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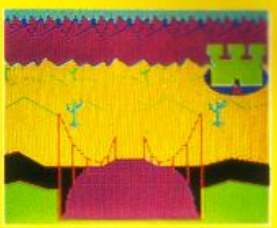

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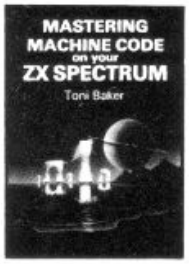
For those who would compute with the gods



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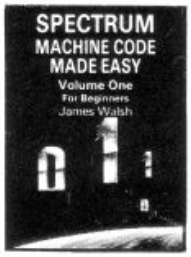

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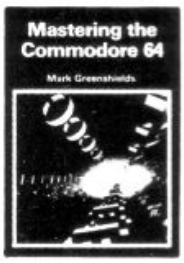

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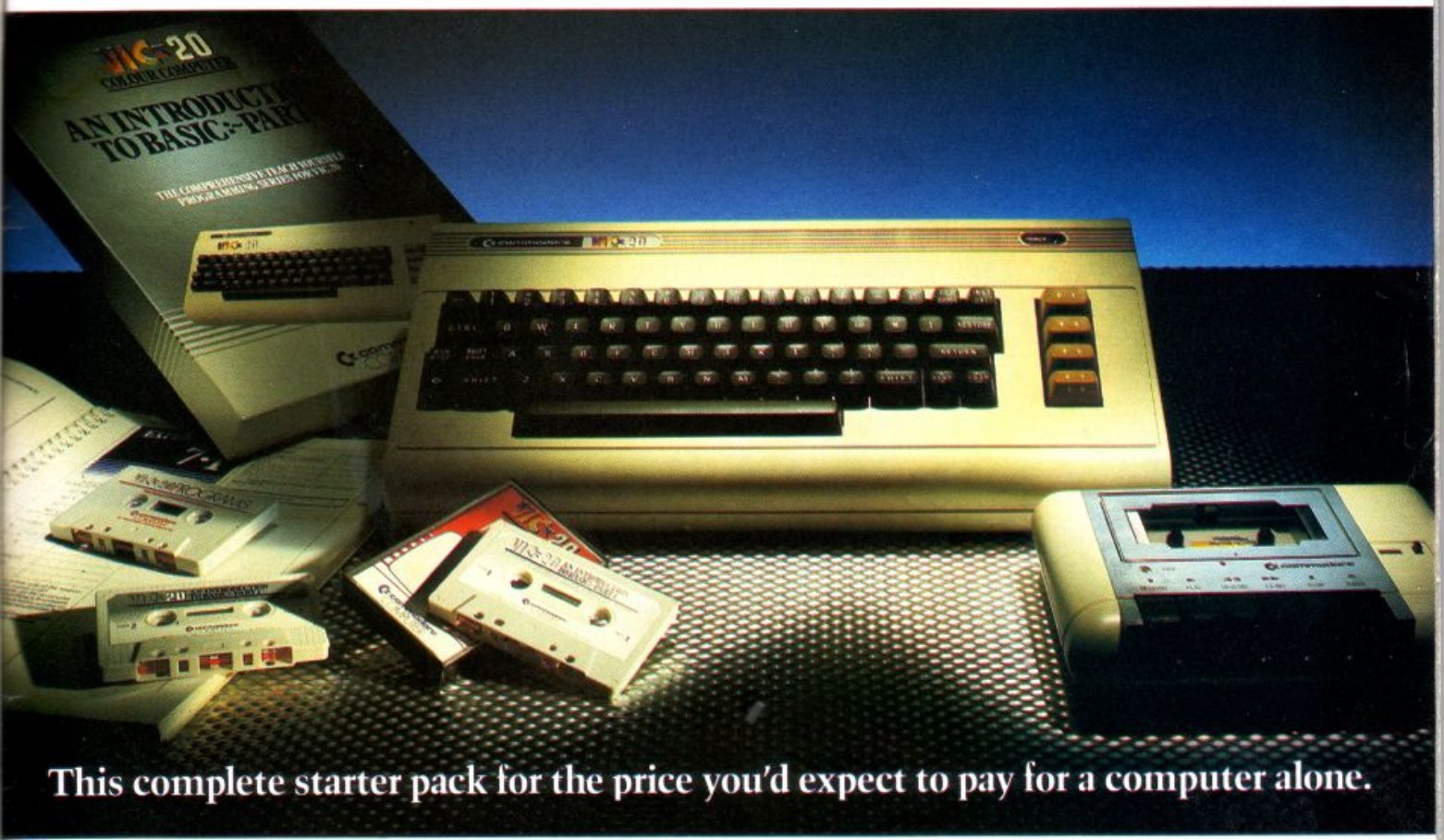

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SOFTWARE companies are for ever moaning about software pirates — that is people who illegally copy software and sell it. They complain that the activity is robbing them of profit in much the same way that people who tape music from records or radio shows are robbing the Music Industry.

While there is no doubt that such activity does go on, it is not doing anything like the amount of harm that the moaners suggest. My blood boils when I see the "home taping is killing music" sticker. What nonsense. It is the greed of the record companies that is killing music. They fall over themselves to pay huge sums to big-name recording artists and then wonder where they are losing money.

I buy a lot of records, and I tape them. I do this because a constantly played record gets scratched and damaged but a tape doesn't and anyway it can be cheaply replaced. I feel that the five pounds I pay for this disc entitles me to do this. In the same way, I copy any software that I buy. Not to sell, but if a five pound game tape gets damaged then I lose the program, but a "back-up" or reserve copy tape costs about 50p a time.

People do give, or even sell, copies of commercial programs to their friends, you can't stop it. There are even "Zap" clubs, where people go about this in an organised way and there is no doubt that this activity is criminal. The crime is theft and should be recognised as such. It is possible that with really good games, only half the copies in circulation are "official". But if this was stopped the industry probably would not make more money. People only have so much to spend on software, and they are spending that much now. Furthermore there is no better advertisement for a company's next game than a well-loved, constantly played copy of the previous game, even if it was pirated.

Bill Bennett

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NEWS

Space odyssey

NOW you can buy a bumper pack of Abacus software for just £14.95. For this you will get a four part space odyssey: Sentinel, Fireflash, Proteus and Avenger.

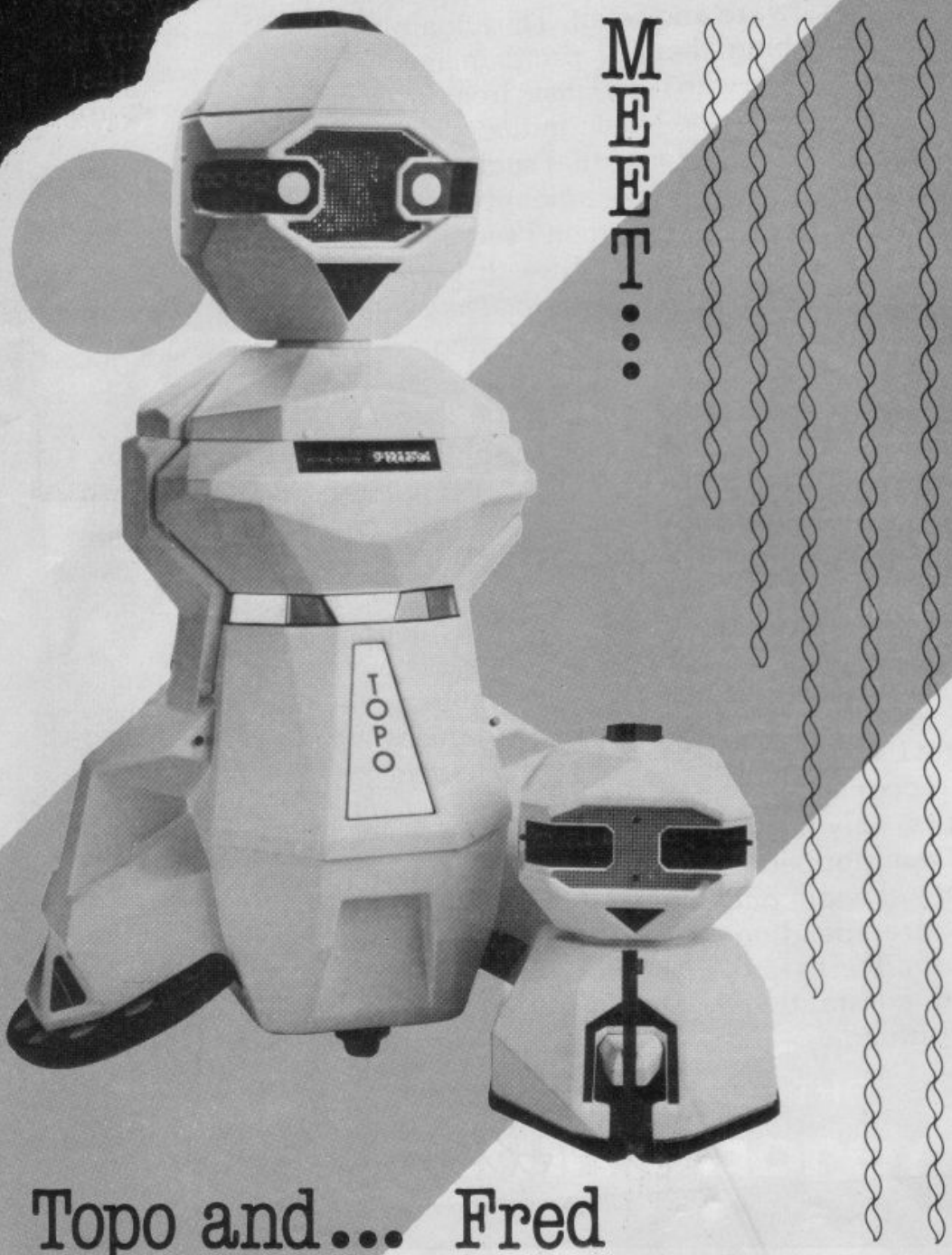
The adventure in space starts with Sentinel; the gateway to your galaxy is guarded by the sentinel system of space stations. You are attacked by the enemy and must repel the attack for as long as possible. If you are unsuccessful, in Fireflash the enemy attempt to land on your home planet. You must destroy them with your guided missiles. In Proteus the enemy has been beaten off, you must clear a path through enemy occupied space. And in Avenger you have finally reached the enemy planet for the last battle.

