.

American PC magazines available and wanted. See list. Smith, 84 Edenfield Gardens, Worcester Park, Surrey KT4 7DY.

BBC software to exchange for other original software. Planctodis, Philosophers Quest, also Bug Byte Music Synthesiser. Tel: Lancing (Sussex) 762093.

Vi-20 plus C2N cassette, 3K RAM pack, joystick, Space Storm, Nightflight, Presentations software, books, £180. Will swap for 48K Spectrum. John Dunn, 82 Plessey Road, Blyth, Northumberland.

Heath Electronics, semiconductor, digital, and microprocessor home study courses. All complete with learning labs, course materials and many components.

Billboard

£50 each. Send s.a.e. for details. M. Goodson, 44 Balliswells Drive, Bieldside, Aberdeen, Scotland.

Sinclair ZX81 16K. New Filexity keyboard. All leads and manual included plus new tutorial book and Sinclair tape. Everything still boxed, only 6 weeks old, £65. Phone: 041-558 1107.

Acorn Atom 12K, 12K BBC Basic board, power pack, floating point, manual, software, only 6 months old. £200 one. 0582 67560.

Ideal experimenters Tangerine Microtan 65 lowessace, Chunky Graphics, Tanex 7K RAM, X-bug, 10K Basic, P.G.M., Toolkit, power supply, case, keyboard, keypad, games, TUG newsletters, manuals, £320 one. Letchworth 79839 after 6.30 for more details.

Wanted: Atom Forth and other Acorn Atom games in exchange for other Atom games software. Tel: Ian on Ramsbot 0202 after 5pm.

Computer magazines. Practical Computing (Oct80-May82), Personal Computing (Oct80-May82), Your Computer (various 81-82). Sold as sets or single issues. Offers to J. Ledingham 57 Lilyth Terrace, Edinburgh.

IBM software, many games and utilities for sale. List includes Zork II, Germany, Southern Command, Morids Crypt, Pool and many more. Phone Paul on 01-549 3045 any time.

Wanted Super Expander for Vi-20. Will pay £15 to £20. Also wanted cassettes and Omega Race cartridge. Phone 01-577 0262 after 6pm.

Sharp MZ-80K (48K) as new, 11 months guarantee. Four Basics, Forth, Fortran, MIC-code language. Games: The Valley, Space, Defender, £100's of software for £350. Tel: 01-864 2636 after 6pm.

Atari VCS + Combat + Asteroids + joysticks + paddles + adaptor + aerial. Original original packing and in very good condition. £59 one. Buyer collects. Tel: 01-572 3650 weekdays 4.30pm-6.30pm.

Rowtron video game plus 6 cartridges, Air-sea Battle, Pac-man, Horse Racing, Space Invaders, Combat and Sports World. Good condition. £60. Tel: Rotherham (0709) 527195 anytime.

Apple II 64K Eurocolorcard disk drive controller £895. 2nd disk drive £219. Cooftank fan £55. Export and Kraft joystick £39. Epson MX80F13 interface £419. Applewriter software £29. B/W TV £49. The lot £1,590. 01-505 0182.

Intel 8271 disk controller chip wanted for cash. Tel: Peter on 01-460 6356 (evenings).

Printer wanted. Any type but preferably 80 cols or more. RS232C/centronics interface. May consider if not working. Good price paid. Phone Giles on 030-885 301 with details, please.

American PC magazines for sale or exchange. See list. Smith, 84 Edenfield Gardens, Worcester Park, Surrey, KT4 7DY.

Spectrum 16K boxed as new. A few months old. Any reasonable offer accepted. Tel: Brian on 0698 80620.

ZX81 computer 16K with Kaye keyboard, video inverter, 11 game cassettes, plus books, magazines. All for £90 one. Tel: Whitley Bay, 520337, Brian Entwistle.

BBC Micro computer in exchange for other BBC software. Tel: Neil on Glasgow 881 3468.

Swaps for Intellivision Donkey Kong and Demons Attack, interested in Dragonfire Swords and Serpents, Beauty and Beast. Will sell £20 each. Steve Saunders, Tel: Kidlington Oxon (08675) 3579.

Swap Spectrum Scramble (condition red

by Work Force for any other software, games and serious considered. Tel: Bloxwich 409552 (evenings).

Arali VCS £65. Cartridges: Pac-Man, Defender £15 each, Combat £10, cost £125 but sell for £590 or swap plus cash for Vi-20 Commodore. Tel: Blackburn 27164.

For sale, Atari VCS five cartridges: Combat Nightdriver Tennis Laser Blast Hanted House £100. Tel: 0492-44738. A Hall, Colwyn Bay.

UK101 fan cooled. Wemon & Mon 2 selectable, in case with add on RAM board, sound board. Various program tapes & manuals etc. First offer over £100. Phone Maidenhead 35343.

UK101 8K 1-2MHz 300/600/240 baud, cased, UKmon2, PSG board, much documentation some programs on tape. £100. Ring: Dave, Bourne End (Bucks) 25019, evenings.

Spectrum books. £100 Spectrum graphics £30 Spectrum Explored £2.50 Spectrum manuals £2.50 Sinclair User mags issues 1 to 12 £3. Tel: Lancing (Sussex) 762093.

Sinclair ZX81 16K RAM. Professional keyboard and case. Manual, and leads. Tel: Coventry 70507 (evening), £75.

Vi-20 16K + 3K RAM packs + tape deck + joystick. Over £300 software on tape and cartridge including Gorf, Choplifter, Omega Race, Jelly Monsters, Adventureland etc. etc. Cost £650. Must sell, give away at £300 ring: 0325/316956 after 6pm.

UK101, 8K RAM, cased, tapes. £85 one. Tel: Colin 01-908 0651 evenings.

T199/4A games, modules, chess, attack, soccer, never used. £30, worth double. Tel: Huddersfield (0484) 605558, evenings.

TRS-80 Model 1, Level 2, 16K complete, manuals, leads, software etc. £150. Tel: Bloxwich 408885 after 6pm.