A novel idea, and as the games usually sell for £5.95 each the pack is excellent value.

New releases

IF YOU own a Commodore 64 (CBM 64 from now on), Terminal Software's two new space games might be worth a try; ***Hunter*** *and* ***Stellar Dodger*** *are both fast action, kill or be killed situations, £7.95 each. Softcell's* ***Bomber Run 64*** *will cost just £4.95. Maybe you're tired of all these sort of games, in which case* ***My Word*** *from Papillon Software is worth a try. It's a family word game, like* ***Scrabble*** *but different and better, £14.95.* ***Arcadia,*** *one of Imagine's best selling games for the Spectrum and the Vic-20 is now available for the CBM 64, price £5.50. It's a multi-coloured explosion game.*

For the one one Lynx owner out there, one game (apologies), ***Oh Mummy,*** *a doomed Egyptian pyramid game, price £7.95. Anyone unfortunate enough to have a ZX-81 (sorry) will have only one new game this time,* ***Forty-Niner*** *from Software Farm is based around the Great American gold rush, a little gem (it's getting worse) at £5.95.*



Topo and... Fred

Perhaps Star Wars isn't that far away, meet Topo and Fred, your very own personal robots. Actually there's no need to be scared, they don't really do that much.

Topo is, to quote the makers, a development tool. Meaning they hope lots of people will dream up wonderful things for him to do. Fred is like a little turtle, you know, those gadgets that draw squares and circles on the floor (if you manage to direct them properly). But you'd need an Apple II computer if you were thinking you might like one — both robots run off software written for this machine.

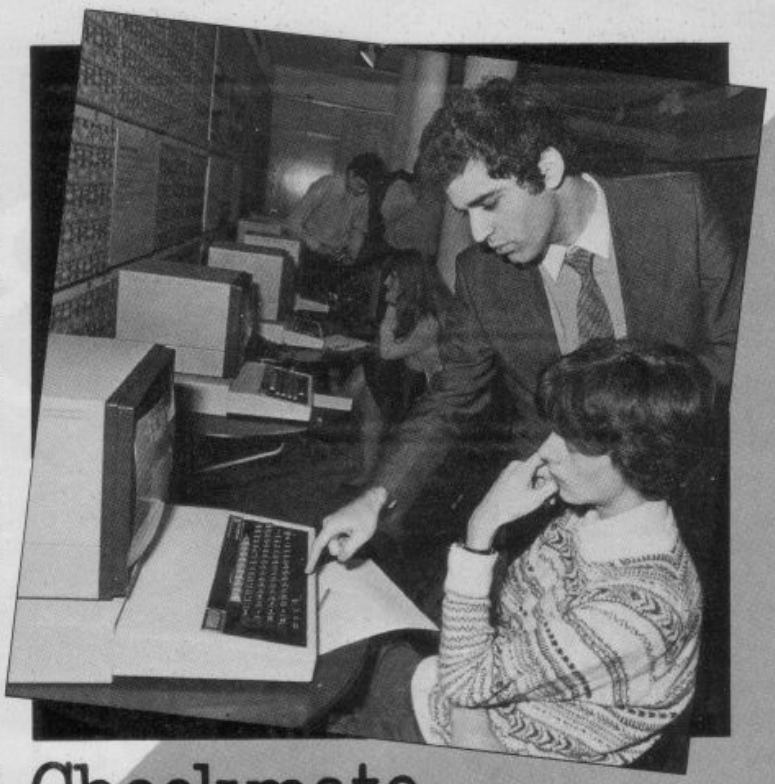
You'll also need a lot of money. Topo will probably cost around £1,500 and he doesn't really earn his keep, all he'll do at the moment is trundle up and down and talk a bit. Fred does all the usual things turtles do and costs about £200. Both characters are made in the States by Androbot — the company at least sounds the part.

Computer break

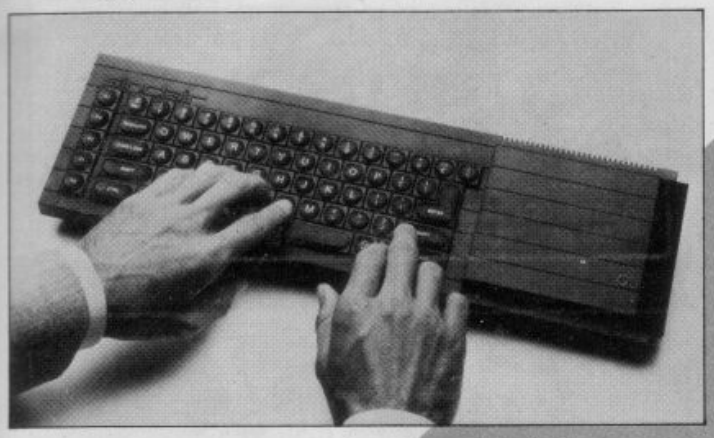
HOLIDAYS used to be a time when you went for long walks on the downs, train spotting, picking flowers or solving some famous five-type mystery — least ways that's what Enid Blyton would have us believe. In 1984, however, a lot of schoolkids are going to want to sit in front of a computer for hours on end.

To cater for young computer buffs who want an advanced computer holiday, PGL is operating courses at Herriot-Watt University, Edinburgh, and Portsmouth Polytechnic. The courses are one week long and offer the opportunity to learn more about mainframes as well as micros. The course at Herriot-Watt includes lectures, demonstrations, excursions, and hands-on experience of the latest computer developments. At Portsmouth Polytechnic the emphasis is on advanced programming and high level languages, such as Pascal.

So if you think flower spotting is soppy and solving walks a waste of time, perhaps the answer is to spend a week with computer experts.



A giant leap...



SINCLAIR's new micro is called the QL which stands for Quantum Leap — or a huge step-forward in home computing. This may be so , but it also represents a huge step-up in home computer prices. At £399 the machine is hardly cheap, even when you consider the powerful features it contains.

Superbasic is the language used, which is in reality a souped-up version of the Basic language we all know and love. It has a powerful 32-bit microprocessor, which means it can do a whole lot more computing than most machines,, which tend to have eight-bit processors. For example a number of different programs can be run on the micro at once.

Maybe the most important features are the large 128k memory, and the built-in microdrives, which store information on special tape cartridges. The machine comes complete with some useful software, such as a word-processor and a graphics package amongst others. The manual comes in a hefty ring binder and most wonderful of all, the micro has a real keyboard. For more details ring Sinclair Research on (0276) 686100.

Checkmate

THE guy in the suit and tie is Gary Kasparov, winner of the Acorn Computer World Chess Championship semi-finals. He dropped in to Acorn's London showroom to take on 10 junior chess players simultaneously — fair odds I suppose. But they weren't using traditional chess boards, the games were played on BBC Micros with Acornsoft chess programs. After six hours Kasparov won 6-4.

The final of the World Chess Championship is between Kasparov and another Russian grandmaster, Smyslov. The winner of this (and its expected to be Kasparov), will meet the present world champion, Karpov — yet another Russian.

Buzzbox modem

SCICON has brought out a pocket-sized modem called Buzzbox for only £70. With one of these you can link up with the telephone network which gives you access to other micros and things like Prestel — the information service. So now you can get into exchanging data and programs with your friends and other-computer-club members.

More software

SOFTWARE for the Electron is starting to seep through. Micro Power has jumped in with both feet and launched a total of 13 titles: ***Cybertron Mission, Escape from Moonbase Alpha, Swoop, Cosmic Combat*** *and* ***Positron*** *are, of course, space-zap games; more down to earth are* ***Croaker*** *(a version of* ***Frogger), Bandits at 3 O'clock, Felix in the factory, Felix and the Fruit Monsters*** *and* ***Killer Gorilla*** *(a version of* ***Donkey Kong*** *— all arcade games.* ***Micro Power*** *has also brought out* ***Adventure*** *(an Adventure game — sorry to state the obvious);* ***Chess*** *— I won't tell you what that's about; and* ***Draw*** *— wonder what that does? All cost £7.95, except* ***Cosmic Combat, Positron*** *and* ***Bandits*** *which are £6.95 and* ***Draw*** *which is £9.95.*

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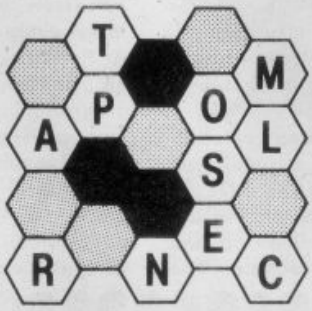

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LETTERS

To/ Computer Choice,
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Games queries

I WOULD like to ask what that green bonus in Jet Pac is. I have a friend who calls it a green hat but I think that it is a bowl.

Also, in Atic Atac the tape cover does not give any information as to what certain objects do. All I know is that a certain colour key opens that colour of door, a cross keeps Dracula at bay and a spanner can kill that girl in the Atic.

I would like to congratulate Ultimate for its great games. I have them all except Cookie, which I hope to get soon.

David MacKenzie, Argyll, Scotland

***Atic Atac is without doubt a very exciting game, combining elements of adventure and arcade games in one original package. I tend to agree that the green object is a bowl, though someone told me it is an acorn. Has anybody out there scored 100% yet? If so, then tell us how.**

Still waiting

IN YOUR January '84 issue you have an interesting article *Spectrum Users Report*, and this has prompted me to send you a schedule of events concerning a Spectrum which I sent to Sinclair Research for upgrading to 48K on 14th October last.

12th October: Telephoned Sinclair Research, Camberley, to enquire how much and how long it would take to upgrade a Spectrum 16K to a 48K. Was told to send computer together with cheque for £40. Delivery would take 10 days from their receipt of the computer.