Atari VCS with 16K RAM. Tandy monitor with Tandy Assembler, Debugging program and manuals. Excellent condition in original boxes. Cost approx £500. £375 one. Tel: Leeds (0532) 574671.

Apple II 48K Europlus. Complete with TV modulator, manuals, leads and software. Excellent condition. £375 or offers. Tel: 021-430 3759.

Wanted 16K or 48K Spectrum. Also any other Spectrum hardware or software. Must be good condition. Tel: 01-221 0182 between 7pm-10pm weekdays, anytime weekends. Ask for Sean.

Vi-20, cassette player, 8K RAM pack, First Computer, 16K RAM pack, Defender, Amidar, Power Blaster, Comiads, Abductor, Gridrunner, Alien Blitz, Frogger, + joystick, many magazines. Just £250. £100 worth games. Hants: 860482.

Atari software cassettes. Shamus, Ghost Hunter, Preppie, Baja Buggies, Galactic Chase, Ghost Encounters, Ricochet, Caverns of Mars £12 each. Cartridges: Star Raiders, Space Invaders £10 each. Tel: 031-229 6794.

Atari VCS 3 cartridges all for £75 one or will swap for 16K Spectrum or 48K ZX81. If interested write to 10 Park Lane, Sandbach, Cheshire CW11 9EQ. Tel: 3962.

Will exchange 50-watt RMS stereo music centre including speakers for Model-B BBC computer with some software included. Phone Colchester 869130 or call 9 Booth Avenue, Colchester.

ZX81 16K Memotek keyboard, lots of software including Spectrum Bomber, Space Invaders, plus more, also magazines worth over £150. Sell offers around £125. Tel: Funderhall 8152. Buyer collects. Ring after 3.30pm.

Intellivision II cartridges (Dungeons, Astronaut, Lock and Chase). Sell £150 or exchange for Dragon, 48K Spectrum.

Tel: 01-368 8465.

Swap Cascade software cassette 50 (Vi-20 version) for Rabbits Skramble or original Vicman or other Rabbit. Autogenic unexpanded cassettes. Ring Wakefield 253251 (6pm till 9).

Software for Apple2, Visicalc, Applewriter 2, Tasc Computer, and more plus over 30 games. Offers please. Tel: 0626 862455.

Vi-20 computer, joystick and recorder. Three months old. £150 one. Tel: 061-620832.

TRS-80 MkIII 48K 10 months old line VII printer Scriptoid word pro Edman TRS-80 encyclopaedia, many games, books. Cost over £1,000, £750 one. Tel: 051-428 6231 after 6pm. Peter.

Sharp MZ80K. Exciting machine-code arcade-style games. Pacmen, Phoenix, Asteroids, If you die £10 for three. M.J. Hill, 9 Queens Rd. Chandler's Ford, Eastleigh, Hants, SO5 1AH.

Vi-20 wanted, will pay good price. Maidstone area. Phone Keith on Maidstone 842341.

BBC Model B with disk interface. Almost new. £100 off list price. First 425 accepted. M. David, 100, Wilford Grove, Southsea, Hants. Tel: 0705 818555.

Sinclair ZX81 brand new, still boxed, leads and manual with it, also magazines, books and software. Price new £65, will take £40 one. Phone Bath 314223 evenings.

Software for Eastern Front £15: Lords of Karma £70; Protector £15: Golden Voyage £10; LE Stick joystick £15; compute 1st book £7. Chris (0702) 559455 (5pm).

Colour Genie 16K as new. Plus two arcade games, lots of books. Super software and graphics, excellent value £160 complete. Tel: Braintree 23950 evenings.

MZ80K 48K + i/o box, P3 printer, dual disk drives CP/M modified, double precision Basic, FDOS, Forth, many tapes, user notes, workshop manuals, upgrading, 1st offer above £800 one. Tel: 0703-774384.

Atari VCS Plus 3 cartridges: Combat, Golf, Outlaw good condition and complete for £75 one or will swap for 16K Spectrum or 48K ZX81 or similar priced computer. Ring Sandbach 3962 evenings.

Atari VCS + Mini Sensory Chess Challenger cost £150, sell for £100 (can be bought separately) or will swap for the ZX Spectrum 16K or ZX81 48K, both with software. Tel: (09367) 3962.

Wanted Acornsoft: Tree of Knowledge, Graphs and Charts, Peeko Computer Word Hunt Creative Graphics, Philosophers Quest £140. Also wanted: Philips Videopack + two cartridges Tel: Stalbridge 62785 evenings.

Wanted Othello for Vi-20 computer, will swap for Cosmic Battle, phone Adrian on Banbury 720640 after 4pm.

Atari VCS 6 cartridges defender, Asteroids, Missile Command, Space Invaders, Golf and Combat. New power pack and joysticks, worth over £220. Accept £120. Tel: 01-205-31224.

BBC B1 20S, disk interface, Shugart disk drive, Wordwise word processor, working cassette recorder, printer lead, Micromet modem, books, software. Worth £900, accept £750. Phone 0533 41916.

12K + 12K Acorn Atom. New keyboard. Floating point. Printer interface. Leads — manuals — PSU. Worth £300+, accept £150. Also cassette drive. Matched to Atom. Counter and pause. Worth £20+, accept £10. (0472) 48531, after 6pm.

50 + recent magazines, programs for popular micro, worth £30+. Accept £15. Acornsoft Atom games packs 1, 8, 9 + Bugbyte Invaders + Hyperfire + others. Magic book. Worth £55+. Accept £25. (0472) 48531 after 6pm.

Sekoma GP80A 80-column graphics

MICROSHOP

Rates: £10 per single column cm. Minimum size 3 cm. Series discount available. **Mechanical Data:** Column width, 1 column 57mm, 2 columns 118mm, 3 columns 179mm. **Copy Dates:** 10 days prior to publication.
Contact: Ian Whorley on 01-323 3211.

Software

Bamby software

Introduce original games
for Dragon 32

Planetary Trader—Choose your cargo—and they try to deliver it! Easy? Depends on what you do £5.95
Golden Apples—Steal the apples, and defeat the warlock £8.45
Surprise!—Spells, giants, a magic ring, but this is not another 'Lord of the Rings' £8.45
Mini-games—4 games per tape: simple but compelling £5.95

All tapes include P&P, and no-quibble guarantee.

Write to:
Bamby Software,
 Leverburgh, Isle of Harris, PA83 3TX
 Or phone 065-982-313 or 239 between 9am and 9pm.

A SINCLAIR SOFTWARE/HARDWARE
 SPECIALIST CONVENIENTLY SITUATED
 BETWEEN M1 AND M62 MOTORWAYS.

PHILIP COPLEY HI-FI LTD
 6 WESTLEY STREET, OSSETT,
 WEST YORKSHIRE

TEL: 0924 272545
 HOURS OF BUSINESS: TUE-SAT 10.30-5.30
 OPEN BY APPOINTMENT UNTIL 8P.M.

NEW SPECTRUM AND CAMEL GAMES

ORIC 1 BETA BOMBS—Get your man through the door—when it's open—before the intelligent bombs get him. £4.95

SPECTRUM 16K EARLY BIRD AND CHOMPER—Can the early bird catch the worm? Superb graphics and ten levels of play. How much can you eat before being caught? Two games on one tape. £5.95

SPECTRUM 48K WHIST—Best game of whist yet, full graphics, and you can cheat. £5.95
 Full range of software for ZX81, Spectrum and Citi. Send us for details.
 Make cheques etc. payable to S.A.J. Services, Unit Office, Pier Road Industrial Estate, Gillingham, Kent ME7 1RS.

WANTED PROGRAMS

Quality written games and business programs. We pay up to £500 plus royalties. For all popular makes of machine. If you have the ability to write imaginative and entertaining programs we will offer you a financial package that will be hard to beat. Write with details and sample if possible.

COSMIC SOFTWARE
 165 St Helens Rd, Hastings,
 E. Sussex TN34 2EH
 (0424) 446199

COMMODORE 64 HI/RES Graphics

12 new basic commands including plot, draw, circle, box, split screen + colour, paint.

1.5K of M—C

Cheque postal order for £14.95 to
SUE'S SOFTWARE
 16 Gardner Drive, Kinoulton, Notts.

ATARI 400/800 OWNERS

A comprehensive library of cassettes, cartridges, disks. Over 200 games available. All original games with full documentation. No copies. Send S.A.E. for details to:

MIDLAND GAMES LIBRARY
 48 Road Way, Bishops Cleeve,
 Cheltenham, Glos.
 Tel: 0242 674960
 6pm-9pm only.

BASIC PROGRAMMERS

Are you always short of space? • Looking for variables? • Debugging programmes (other people's)? • Searching for jump sources? **YOU NEED LOWMAN:** LOWMAN is LOWADD LTD's programme MANipulator. It is a suite of eight utilities used in their own program development.

THEY CONSIST OF:

1. Delete Remarks. Shrinks programmes prior to compilation.
2. Search for expressions. Will search and print locations of up to 20 expressions per pass.
3. Analyse Programme. This comprehensive programme produces a complete breakdown of addresses of all definition statements. Source and destination of all jumps, Fornext and Whilewend loops, and a complete list of addresses of all variables in alphabetical order.
4. Compare. Compare 2 ASCII source codes and print differences.
5. Compress. Compress source to Basic 4.51 lexical convention.
6. Expand. Expand source to Basic 5.00 lexical convention.
7. Global. Search and change within ASCII code with options.
8. Left justify. Aligns code and inserts TAB after line number.

THE WHOLE SUITE CAN BE CUSTOMISED BY USER TO MATCH ANY SCREENS. Available in CPM format on IBM standard 8" floppies. Please state density required. TANDY format available shortly.
 Send CHQ PO for £39.50 to LOWADD LTD, 82 GIRTON RD, CAMBRIDGE CB3 0LN.
 For other formats please write.



Small School Software

Study Packages are designed to a high specification by experienced specialist teachers for use both at home and in school. Based on the well-established techniques of individualised learning schemes, the Packages consist of a suite of objective matched programs using to the full the capabilities of the BBC-B Micro, supported by software documentation, course notes, exercise materials, Revision program and Post Test.

Package Titles include:

...The Theorem of Pythagoras ...First Steps in Algebra...
 ...Mental Arithmetic Tests...
 all priced at £6.95 inc.

But send for a full description and List of Titles enclosing a s.a.e. to—
SMALL SCHOOL SOFTWARE, 41 Sinal Lane, Hayling Island, PO11 0HJ.

NEW BRAIN 32K

Programs by Brainstorm Software of Edinburgh. Complete order below and post (with remittance if applicable) to:
Brainstorm Software, 35 York Road, Edinburgh EH5 3EG

<input type="checkbox"/> Word Processor	£35	<input type="checkbox"/> Return of the Enterprise £8.60
<input type="checkbox"/> Video Calc/Data Base	£20	<input type="checkbox"/> Star Runner/Globber £8
<input type="checkbox"/> Graphics Aid	£20	<input type="checkbox"/> Bully Boys/Link Up £8
<input type="checkbox"/> Diary	£8	<input type="checkbox"/> Whist Pairs £8
<input type="checkbox"/> Directory	£8	<input type="checkbox"/> Depth Charge £5

all prices inclusive of postage and packing.

Please send me a program ticked above: program details (delete as appropriate). Total remittance £

Name

Address

Generous discount for dealers. Enquiries from software authors welcome.

COMPUTER TAPES

Top quality tapes as used by the best software companies at incredibly low prices.

Full range in stock. Send S.A.E. for list.

10 x C10 £5.00

10 x C12 £5.50

10 x C15 £6.00

Each order has a 50p p&p charge

We also offer a copying service to customers wishing to duplicate a cassette at £2.50 inc tape, p&p 50p, good discount on quantity ordered to programmers.