14th October: Sent computer together with £40 cheque by recorded delivery.

11th November: Phoned Sinclair, Camberley, to enquire why computer not yet received back. Told by Sinclair, "computer in despatch bay — will be with you in next few days."

18th November: Same as for 11th November.

25th November: Same as for 11th November.

2nd December: Same as for 11th November.

9th December: Same as for 11th November except that I then asked to be put through to the General Manager as I was not satisfied with their reply. The General Manager first said, "Why should we keep it so long?" to which I replied, "You tell me." General Manager promised to investigate and to telephone back.

12th December: 15.18 hours, and still no reply from General Manager, so I sent telex marked Personal to Clive Sinclair asking for his immediate attention.

16th December: Still no reply from General Manager or Clive Sinclair and computer still not received back.

F. E. Shute, Norwich, Norfolk

***This kind of tale is all too common. It would be much better if Sinclair Research sold a simple plug-in expansion that you could fit yourself.**

Corridors of Genon

I REFER to your review of our Corridors of Genon in the January issue of *Computer Choice*. Your reviewer appears to have misunderstood the operation of the door codes.

There are three codes given to you; that for the next left-hand door appears on the left of the screen, the next right-hand door on the right of the screen, and the next door in front of you at the top of the screen. If you turn and face a door on the left, say, the code does not disappear, but is transferred to the top of the screen since you are now facing it. This would be the most logical thing to happen.

Once Bogulised the door codes start to disappear as your ESP, which allows you to know the door codes, begins to drain from you. This is all explained on the scenario on the insert card. At this stage there are many dead ends formed, which are impassable unless you have remembered the sequence of door numbers. Usually at this stage panic rules anyway.

R. J. Evans, New Generation Software, Bath

***I found Corridors of Genon great fun, but I like getting caught by the Bogul, because the graphics are so good.**

Dragon supporter

I FOUND your Buyer's Guide to computers in the January 1984 edition of your rag totally biased towards Sinclair and detrimental to the Dragon 32. You couldn't find a single point to commend it, though the Spectrum got flying colours for everything.

You didn't take into account or publicise the fact that the Dragon 32 uses the Motorola 6809 Microprocessor, a very powerful chip, almost 16 bit. I must point out that harmonies can be produced in sound on the Dragon, using machine-code.

I am a personal secretary, have been typing for 25 years, and find the keyboard excellent. I CANNOT, and that I stress, use a Spectrum keyboard. It doesn't even warrant calling those rubber stoppers a keyboard. Graphics — well, your narrow minded views are unfounded. Have you seen The King by Microdeal, try Cuthbert in the Jungle, Atari's Pitfall is, by the way, excellent! A computer is only as good as its programmer and I would suggest that you learn to program, then you can make judgements.

I've only mentioned a few games out of the dozens that are for sale. You haven't looked very hard have you? Value for money? Well, £175 and falling, for a robust machine, well made, and easy to program. I could spend £130 for a pocket calculator, but I've more sense. I wanted a computer when I bought my Dragon, which is what I got, not a games machine like the Spectrum.

I hope you receive more complaints like mine. In fact, I'm sure you will, but would you have the nerve to publish them, or are you so small-minded you couldn't bear to admit you were wrong, especially on so many points?

Don't knock it, until you can use it.

Lynne Powell, Rednal, Birmingham

***The Dragon is now a very old machine, getting on for its second birthday. Although there are some very good games — I like Franklin's Tomb and Empire, and some reasonable serious software, such as, a word processor, there is nothing like as much software as there is for other machines. I still think it is overpriced at £175.**

ZX Beep

ONE of the major complaints about the Spectrum keyboard (apart, of course, from the "dead flesh" objection) is the fact that the sound is very difficult to hear and thus typing mistakes are difficult to spot without actually looking at the screen. Well the solution is simple, POKE the address of the BEEP (23609) and change the length of the BEEP from 0 (the low click it makes at the beginning) to any value up to 255. I find a convenient length to be 30 so; POKE 23609, 30.

To return to the original click, either turn off (a rather drastic measure) or; POKE 23609, 0.

Happy typing.

M. Cummins, Marlow, Buckinghamshire

Score chart

COULD you have a score chart for computer games. It would make your mag a lot better. We could have a challenge and your readers page would show these ideas.

Thanks.

Paul Dolbear and Stephen Hill, West Drayton, Middlesex

***Good idea, send 'em in. I'll get the ball rolling by telling you about my Atic Atac score . . . (At this point we had to drag the editor away to do some work.)**

A New Dimension in Spectrum Hardware

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for Sinclair Spectrum with these features to give you endless hours of enjoyment.

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The LIGHT PEN enables you to produce high resolution drawings on your own TV screen simply by plugging into the ear socket of your Spectrum. The controlling software supplied with the light pen has 16 pre-defined instructions. You can change colour (Border, Paper, Ink), draw circles, arcs, boxes, lines and insert text onto the screen at any chosen place, you can also draw freehand. There is a feature to retain the screens and animate. On the 48K Spectrum you can retain 5 screens. You can also use the machine code on its own in your own programs, for selecting out of a menu etc. The LIGHT PEN is supplied with a control interface, to adjust the sensitivity/pen alignment.

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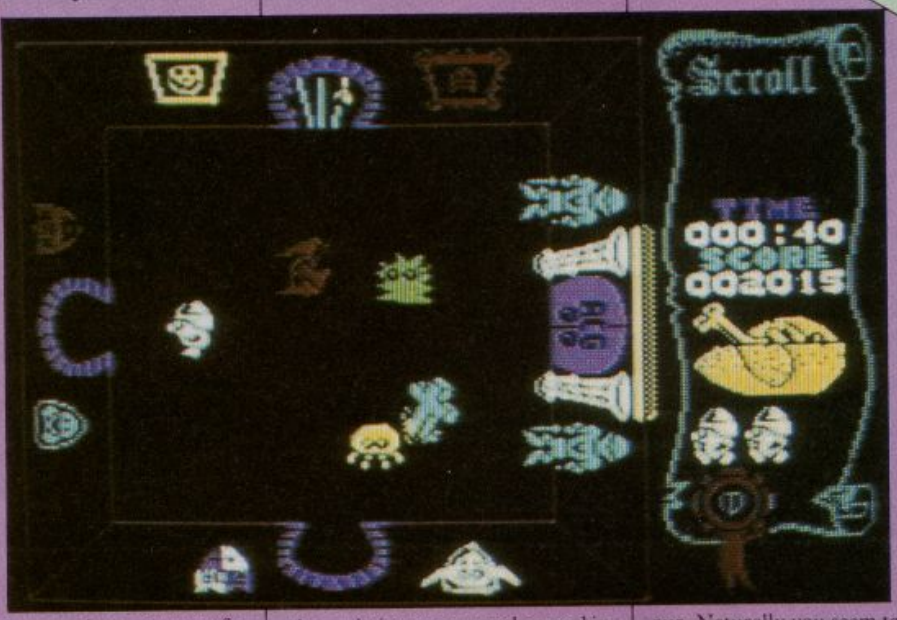
Atic Atac

Ultimate Play The Game

PROGRAM OF THE MONTH



SOFTWARE reviews throughout *Computer Choice* are rated out of five, from Brilliant to Dullsville. See rating values below.

BRILLIANT	■■■■■
EXCITING	■■■■
WORTHWHILE	■■■
MEDIOCRE	■■
BORING	■
DULLSVILLE	

AT long last an adventure game for arcade fans, or to put it another way, an arcade game for adventure fans. Whichever way you look at it, Atic Atac is a sure-fire winner. The start of the game finds you in the hallway of a grand old house, with a locked door behind you. Your mission is to explore the house, return to the front hall, and to unlock the front door with the golden key.

If that sounds simple to you, then I can reassure you it isn't. To move around the house you have to pass from room to room through a number of doors, and when you find them, secret passages. It doesn't take long to discover that the layout of the house is consistent, that is, that rooms are always in the same place relative to one another, and in this respect it is like an adventure game.

When dashing around the building, you will notice that sometimes doors slam shut, trapping you, or at least stopping you from getting to the place you intended. When this happens ghosts, ghouls and gobbledigooks appear to haunt you. Points are scored when you zap them, and in this respect, Atic Atac is like a shoot-em-up game.

In addition to the normal doors, which are coloured white when shut, and seem to open and close at random, there are a number of coloured doors. You can only open these if you happen to be carrying the key with the corresponding colour. Naturally you seem to need all these keys to find your way around the entire house.

Graphically Atic Atac is superb, and it is quite likely the shape of things to come in terms of home computer software, if this much can be done on a humble Spectrum, then we are in for some very exciting games in the future.

I like the fact that you can choose between three different types of participant; Knight, Wizard or Serf. The differences between them are not much more than cosmetic, but it does add variety to an already interesting game. The amount of food you need to eat in order to survive is indicated by a turkey gradually being eaten away at the side of the screen on a scroll. The scroll also displays the number of lives you have left, your score and the time you have spent so far.

After two or three sleepless nights, I have only solved 85% of the map, and can score around 25,000 points, and I don't think I can rest until I have got to the end, but I hope it isn't too soon, as this is one game that I can keep on playing until the micro-cows come home.