HEATH MICROWARE,

4 Gateacre Ave.,

Obwestry, Shropshire.

Tel: (0691) 652626

BANNED

All 'Arcade Action' Games from our lists. We specialise solely in adventure and simulation games from many independent suppliers. Full lists: (state computer).

SAGA50FT.

148 Barrack Road,
 Christchurch,
 Dorset,
 (0202) 486 207



BBC CHARACTER GENERATOR

Menu driven facilities include reflect, invert and 3 rotates. Display is on grid for multi-character pictures. Full load and save etc.

£9.95 P&P FREE

VISCOUNT SERVICES LTD

2A Boulton Road, Southsea, Hants.
 NOU55 GUARANTEE 0705-833633

TRS-80/L2/GENIE SOFTWARE (16K)

Cassette 1: Space Invaders (m/c). Mastermind (finds your code in seconds), Apollo (m/c), Machine code copier, Defuse and Rate.

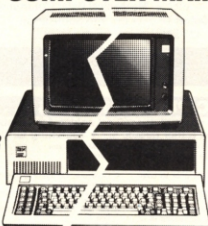
ALL SIX PROGRAMS ON ONE CASSETTE FOR £9.95
 Cassette 2: Space Defender. A last professional quality m/c game in graphics with a top 10 ladder continuous display of Score etc. A last, real time, action-packed game. Apollo 7: An exciting m/c game with sound effects and graphics.

BOTH PROGRAMS ON ONE CASSETTE FOR £9.95
 Each cassette costs £3.95 (or both for £8.95) from:
K. Meenan, 32 Lismore Road, S. Croydon, Surrey CR2 7QA.

Hardware

MICRO-COMPUTER MAINTENANCE

APPLE
IBM
SIRIUS
VICTOR



NATIONAL
ON-SITE
24 hr
CONTRACTS

COMMERCIAL DATA SYSTEMS LTD.

Telephone: 0268-710292 (ask for sales)

HOME COMPUTER CENTRE

ATARI 400 16K	£158.00	SPECTRUM 16K	£98.00
ATARI 800 48K	£398.00	SPECTRUM 48K	£128.00
SINCLAIR ZX81	£44.00	DRAGON 32K	£175.00
ORIC-1 48K	£168.00	COMMODORE 64	£342.00
BBC 'B' 32K	£398.00	VIC 20 PACK	£128.00

Plus printers, cassette recorders, RAM packs, accessories etc., etc. Extensive software stocks.

Open 6 days a week.

Mail order — phone
Northwood 20664,
free lists & prices.

Access, Barclaycard,
American Express.

SCREENS

MICROCOMPUTERS 6 MAIN AVENUE, MOOR PARK,
NORTHWOOD, MIDDLESEX

ATARI

ATARI 400 WITH BASIC ONLY £142!
ATARI 800 WITH 48K + BASIC ONLY £282!

- * ALL INCLUSIVE OF VAT
- * FREE FULL YEAR GUARANTEE
- * FREE DISCOUNT CLUB MEMBERSHIP

* FULL RANGE OF QUALITY SOFTWARE ALSO AVAILABLE. CATALOGUE 85p

8 COSDACH AVENUE, WALLINGTON,
SURREY SM6 01-647 1713

APM
COMPUTERS



WEST DEVON
ELECTRONICS

DRAGON 32 — £169.90
INC VAT — FREE P&P

15 Station Road,
Horrabridge, Devon
Tel: Yelverton (0822) 853434

Clubs

ORIC-1 OWNERS.

Tangerine created Oric-1 now TUG creates the rest. An independent users group with a solid reputation for progressive system support. Monthly newsletters, meetings, software, hardware, reviews, advice and lots more. We have a proven record of performance on our system. Join TUG. You'll like us, we do! Send £1.00 + S.A.E. (A4) for sample newsletter and details. Tangerine Users Group, 1 Marlborough Drive, Worle, Avon BS22 0DG.

Exhibitions

SOUTH OF ENGLAND
PERSONAL COMPUTER
FAIR

SUNDAY 12 JUNE
WOOD GREEN SCHOOL
WITNEY

just off the A40, 11 miles west of Oxford
Exhibitors from all over England under one roof!

Microcomputer Equipment and Services on display for all Home, Business and Educational use — beginners and experts alike. Many of the newest and most exciting Micros will be on sale together with a wide selection of computer software and books

11AM-7PM

Ample free parking Admission 75pence Lunches available
Further enquiries 0993 2355

SOUTH OF ENGLAND
PERSONAL COMPUTER
FAIR

Courses

OPEN HOUSE
FOR
COMPUTER NOVICES

Choose your time — day or evening.
Learn at your own pace on Apple, Pet or CPM
Computers BASIC programming and
Business Packages
including

Dbase II, Wordstar, Supercalc.

Brochure from:
MICROCOMPUTER ADVISORY
CENTRE.

Polytechnic of the South Bank,
Borough Road, London SE1 0AA.
Tel. 01-928 8989 Ext. 2468

WILL YOU TEACH COMPUTING?

BEAUMONT SUMMER CAMPS would like you to teach computing to 6-16 year olds at one of the many fine locations this summer. So if you know Commodore BASIC, CONTACT:
JAY HAMMOND,
68 VICTORIA ROAD, LONDON NW6.
01-328 1079

Services

HOBBYIST LIMITED

Open 6 days 10am-7pm, Wednesday and Saturdays
5.30pm.

Authorised Apple Service Centre.

Apple IIe, Epson HX20 Portable Computer and Epson RX80, FX80 Printers all now in stock. Also wide range of supporting peripherals and books.

3 The Broadway, Manor Hall Road,
Southwick, Brighton BN4 4ND

Tel: 0273 93435

My name is Simon Stable. I specialise in direct data duplicating for the following cassette-based micros: BBC AC, ZX Spectrum, Oric and Dragon, VIC 20, Atari 48K, Disc copying for BBC. My prices are very competitive with a fast turnaround. Dot matrix printed labels to order or blanks (tractor).

"BLANK CASSETTES" 08692 2831/3986 "COMPETITIVE RATES"

For further information about real-time cassette copying

• write or phone

46 WEST END, LAUNTON, OXON. OX6 0DG.

Insurance

INSURE
YOUR COMPUTER

Impact damage, Fire, Theft & Transit Insurance
for your Computer Equipment:

£1 to £1,500 cover	£8.00 pa £10 (excess)
£1,500 to £2,500	£16.00 pa £15 (excess)
£2,500 to £8,000	£16.00 pa £25 (excess)
£10,000	£20.00 pa £25 (excess)

Ask for details

KGJ Insurance Brokers
6 Hargry Road, Stourbridge, West Midlands DY8 10Q
Tel (03843) 5333-2545

To Let

SURPLUS PREMISES
TO LET
ANGEL ISLINGTON
N.1

IDEAL FOR STUDIO, COMPUTER/SOFTWARE OR
OFFICES. ATTRACTIVE RENT/LEASE.

01-359 2465

JOYSTICKS from £4.50 each
DIRECT FROM OUR FACTORY

IN KIT FORM: kit contains 1 switched joystick assembly, 2 moulded case halves, fire button, 1.5 metres 5 core + screen cable, fixing screws.

READY BUILT with 9 way "D" socket — suit Atari or Vic 20 £4.50 per kit
FEW ONLY with potentiometers and 5 way din socket to suit Dragon £5.00 each

CONNECTORS

"D" connectors 9 way female plug or 15 way male plug complete with hoods £1.75
 Din plug 5 way 240 deg 50p

AERIAL SPLITTER SWITCHES

(Saves unplugging T.V. Aerial to connect computer) £2.50

Cheque or PO with order. Prices quoted INCLUDE VAT, 1st Class Post, immediate despatch — 7 day money back guarantee.

VOLTMACE LTD., PARK DRIVE, BALDOCK, HERTS.

Callers welcome Monday to Friday.

Telephone: (0462) 894410

Oric 1, BBC, Lynx
cassette leads

(with motor control)
 Din to Din and remote jack or
 Din to three jacks
£2.95 inc p & p

Texas TI99/4A
cassette leads

No need to pay £11.50 for Texas leads
 Ours are only **£4.95 inc p & p**.
 Single recorder only

CLARES PCN

222 Townfield Road,
 Winstford,
 Cheshire CW7 4AX.

TEL: 06065 51374.



GRAPHICS

- * The New Intelligent Graphics card
- * Serial or parallel operation
- * 38 commands
- * 512 x 256 (131,072 pixels)
- * 85 x 25 text
- * Prices from £55 inc.

send SAE for comprehensive details

COMPUTER AIDS

33 Beardsden Cr., Hinkley, Leics LE10 8SQ

SHORT-LENGTH
COMPUTER/AUDIO TAPES

If you have searched without success for high quality low cost short-length tapes then sit back and relax.

Premium Grade Agfa R.F.W. Cassettes. Manufacturers of high quality blank cassettes suitable for programming. For example, with a minimum order of 25, you can purchase 25 cassettes of 2 1/2 minutes each side for only £10.00 plus postage & packing of £1.95p. Fill in the coupon and post with your remittance to: R.F.W. Recording Supplies, Green Acres, Northlands, Sibsey Nr. Boston, Lincolnshire PE22 0UA. Tel: 0205 750 595

All prices are inclusive of VAT at 15%

Please send me high-quality audio tapes in the quantity indicated (tick where applicable)

25 cassettes
(including £1.95 p&p)

<input type="checkbox"/> 2 1/2 mins.....	£11.95
<input type="checkbox"/> 5 mins.....	£12.20
<input type="checkbox"/> 6 mins.....	£12.45
<input type="checkbox"/> 7 1/2 mins.....	£12.60
<input type="checkbox"/> 10 mins.....	£13.20
<input type="checkbox"/> 12 1/2 mins.....	£13.95

50 cassettes
(including £2.49 p&p)

<input type="checkbox"/> 2 1/2 mins.....	£22.75
<input type="checkbox"/> 5 mins.....	£22.95
<input type="checkbox"/> 6 mins.....	£23.49
<input type="checkbox"/> 7 1/2 mins.....	£23.99
<input type="checkbox"/> 10 mins.....	£24.99
<input type="checkbox"/> 12 1/2 mins.....	£26.49

100 cassettes
(including £3.50 p&p)

<input type="checkbox"/> 2 1/2 mins.....	£43.50
<input type="checkbox"/> 5 mins.....	£44.50
<input type="checkbox"/> 6 mins.....	£45.50
<input type="checkbox"/> 7 1/2 mins.....	£46.50
<input type="checkbox"/> 10 mins.....	£48.50
<input type="checkbox"/> 12 1/2 mins.....	£53.50

Including inlay card & side-labels.

Total Remittance £

NAME

ADDRESS

I enclose my cheque/PO

Please make cheque/PO payable R.F.W.

Speed up the action with

PICKARD JOYSTICK CONTROLLER

Allows use of any keys, not just cursors — no special programming — does not affect other add-ons — special price until the end of June.

Price: £18.95 + £1.50 p&p. Spectrum ZX81 compatible

Success Services

154 High Street, Bloxwich, Walsall, West Mids, WS3 3JT

Tel. (0922) 402403

Graphics

VOICE INPUT MODULE
FOR APPLE II+ & IIE®

DESCRIPTIONS:

16 CHANNEL SPECTRUM ANALYZER
 6803 HIGH SPEED PROCESSOR
 8K BYTES RAM 4K BYTES FROM
 UTILITY DISKETTE WITH—
 VOCABULARY BUILDER EDITOR
 VOCABULARY TRAINER
 RECOGNITION SOFTWARE
 VOCABULARY TESTER
 MERGE VOCABULARIES
 CHANGE VOCABULARY
 11 APPLICATION VOCABULARIES
 MICROPHONE, USERS MANUAL
 AND ALL NECESSARY CABLES AND
 CONNECTORS

APPLICATIONS:

LOCAL ENVIRONMENT CONTROL
 DATA INPUT AND RETRIEVAL
 CONTROL SYSTEMS
 GAMES AND ENTERTAINMENT
 WORD PROCESSING
 INDUSTRIAL AUTOMATION
 BUSINESS
 EDUCATION
 PROGRAMMING
 PRICE £299 INC VAT

C.G.D. LTD

181 LOWER RICHMOND ROAD
 RICHMOND, SURREY TW9 4LT

Second User Equipment

BERKSHIRE MICROSLTD.