Bill Bennett

RATING ■■■■■

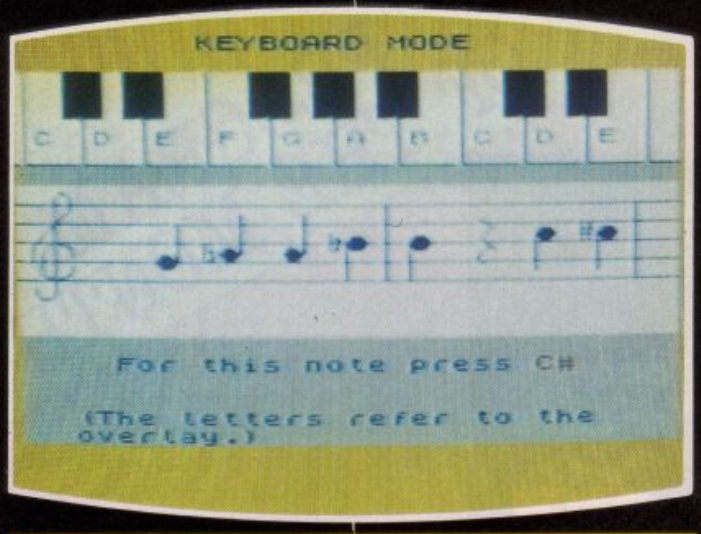
Young Computer Brains

COMMODORE and *The Sunday Times* recently ran a competition to find the Young Computer Brain of the Year. Entrants were required to come up with an idea which could be used on a computer to help the sick, underpriveleged, mentally or physically handicapped or other unfortunate people. It was not necessary to have any experience of computers, and although some entries did include programs, others had only used micros at school or not at all. It was important that the idea was usable on a computer.

The entrants were divided into three categories: under 13, the winner of which was Joanna Richardson, aged 11; 13-16, Neil Fitzpatrick, aged 13, came first in this section; the last age group, 16-18, was won by Graham Ogg, aged 16, who was also the overall winner of the competition. All the winners have been given Commodore equipment. Graham came up with a program for testing the risk of a kidney transplant failing. His father is a kidney specialist and Graham had access to a computer in the kidney unit of Guy's Hospital, London, while working at the hospital during his school holidays. Doctors are so impressed with his idea that they are going to put it into action.

Neil Fitzpatrick used a computer's graphics capabilities to help teach deaf people to speak. Because they cannot hear sounds they cannot match the noise they are making to that of their tutors. Using a computer which will transform the waveform of a word or phrase into a simple graphics on the screen, a deaf person can easily compare his speech with that of his teachers.

It was Joanna's mother that provided the basis of her entry. Her mother organises voluntary social workers who visit people in their homes. In order to find the right visitor for the right person, the volunteers must fill in lengthy forms which take a long time to sort through. This is clearly an area in which a computer can be used to sort and match, alleviating the organiser's problems and avoiding errors — it's no use sending someone who's scared of dogs into a home with a huge alsatian.



Musicmaster

Music master

Incognito Software

IF YOU'RE expecting to become some sort of musical genius by diligently using Musicmaster, I'm very much afraid you are going to be rather disappointed.

In its defence, the notes (words) on notes (music) are helpful, and the fact that they're on a screen and not in a book would make them ten times more interesting in some people's eyes. But when it comes to writing tunes it all gets a bit confusing. Somehow the tune in your head doesn't quite come out on the screen.

Of course, anyone that writes a music program for the Spectrum is going to have their work cut out. The sound on this machine is abysmal — Beethoven wouldn't be as famous as he is today if he had had to use one.

Everything being relative Musicmaster compares quite favourably with other music programs around. £9.95.

Sally Clark

RATING ■■■

Dallas

Strategy Games

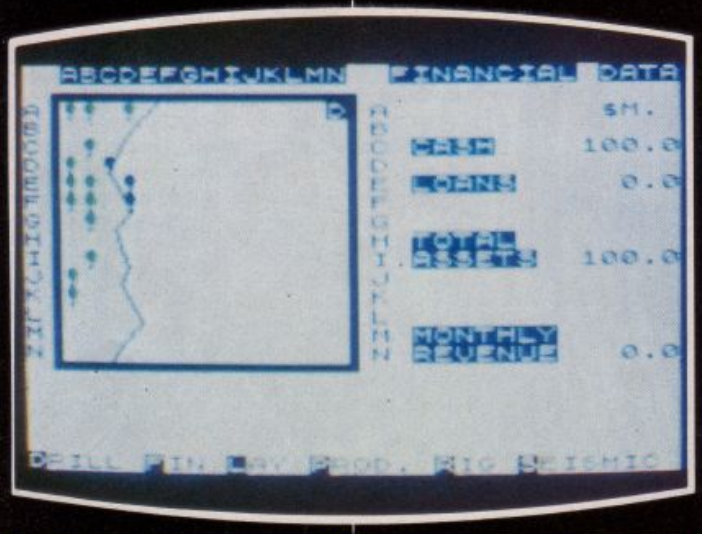
IF YOU can't wait for the next episode of Dallas, perhaps the game of the same name is for you. You might miss the romantic entanglements though, because Dallas (the game) focuses on the oil side of things.

Your aim is to take over the Euing empire, and you can choose between three skill levels. A small map appears on the screen showing woods and oil wells. You can make bids for new sites but you may go broke buying duff land. You must move your rigs about and test for oil, but it may test your patience as there is more limestone about than anything else.

Unfortunately, not as exciting as the program — and I don't even like Dallas. £6.

SC

RATING ■■■



Dallas

Android Two

Vortex

ANDROID Two has been given the Militoid Assignment; he must destroy five militoids in each of three zones: the Maze of Death, the Paradox Zone, and the Flatlands. But he must be quick as his transporter will only wait a short time.

The instructions for playing the game are clear and concise, which makes a change. The game should be welcomed by Pacman fans — getting round the Maze of Death is a bit like a more sophisticated version of Pacman's maze. The graphics are excellent as well. You must guide your Android around, avoid being destroyed by various hoveroids, landmines and indestructible bouncers. Easier said than done, after all that you still must destroy the militoids.

Don't let the Pacman analogy lead you into believing that you have only one screen to play in; it scrolls endlessly left and right, up and down. An excellent game.

SC

RATING ■■■■

Android Two

Dietician

Keysoft

YOU'RE supposed to take the Dietician seriously but it kept us amused for hours. You feed in your weight, height, sex and age, and the computer tells you how overweight you are and how much you ought to lose.

It'll work out how many calories you need to maintain your weight, and will then plan out how many weeks and calories it will take to shed those excess pounds. One of the options is a diet plan, which simply tells you the units of food groups you are allowed each day e.g. fat 9.5. The food group option tells you about which foods are best — but it doesn't explain these units.

I can't really see that this program would be of any use to anyone who was seriously dieting, but its quite fun. A little alarmingly you can enter your personal details but with your weight at half of what it actually is, the program merely tells you you are normal — most of us would be seriously ill, that is unless you really do need help. £6.95.

SC

RATING ■■■

Ostron

Softek

OSTRON takes you into a world full of dark knights and evil deeds, it looked more like little Escher-type birds floating around a screen to me.

Ostron

You ride an Ostron (ostrich) and the idea is to kill off the evil knights on their buzzards. Different colours indicate different levels of cunning in the enemy. To win you must rise above your opponent before engaging in conflict. Once you get the hang of it the game becomes quite absorbing, it reminded me of killer gorilla — all those ledges you have to fly around.

Softek claims that this is probably the most original arcade game to have ever appeared — a slight exaggeration I feel. Actually a very ordinary arcade game. £5.95.

SC

RATING ■■■

Wally Kong

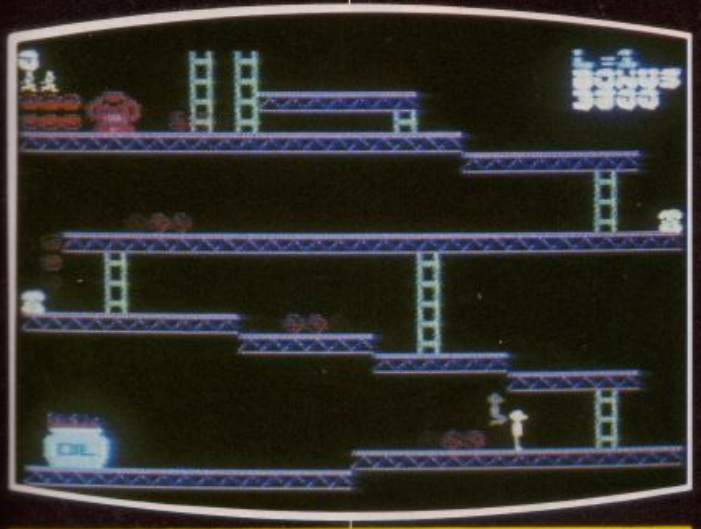
Callisto 48k only

HOW silly is it having 200 levels of difficulty? Well, the game is called Wally Kong. It's a version of the Arcade Game Donkey Kong. And it's not a very good one compared to others on the market for the 48k Spectrum. The graphics are nothing special except when you make the figure you control jump over the boulders rolling towards it. His/her little legs bend at the knee in the effort — cute. But the sound is disappointing.

Just a few clicks and buzzes, nothing to create atmosphere or excitement. Even at the lowest of those 200 levels, the third stage (jumping to and from rising platforms) is crazily fast for a learning stage. Perhaps if Wally Kong had been the first Spectrum version of Donkey Kong, it would have got a higher rating. But it isn't. Nobody said the world was an easy place to sell computer games in, Dorothy.

Danny Green

RATING ■■



Wally Kong

The Guardian

PSS 48k only

NO it's not a game about how to run a trendy Fleet Street newspaper. You guard the perimeter of a spider's web in an incredible fast action program. Nasty craft and meteors come out of the middle of the web while you rush around shooting towards the centre. If things get too hot, your star crusher will wipe out everything on the web. The control keys are laid out well — there's no problem picking up how to play immediately. The early stages are quick and you are helped along by exciting graphics and sounds. When things get hard, The Guardian is one of those special games that pulls you back for another go . . . and another.

DG

RATING ■■■■

Rider

Rider

Virgin Games

Spectrum 48K

VIRGIN Games sure knows how to treat it's software writers. They get the pop star treatment. Mugshots in the cassette card. Intimate details of their relationships with other computers. Terry and Roy are today's hits. Their game is strong on graphics and weak on challenge. It's in two parts: first you control the left and right movement of a parachutist trying to land on a moving motorcycle. Not only is this a hell of a lot easier on screen than in real life, but after about three goes it's a complete doddle. In the second half, you ride the bike through a cross between a minefield and a cemetery. A near miss of either a gravestone or a mine slows you down, and a direct hit kicks your bucket. Get through that bit OK, a screen message tells you that you are promoted. Fine. And that's it. Sure, you can increase the speed next time. You can even play with up to five people. But neither of these makes up for the fact that after half an hour you've got the game sussed. £5.95.

DG

RATING ■■■

Spectrum

MOGUL

THE HOTWARE PEOPLE

METAMORPHOSIS

You stumbled into the nest of the **Cyglorx** and find yourself fighting off robot tanks guarding the **Cyglorx eggs.** You think you have everything under control and then the eggs start **hatching.** Commodore 64 version features 4 different screens.

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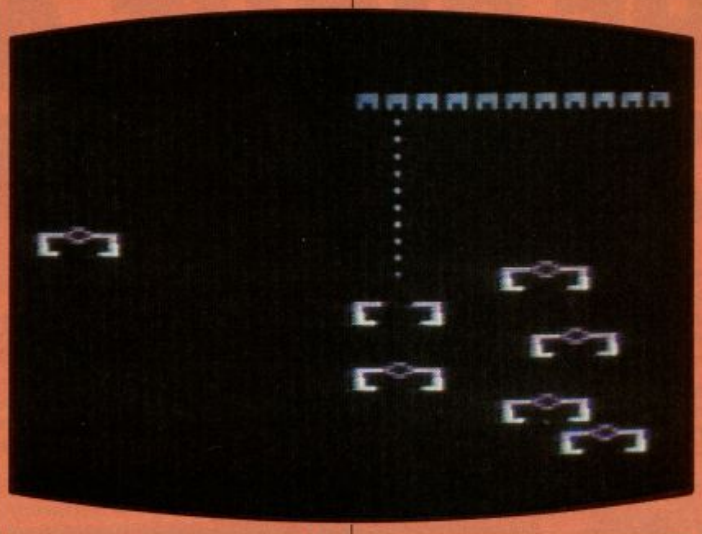
Martians



Martians

Artic Computing Limited

ANOTHER trusty zappy game. The martians are coming! The martians are coming . . . up the screen! Your job is to drop a bomb on them — smash — from a sort of demented lego brick at the top of the screen. Nice crashing sound when you hit a martian ship square in its heart. But even a glancing blow will send the bomb richochetting among the rest of the baddy fleet causing death and destruction. Wow!

Well that's the thrill bits. On the debit side the graphics are rather simple and you can't keep your bomb-thrower stationary for a good shot. You can reverse his motion by pressing the R key. Space bar drops the bomb. However, when I got the program the controls wouldn't work. I then found the shift lock key was on. Releasing it cured the problem — something to watch out for. Unexpanded Vic. £5.95.

Lance Sucharov

RATING ■■

Quadrant

Quadrant

Romik Software

YOU are a little man, Boris, running along the surface of planet Synlac. You have to make him leap over craters, while a group of curious cubes circle overhead. They are in fact nasty Acturian Macrobats casually dropping track-bombs which more often than not miss you. This is just as well as it needs fair concentration to avoid being splattered into a crater. However, Boris is well armed and keeping your finger hard on the firing button guarantees a steady kill rate of the circling cubes. Boris gets paid $50 for each alien zapped, which obviously hasn't yet come to the notice of the Council for Intergalactic Crimes against Aliens.

It's basically a simple zap-zap game, but the graphics have good realism although they're not lavish. As Boris runs you hear his little feet tap-tapping along. The stars stay still in the sky as the pink mountain range slowly drifts past on the horizon. In the middle distance other craters go by at a faster rate. You can kid yourself you're on the planet. Most games don't have perspective like this. Hitting the space bar freezes the game — useful when you're shouted at to come to lunch. Unexpanded Vic. £6.99.

LS

RATING ■■■

Patience

Commodore Business Machines

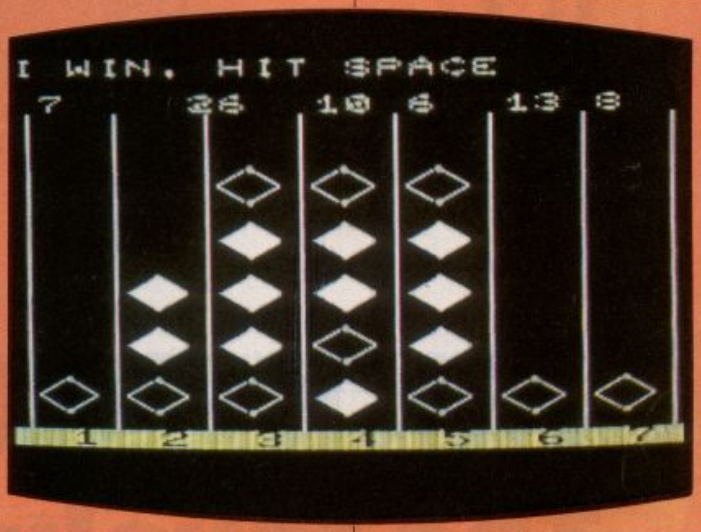
ONE game of patience you can't cheat at. In fact my six-year-old and the 70-year-old babysitter were glued to the game all evening.

Basically this is the old familiar card game but much better. You don't have to shuffle or fumble putting the cards out every time. It's slick with clear graphics and there is a screen-full of instructions if you want it. But the best way to learn is perhaps to watch your granny at the controls. In fact if you want to switch on the sixty-year-olds to computers, try them on this. 3K, 8K or 16K ram pack needed. £4.99.

LS

RATING

Connect 4



Connect 4

Artic Computing Limited

WELL known game of counters where you have to get your four in a straight line to beat your opponent. Very slick on the computer. The counters drop like diamond shaped snow-flakes from the top of the screen, into the column of your choice. You can play against a friend or against the computer, which is alright but no great shakes at the game. It's a bit mean though as it always starts first. The only thing it lacks is some hunky sounds. A 'boinnnng' when the counters land, and the music from Star Wars when you win, would soup it up nicely. Unexpanded Vic. £5.95.

LS

RATING ■■■

VIC-20

GET THE RIGHT ANGLE ON YOUR SPECTRUM

Trickstick turns your Spectrum into the most sophisticated games machine in the world. Your fingers rest on the Trickstick's six sensitive pads (four directions and two fire buttons) and the harder you press the faster you go or the harder you turn.

Trickstick works by picking up mains hum from your body and converting it by an ingenious circuit design directly into digital input. Proportionality gives vast possibilities for more interesting games.

- Each Trickstick comes with its own interface included in the price.
- Up to eight interfaces can be stacked into each other for 1-8 simultaneous players. (Own 1-8 player game is Attaktics at £10).
- Works with most Kempston compatible software, and with our new programmable adaptor (£10 for Trickstick owners) it works with ANY software.
- Easy to program, even for proportional games.
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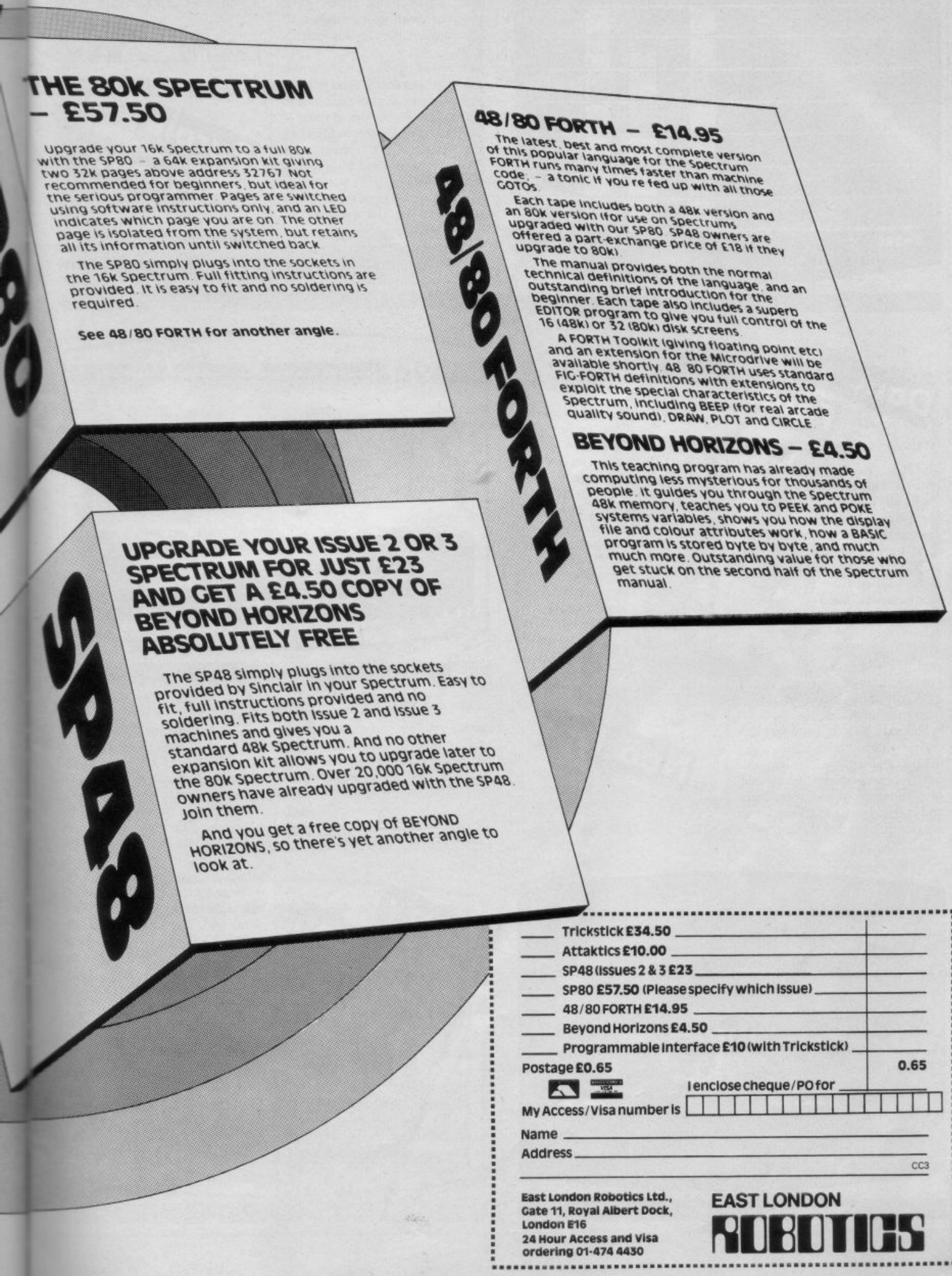
TRICKSTICK-
The revolution that Runs Rings round ordinary joysticks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The SP80 simply plugs into the sockets in the 16k Spectrum. Full fitting instructions are provided. It is easy to fit and no soldering is required.
See 48/80 FORTH for another angle.
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The latest, best and most complete version of this popular language for the Spectrum FORTH runs many times faster than machine code; – a tonic if you're fed up with all those GOTOs.
Each tape includes both a 48k version and an 80k version (for use on Spectrums upgraded with our SP80. SP48 owners are offered a part-exchange price of £18 if they upgrade to 80k).
The manual provides both the normal technical definitions of the language, and an outstanding brief introduction for the beginner. Each tape also includes a superb EDITOR program to give you full control of the 16 (48k) or 32 (80k) disk screens.
A FORTH Toolkit (giving floating point etc) and an extension for the Microdrive will be available shortly. 48 80 FORTH uses standard FIG-FORTH definitions with extensions to exploit the special characteristics of the Spectrum, including BEEP (for real arcade quality sound), DRAW, PLOT and CIRCLE.
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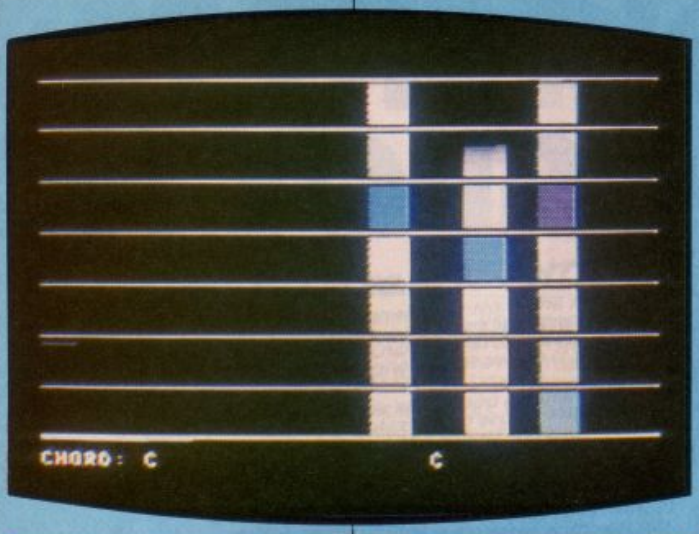