APPLE COMPUTERS

We specialise in second-user APPLE computers and peripherals. Good selection of used Apples always in stock.

PRINTERS

A wide range of new and used printers always available. Prices from £135.

(0344) 84423

Seminars

SIRIUS USER CLUB

Seminar on database management systems

Monday 6th June

Midland Hotel, Birmingham.

£10 members, £30 non-members + VAT

Enrolment: Mr Ray Darcy

SIRIUS USER CLUB

Enterprise House, Gordon Street, Luton

Tel: Luton 412214/5

MAKE YOUR ADVERTISING COUNT

PERSONAL COMPUTER NEWS

offers immediate impact on your market

Call Ian Whorley or Christian McCarthy

on (01) 323 3211

JOIN THE EXPANDING WORLD OF MICRO-BUSINESS

THE COMPANY

TDI Limit d is the leading specialist UCSD p-System software house in Europe, and sole UK importer of the SAGE micro. Rapid growth in the company business has created a number of exciting new vacancies in their Bristol office.

THE POSITIONS

Senior & Junior Systems Programmers are needed to port the p-System to new hardware. We are looking for a solid knowledge of the p-System, UCSD Pascal, and at least two Assembler languages, plus ability to work in a small highly motivated team.

Contact: Chris Lee, Systems Manager.

Customer Support staff are required to provide telephone and sales support, and training services. Good experience of the p-System, and an ability to get on with people are essential.

Contact: Mike Taraniuk, Customer Services Manager.

Software Salespersons are needed to follow up the enormous demand for both the p-System itself, and p-System based applications packages. The ideal applicant will have some knowledge of the p-System, applications software, and/or previous sales experience.

Contact: John Page, Software Products Manager.

THE REWARDS

TDI provides high quality benefits to its staff, and salaries to match abilities and experience.

**TDI Limited,
29 Alma Vale Road,
Bristol BS8 2HL
Tel: 0272-742796**



SALES EXECUTIVES

QUOTA £16 K

BASE £9 K

COMPANY CAR

LONDON AND HOME COUNTIES

A well established systems house specialising in financial and commercial systems for major companies is seeking experienced micro and mini salespeople for its sales team selling the IBM personal.

This is a new position in this profitable expanding operation whose customer list is dominated by the top thousand companies.

If you have a proven track record in the computer industry and wish to make a career move, then phone: Ref NS 153

(0932) 41321

ab executive
WEYBRIDGE

Microshop Classified

- **Spectrum** "Gosub label" ideal for readable structured programs, but what if you renumber? Our renumber program assigns values to labels. (m/c). £2.50. A. N. Wilson, Vicarage, Whitworth Square, Rochdale, Lancs OL12 8PY.
- **Programmers for Apple IIc**. BBC. Top royalties! Includes 1000 programs, utilities. Write or phone Knights Software, 14 Knights Court, Knights Park, Kingston, Surrey, Tel 01-549 3045.
- **Atari 400/800**. Back-up most boot discs, including bad sectors. Also copies most boot cassettes. Requires 32K. £15.95 inc p&p to Anthony Roberts, 16 Ambleside Crescent, Cottesmore, Oakham, Leicestershire, LE15 7AT.
- **Oric-1 48K** Hop-Frog and city bomber written with machine code for fast action thrills. The sorcerer (GP). Eight great games with full colour and sound. £4.95 each. Cosmos Computer Software, 65 Wood Crescent, Motherwell, Lanarkshire ML1 1HN.
- **Oric-1 48K** Arcade games tool kit. 25 new commands (48K) £7.50. Arcade quality, sound synthesizer, 72 channel (48K) £7.50. Free power filter with orders. Zen Software, 6 Park Street, Scarborough, Yorks.
- **Cycle Planner**: computes important dates of female menstrual cycle. Growth Tracker: guide to childhood growth and £19.95 inc. Kit form. Cleveland cassette 48K Spectrum Cheque/PO £7.25. Medidata, PO Box 26, NW9 0WB.
- **Vic 20 and PW9**. 16 line interface for intruder alarms and data collection. Suitable for production analysis, timing sequences, averages. Software examined and £19.95 inc. Kit form. Cleveland Interface, 18 Chelmsford Ave., Fairfield, Stockton, Co. Cleveland.

GAMES - UTILITIES - EDUCATIONAL - ACCESSORIES - HARDWARE - SERVICES

ADVERTISERS

PCN is now offering a NEW service
to advertisers

MICROSHOP CLASSIFIED

For only £10 you can advertise your program or service in the No. 1 SELLING WEEKLY

MICROSHOP CLASSIFIED ADVERTISEMENT FORM

For your classified ad in P.C.N., fill in this form putting one word in each box allowing a maximum of 30 words. Write in block capitals and don't forget to include your name and address, or telephone number. Underline any words required in bold type. All ads must be accompanied by a flat fee of £10. Make cheques or POs payable to *Personal Computer News*. We cannot guarantee to print an ad in any specific issue. Send form to:-

MICROSHOP CLASSIFIED PCN,
62 Oxford Street, London W1A 2HG

Please find enclosed my cheque/PO for £10 for the following ad.