Dancing Feats

Dancing Feats

Artic

I STILL think that if you want to learn a musical instrument the easiest way to do it is to buy one and start playing, but Artic would have you think otherwise. Dancing Feats is a learning-to-play-music program, with the joystick pretending to be your instrument. I'm sure they mean well, but it started to irritate me after 15 minutes. First you choose your back-up, which can sound remarkably similar each time. It just goes on and on behind your composition — if you can call it that, random notes would be nearer the mark.

For your back-up band you can choose what sort of bass, beat, style, tempo, and ending you require. Say, you pressed bass, you would get a sub-menu of jazz, rock, blues and boogie woogie to choose from. So you first have to sort out your beat and things and then you're ready to do the really creative bit — oh dear. If you've any sort of true musical inclinations you are not going to enjoy it.

The accompanying instructions promise that if you move the joystick in a circular motion you will create a riff of melodic sounds while a straight up and down motion produces the sound of individual notes — not quite the way I'd describe it. The fact is that if you wanted to reproduce a certain tune you'd find it extremely difficult as the computer seems to be more in control than you are. You can also choose to play solo — music to someone's ears, unfortunately not mine. Nice graphics. £6.95.

Sally Clark

RATING

Neoclyps

PSS

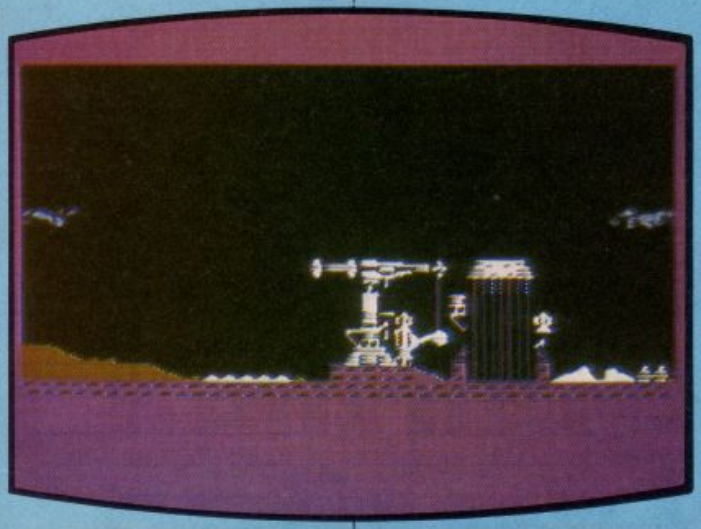
THIS one's for the dedicated shoot-zap-kill games player. Neoclyps is a straight shoot-em-up game based on the arcade game Defender, with no pretentions of being anything else, and as such it's great.

Of course, there's a story woven around it; you are the good guy and a hero and a star pilot (and nice to spiders and all that sort of thing — creep!). Anyway, the baddies, an alien race from a distant solar system, have invaded Neoclyps, a colonial planet. You're the hero so it's up to you to rescue the people of Neoclyps from the awesome invaders. OK?

You can play the game at over 13 different levels; 1-4 for beginners; 5-8 for intermediate; 9-12 for experts; and 13-? for the ace players among you. The graphics are good and the sound is what it ought to be, zapp-kapow-kapow zapp-zapp---- boom. A must for all arcade game fans. £7.95.

SC

RATING



Neoclyps

Crazy Balloon

Software Projects

CRAZY Balloon is an arcade game which involves guiding a balloon around a series of mazes. It might not sound very exciting but its actually quite addictive. As you succeed in getting through one maze without bursting your bubble (or balloon), you automatically go onto the next and more difficult one.

This would probably be good for younger children, us older ones (if not complete beginners) would not find it very absorbing for long. Play it with or without a joystick. £7.95

S.C.

RATING

Purple Turtles

Quicksilva

IF YOU are really quite little (or little at heart, like most of our office) you should love Purple Turtles,

Purple Turtles

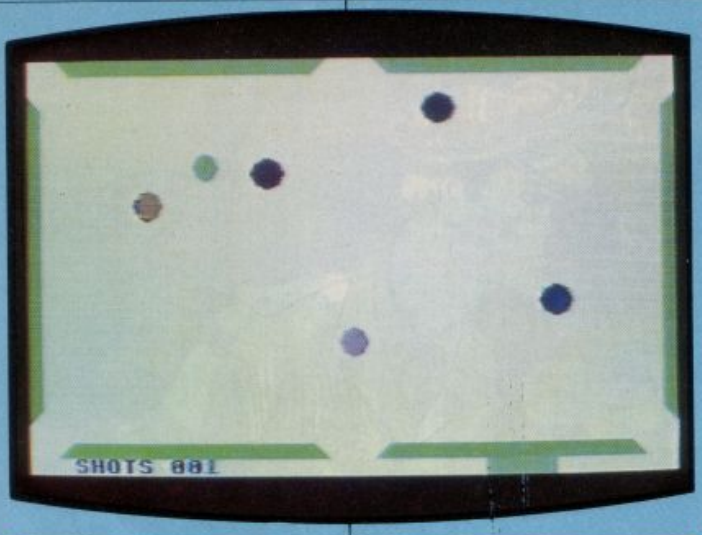
we all did. It's the sort of arcade game that tough zap-em, kill-em astrazone kids will hate, but I bet even they'd sink in the river at level 9.

The graphics are good and depict a little person on one side of the river bank. The river is between him and the other river bank — fairly usual. But in the river are four turtles and you must jump from turtle to turtle to get to the other side and pick up some fruit before returning. The catch is that the turtles submerge to the bottom of the river and then float to the top again at random and you must jump on their backs only when they are at the surface.

At level 1 this is mastered without too much difficulty but it gets tougher and faster as you progress towards level 9. The musical accompaniment, which is aptly *Messing about on the river,* also gets faster. An excellent game for young children. £7.95.

SC

RATING



Hustler

Hustler

Bubble Bus

IF YOU can't wait for the next snooker tournament on the box perhaps Hustler is what you need. The good thing about it is that you can play with one or two players, so it doesn't matter if the rest of your family hates the game.

There are six games that you can play: the first three are for one player, the others for two. In the first you must put any ball in any pocket; in the second put the balls in order; and in the third put each ball in its own pocket. Playing with two players you must put each ball in its pocket and score the pocket; or you can play mini pool — each player has different colour balls and it's the first to put his colour down that wins; or lastly one player pots in order 1 to 6 and the other pots in order 6 to 1.

So there's quite a bit of variety. To shoot you must place the cursor in front of the ball you want to hit and then press the fire button — perhaps it would be good practise if you're not very good at lining up the ball. Unfortunately the colour is bad. The balls are supposed to be different colours, but all you can make out is a sort of smudge on each one. A shame because otherwise it would be a top rate game. £6.99.

SC

RATING ■■■

Ship of the Line

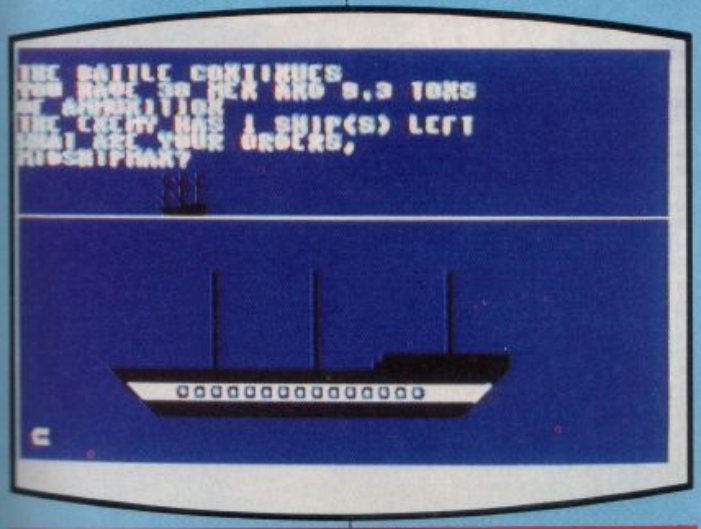
Richard Shepherd Software

SHIP of the Line is a repetitive game of strategy — not, quote, "an adventurous naval strategy", which is what the packaging claims.

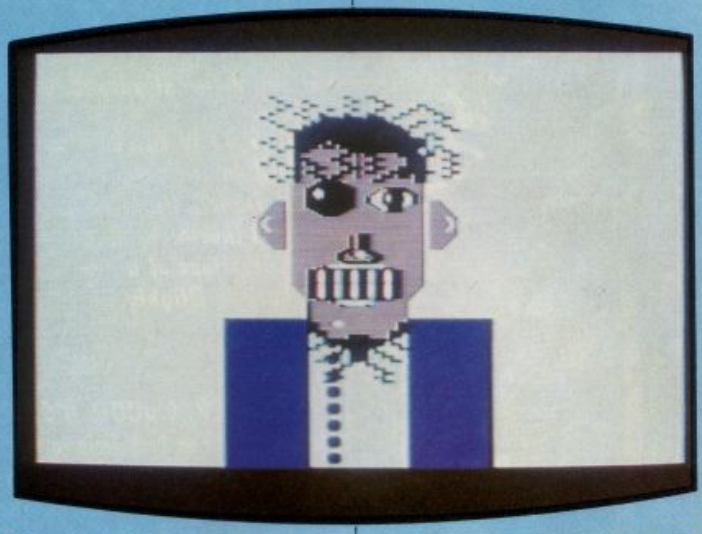
You are a naval officer in the 17th Century and the object of the game is to engage in combat with the enemy. You must make sure that you have enough food, water and ammunition on board; and enough crew to man your cutter. If you run out of ammunition or the crew start to starve, you may be forced to surrender — meaning you've lost.

I was a bit confused when I ordered my ship to leave and managed to sink one of the enemy ships that was attacking me. Especially since I hadn't managed to sink any when I ordered my crew to attack — oh well, such is life. If you're a bad loser you should like this game as it is definitely biased against the enemy. How else could you possibly win in a four-to-one against situation?

The graphics are suitably uninspired as well, just a ship in the foreground (that's you) and a ship or ships on the horizon (the enemy).



Ship of the Line



Face Ache

Face Ache

Commodore 64 Software

FACE Ache is for little ones to play with. You can use it to make lots of funny and not so funny faces, but the computer decides exactly what form it is going to draw, you can only decide which part of the face you are going to change. But the graphics are good so its fun to play with.

The face is divided into left hair, right hair, eyes, nose, mouth, and chin. You can change them all as much as you like — a lot of horrible faces appear on the screen I can tell you. If you get tired of this you can put the machine onto automatic and let it do the work for you. Once you tire of this there is a game you can play which is designed to test your memory. Press G for game and the computer shows you a face that you have to remember. Then you have just one minute to recreate it, the screen then displays your score and tells you how many features you got wrong and how many you got right.

You could make lots of munster-like pictures of your brother or sister, Mum and Dad, or friends. I'm sure if I was about five years old I would think it was all quite fun. The only criticism is the time lapse between tapping the key and the picture on the screen reacting accordingly. It means that you can't be sure whether the computer has accepted your instructions or not — I'm sure a five year old would start bashing away at the keys to try and get a result. £4.99

SC

RATING ■■■

The state of play is displayed at the top of the screen. Definitely rather you than me. £6.50

SC

RATING ■■

Face Ache

Commodore 64 Software

FACE Ache is for little ones to play with. You can use it to make lots of funny and not so funny faces, but

commodore 64

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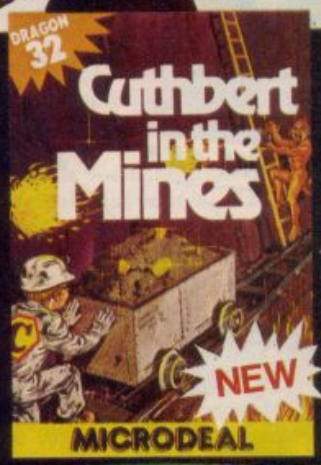

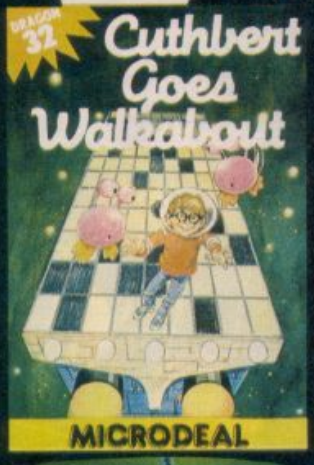

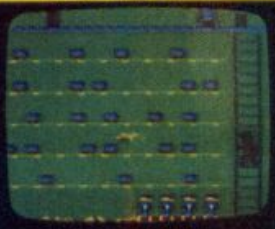

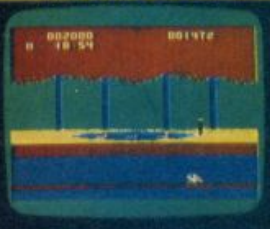

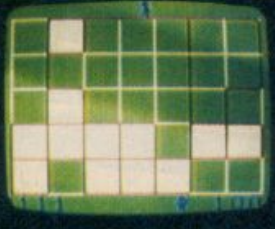

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A·D·V·E·N·T·U·R·E·S

Colossal Adventure

Level 9 Computing

(Commodore 64)

THIS classic interpretation of the original Adventure, has translated very well on to the Commodore 64.

It has 70 extra locations, but with limits on my time, I sadly haven't seen even half of the exciting places that lie in wait.

The descriptions of the locations are very good, we have tried to translate one of these into vision in the illustration above.

For those who have played the original mainframe Adventure there will be much that is the same, but with a few differences, just to keep you on your toes.

One niggle, the screen display is difficult to read, the words are shown in light blue on mid blue and don't stand out at all well in comparison with other adventure displays I have seen on this computer.

Kirstie Rogers

RATING ■■■■

The Man from G.R.A.N.N.Y.

Vectis Software

(Commodore 64)

FOR someone like me who is an adventure game novice, this is the ideal program. It may just be beginner's luck, but instead of being killed in a plane crash in the first five lines of the game because I can't open my parachute, or being sucked into a quagmire for going in the wrong direction — I actually got somewhere! As I say, it does seem easy to get into, but once you're well and truly in (and hooked) then the hair tearing starts.

The game opens with you, a G.R.A.N.N.Y. agent, in a sorry state. Your mission is to track down and assassinate your opposite number, a C.R.O.W. agent who is working on a formula to change the population of the USA into zombies. But while following a lead, you are unfortunate enough to drink a lemonade Mickey Finn, and wake in a back alley with nothing but a headache.

I progressed from alley to alley, and amassed quite a collection of useful objects, such as a key, an apple, a gun (and eventually bullets for it) and even a bucket and mop. I was told after a while that I couldn't carry everything and reluctantly parted with some of it. Of course, in my usual style I ditched something that I needed later! In consequence, I drowned.

The game changes from alleys quite cunningly to Other Places, and the game also features some gems of groan-making humour. Beware of the limbo dancers!

The packaging of the game is quite basic, but perfectly adequate and certainly does not mislead you with flashy pictures. I enjoyed this game a lot and did not find it as frustrating as some, such as the ones that say "You can't" to everything, or where I get killed every ten minutes. Definitely a game worth taking time to play.

Deborah Goldfinch

RATING ■■■■

The Hobbit

Melbourne House

AND about time too! Widely billed as *the* state-of-the-art Adventure game, The Hobbit is finally available to Oric owners. The total Hobbit package consists of the cassette, documentation, and a copy of the book, which I hadn't read since the age of eleven (I must confess I was pleasantly surprised on re-reading it!).

The program itself is of course an Adventure, but it's an Adventure with knobs and bells on. First of all Melbourne House have moved on from the old Noun-verb command structure and The Hobbit accepts commands in a wide variety of formats, including propositions and adverbs almost like real English. Secondly, you can address the other characters in the game (except that they were invariably rude to me) and finally, some scenes have a graphic representation which generally follow Tolkien's illustrations fairly closely. As an ageing punk I approached The Hobbit with caution, only to find myself a convert within five minutes. If you can enjoy Adventure games I think you'll find this has got everything you want.

Fin Fahey

RATING ■■■■

BUYERS GUIDE TO ORIC SOFTWARE

THERE has been a lot of criticism of the availability of Oric Software. Although a growing number of software houses now recognise the need for good pre-recorded software for this machine, the quality is still variable and the range is not nearly as wide as for, say, the Spectrum or Vic-20. However, Oric arcade games are popular, with favourites such as Mushroom Mania and Xenon I. Here's a guide to some of the games that are available.