[illegible]

BACK ISSUES SERVICE

FILL THE GAPS IN YOUR PCN COLLECTION



Issue 1, March 1983
Pro-Tests: Apple's Lisa, Tect TX8000, Spectrum speech synthesiser, Apple printer, Commodore network, 3D on Spectrum, graphics package for Apple and IBM, BBC graphics system.
Features: computer chess, Occam parallel processing language, Victor Sirius function keys.
ProgramCards: Towers of Baram (Pascal), Bishythin (Apple II), Roman Year (Apple II), Shape Utility (Apple II).
Gameplay: Darts, Soccer (Atari), Castle of Riddles (BBC Model B), Pimania (Spectrum), Flight Simulator (IBM PC).
Databases: micros and peripherals.



Issue 2, March 25
Pro-Tests: Toshiba T100, Catto PB100, ZX81/Basicare, Vic speech synthesiser, Spectrum spreadsheet, IBM graphics, BBC word processing.
Features: Colocvision, micro backgammon, nursery computing.
Gameplay: Ultima II (Apple), Tender (ZX81), Starquest (Vic 20), Hungry Horace (Spectrum).
ProgramCards: String editor (Spectrum), Analogue Clock (BBC Model B), Chart generator (Spectrum), String extractor (Spectrum).
Databases: full software listings.



Issue 3, April 1
Pro-Tests: TI Professional, Apple speech synthesiser, Facit 410 printer, IBM keyboards, Pespaced compiler, Sirius toolkit, Dragoncalc.
Features: Atom upgrade, Lynx programming, Apple music.
Gameplay: Mangrove (Vic 20), Mutant Herd (Vic 20), Compendium (Dragon), Patience (Spectrum), Noughts and Crosses (Dragon), Great Britain Ltd (Spectrum), Ulysses (IBM PC).
ProgramCards: Magnify (Spectrum), Spider (Vic 20), Firing Range (BBC).
Databases: micros.
Micropaedia: Anatomy of the BBC, part 3.



Issue 4, April 8
Pro-Tests: Pict Piper Communicator, Olympia ESW3000 printer, Nanaul Supertalk, Commodore Cadenetus, Spectrum Pascal, Cashbook (BBC).
Gameplay: Dark Crystal (Apple II), St George (Dragon), Wizard War (Dragon).
ProgramCards: Fruit Machine (C64), Timesmith (Oric), Array Editor.
Databases: peripherals.
Chibnet: Micropaedia: Go Forth, part 1.



Issue 5, April 15
Pro-Tests: Commodore 700, Bon Hobbit, 1-2-3 (IBM), ZX81 machine code.
Features: speech packs, monitors.
Gameplay: Grand Prix (Dragon), Derby Day (Spectrum), Deadline (Apple).
ProgramCards: Wacky Racers (Oric), Fruit Machine (C64), Parse Integer.
Databases: Software.
Chibnet: full list of user groups.
Micropaedia: Go Forth, part 2.



Issue 6, April 22
Pro-Tests: Tycum Microframe, IBM PC, Scorpio Disks, Dragon sound module, ZX81 graphics, Bottom Line Strategist (CP/M), Paper Clip word processor.
Features: IBM PC DOS, BBC word processing, PC 1251.
Gameplay: Mined Out (Spectrum), Transylvanian Tower (Spectrum), Lunar Lander (Apple II), Evolution (Apple II).
ProgramCards: Wacky Racers (Oric), Mortgage Comparison (Sharp MZ80K), Computer Set Up (BBC), Day of Week.
Databases: micros.
Micropaedia: Graphics, part 1.



Issue 7, April 29
Pro-Tests: Mattel Aquarius, Epson FX80, Olivetti JP101, Lasp on Spectrum, Vic 20 assembler, Supergraf on Victor/Sirius.
Features: Dealer support, Atari graphics.
Gameplay: Krakit (ZX81), Cruising On Broadway (Spectrum), Kakuto (Vic 20), Fantastic Voyage (ZX81).
ProgramCards: CBM controls, Computer Set Up (BBC), Wacky Racers (Oric), Julian Dates.
Databases: Peripherals.
Micropaedia: Graphics part 2.

MICROPAEDIA LIST

Anatomy of the BBC micro

Part 1: Tune into the BBC — an exploded view; Tube map; blossoming into colour; second opinion — a first timer's look; maths and science on the Beeb; programming the function keys; learning with Logo; BBC Basic; User Guide extra; alternative languages.

Part 2: Introduction to peripherals; playing games — reviews and programs; word processing on chip and cassette; history.

Part 3: Networking; interview with Acorn's Herman Hauser; faults and servicing; video recorder link-up; turtle graphics; Beeb books.

Go Forth

Part 1: Basic and Forth compared; Forth on your micro; assembler language; changing up; the Jupiter Ace.

Part 2: Jupiter Ace software; guide to Forth; Forth on Apple, IBM and ZX81; more implementations; Forth 79 v FIG-Forth; books.

Graphics

Part 1: Colour co-ordinated; Spectrum, Oric, Atari.

Part 2: Graphics on the Vic 20; the Video Interface Chip explained; Dragon displays; video easel on Atari 800.

HOW TO GET THEM

All available back copies of PCN can be ordered from our new Back Issues Service, using the coupon printed here.

For a guide to the subjects covered by Micropaedia every week, see our Micropaedia list above. Send your orders to: Personal Computer News Back Issues Service, 53-55 Frith Street, London W1A 2HG.

To make sure of getting all your copies in future, why not fill in the tear-out subscription card in this issue.

ORDER FORM

Any one issue is 75p, additional copies 55p, post & packing inclusive. Overseas readers please add £1 per copy airmail postage. Please allow up to 21 days delivery.

Name Telephone (day)

Street

Town Post Code

Please send me issues of PCN, issue nos

I enclose my cheque/PO

made payable to Personal Computer News or please debit my credit card:

Visa/Access/Amex/Diners

Card no Signature

A new range of soft wear, US style

The name of the game in big business is diversification into information technology being the favoured route. How refreshing then to find it working the other way round.

An American company, I/O Devices Inc, has been going in for some fancy corporate manipulations recently. First it restructured its stock (that's stock as in shares) then it changed its name to Medcomp Technologies Inc. Finally it decided to go into the chinchilla business.

These cuddly rabbits are much prized for their white fur and Medcomp is splashing out \$2.3 million to buy 7,000 of the animals. They will be shipped out to Israel where the company anticipates they will breed more and produce more closely matched pelts.

So where does this all lead us? You'd probably best look out for a spate of fur-covered computers, in tasteful white.

Terminal fitness

Denise Katnich is happy in her work. Anybody who can sit in that position without wearing a fixed grimace must be. Denise is demonstrating how to spend all day at a terminal without developing all manner of health problems.

In our picture she risks a dislocated shoulder for the benefit of media maker Verbatim, which has just issued a booklet called Tone Up at the Terminal.

So the next time you see somebody hugging themselves, wobbling their neck, breathing heavily, and flinging their limbs around, take a leaf out of their book — or write to Verbatim for your own copy. The address is 6 Stanley Park Road, Wallington, Surrey.

But how do you manage to hold the book?



SUNTAX ERRORS

Sprite lines

In last week's review of the Sord M5 Richard King was just explaining why 'the so-called "sprite graphics" are the most interesting feature of the display' when a line of text was spirited away. The next sentence should have read: 'Sprites are little programmable displays which can be moved around the screen.'

Advance billing

We pride ourselves on being up to the minute at PCN, but we got a week ahead in last week's Menu page. We billed this week's page 35 early giving you advance warning of Mike Whitney's paddle among the Apple pixels.

Master mistake

Due to an oversight, Kuma's Deskmaster Series somehow became Datamaster on page 12, Issue 12. Apologies.

PCN DATALINES

PCN Datelines keeps you in touch with up-coming events. Make sure you enter them in your diary.

Organisers who would like details of coming events included in

PCN Datelines should send the information at least one month before the event. Write to PCN Datelines, Personal Computer News, 62 Oxford Street, London W1A 2HG.

UK EVENTS

Event	Dates	Venue	Organisers
Apple '83	June 3-5	Fulcrum Centre, Slough	John Riding, Database Publications, 061-456 8500
ZX Microfair	June 4	Alexandra Palace, London	Mike Jonstone, 01-801 9172
Office Automation Show & Conference	June 7-9	Barbican Centre, London	Clapp & Pollack, 01-747 3131
4th Commodore Computer Show	June 9-11	Cunard International Hotel, London	Commodore Business Machines UK, 75 74111, Ext 220
Blackburn Computer Fair	June 11	King George's Hall, Blackburn	Bradley Enterprises, 0772 312677
South of England Personal Computer Fair	June 12	Exhibition Hall, Wood Green School, Witney	Julian Wilde, 0993 2355
Computer Fair	June 16-19	Earls Court, London	Roy Bratt, Reed Exhibitions, 01-643 8040
Computer Open Day Exhibition	June 16	Holiday Inn, London	Tony Kaminiski, Couchmead Communications, 01-778 1101
Fylde Computer Show	June 17-19	Winter Gardens, Blackpool	Northern Exhibitions, 0706 877687
Compec North '83	June 21-23	Belle Vue, Manchester	Roy Bratt, Reed Exhibitions, 01-643 8040
Leeds Software Fair	June 21	John Taylor Teacher's Centre, Leeds	Graham Creighton 0532 782181
BBC Micro User Show	June 24-26	Renold Building, UMIST Manchester	Database Publications, 061-456 8500

OVERSEAS EVENTS

Event	Dates	Venue	Organisers
Exhibition & Conference			
International Computer Technology	June 7-10	Hong Kong Exhibition Centre, Hong Kong	Terry Hill, Industrial & Trade Fairs International Ltd, 021-705 6707
Mini Computer Show for Office, Home, Hobby	June 23-26	Exhibition Hall, Cologne	German Chamber of Industry and Commerce, 01-930 7251
International Micro Computer Exhibition	Aug 2-5	Kuala Lumpur, Malaysia	Conference & Exhibition Management Services SDN BHD, 9-A Jalan SS24/8 Taman Megah, Petaling Jaya, Selangor
National Computer Business & Office Systems	Aug 16-19	Auckland, New Zealand	Trade & Industrial Exhibitions, 12 Heather Street, Parnell, PO Box 9682, Auckland

 **commodore**

Vol 2 No 2 £1
JUNE 83

COMPUTING

The independent magazine for all
Commodore computer uses

INTERNATIONAL



USA \$2.50
CANADA \$3.00
GERMANY 6DM
AUSTRALIA \$3.00
FRANCE Fr18.5

**NEW
PRODUCT
REVIEWS**

64



HARDWARE
A Cheap VIC Joystick

BUSINESS
Sales validation
on PET

**SOUND AND
VISION**

Music on the 64

PLUS

Pages & pages of
Programme Listings

ON SALE NOW
FROM ALL
NEWSAGENTS



DRAGON 32 OWNERS
Shoot your
mouth off
in...

Talking Android Attack

Another great game from Microdeal the first of a new generation of fast action, talking arcade games. At the start of each frame the computer warns the androids of an intruder "Intruder Alert"!! Now you can either run for the nearest doorway, escape and be called a "Coward", or chase, shoot and try to wipe out the androids, however, if you hit one it will turn into a GHOST ANDROID, capable of wandering thru walls — which of course are electrified with a fatal effect on you when touched!! Should you clear the screen the computer sneers "I'll get you next time". Will it?

All Cassettes £8 each (including VAT & Postage)
AVAILABLE FROM DRAGON 32 DEALERS NATIONWIDE OR ORDER DIRECT

SEND 1st CLASS STAMP FOR OUR FREE SOFTWARE LISTS
FOR DRAGON 32 & TANDY RANGE OF COMPUTERS.

MICRODEAL

14 TRURO ROAD, ST. AUSTELL,
CORNWALL, PL25 5JE. TEL: 0726-67676.

AVAILABLE
FROM SELECTED
and
John Menzies