Arcade

Xenon I	I.J.K. Ltd	£8.50
3-D Maze/Breakout	I.J.K. Ltd	£7.50
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Mushroom Mania	Arcadia Software	£5.50
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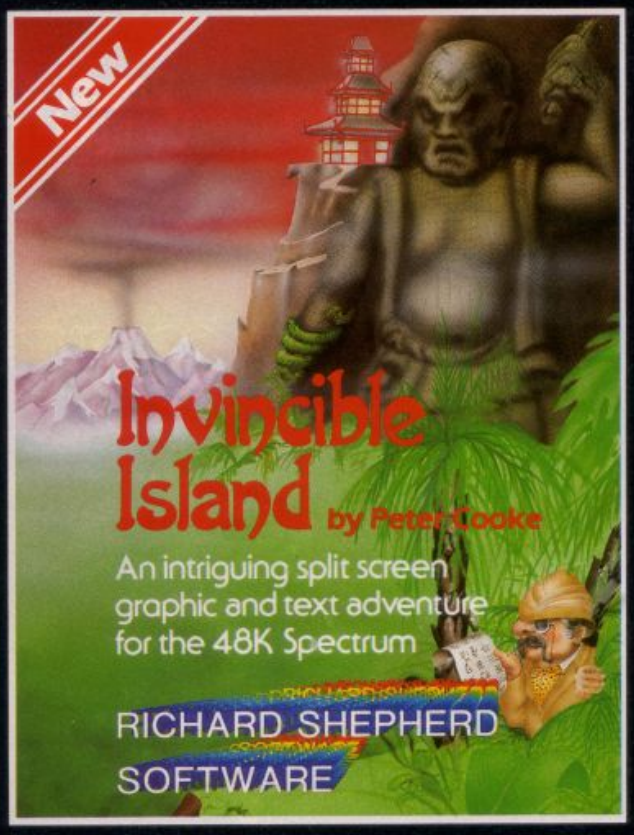

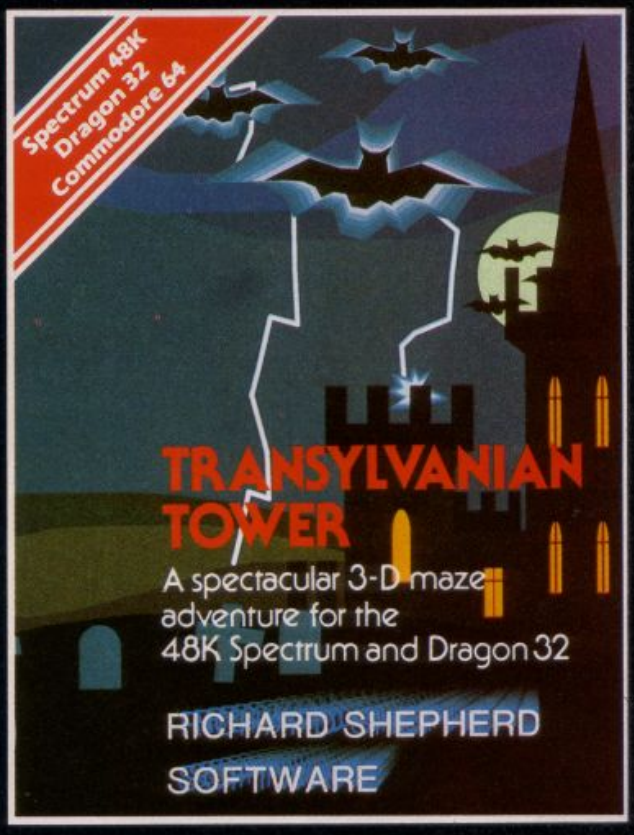

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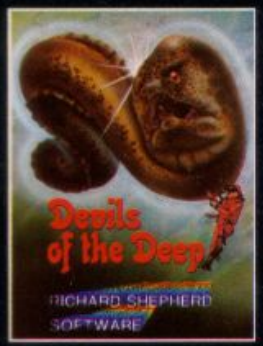

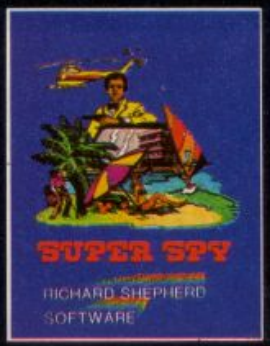

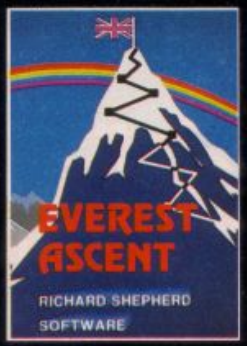

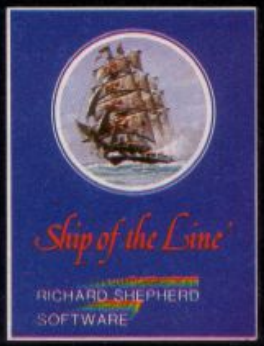

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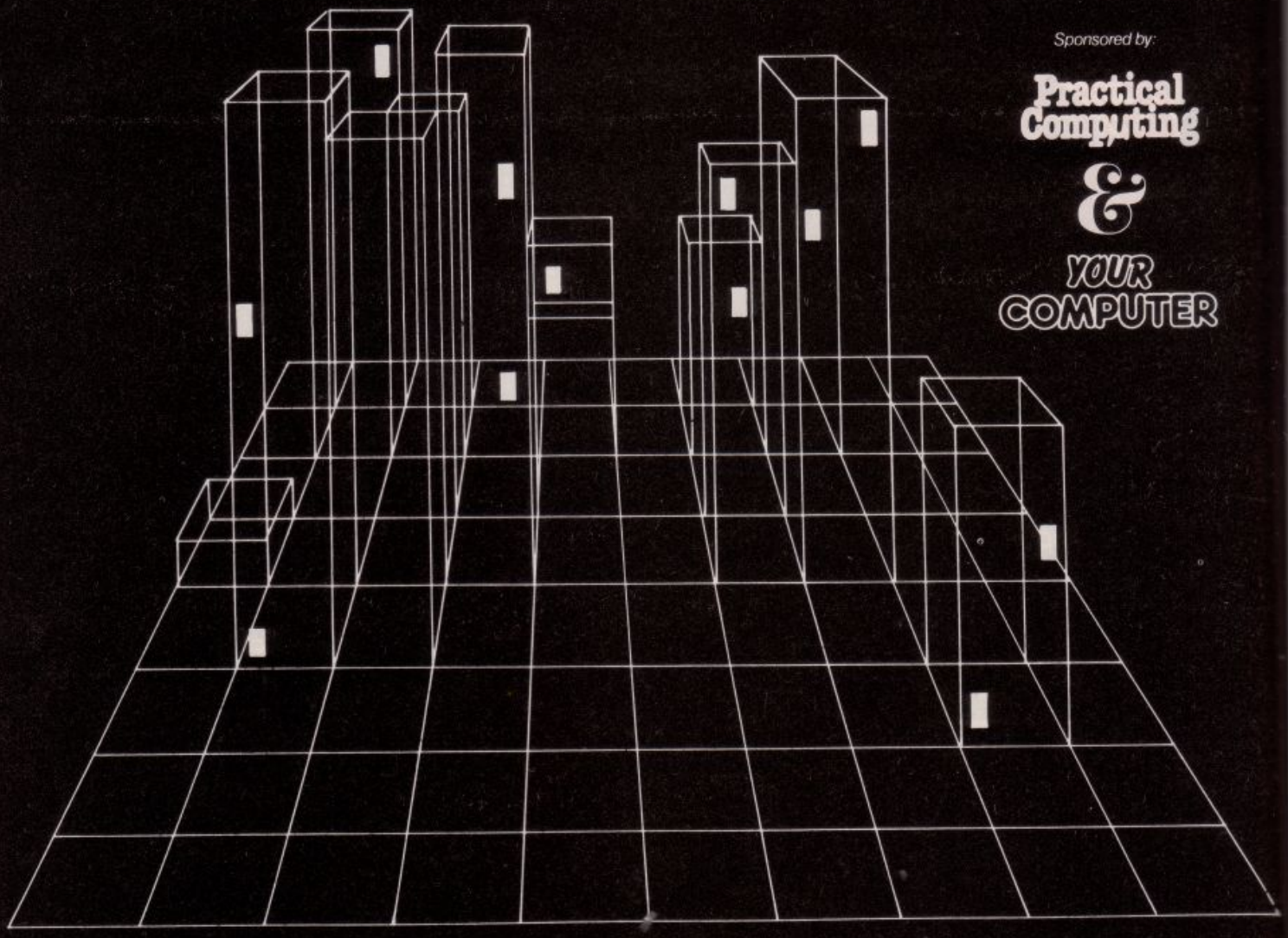

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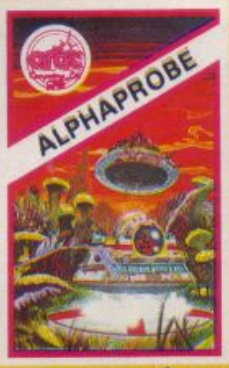

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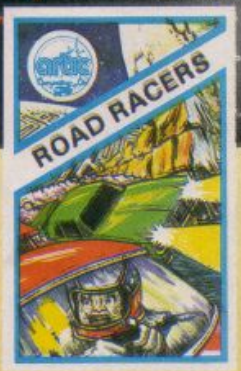

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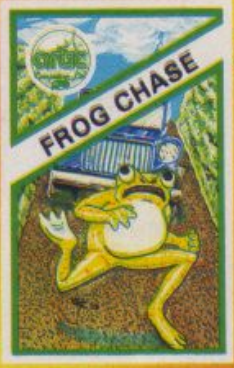

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ON TEST:

TRIPLE TEST

THE THREE machines under this month's Triple Test microscope are not particularly new or wonderful, but they have one especially pleasing common feature; they are cheap. So cheap, that they could be described as pocket money micros or more accurately, throwaway micros.

Just because the computers are cheap doesn't mean that they are not real microcomputers. In fact here lies one of the greatest benefits of these machines. If you are unsure about computing and think that you might like to have a go, but don't want to commit yourself to spending a lot of money, then buy a cheap micro. Within weeks you will almost certainly be hooked on this fascinating hobby and saving to buy a bigger and better micro, with the advantage that you don't have to risk a lot of money up front.

Other people like the cheaper models because they don't have a lot of money to spend on micros. All three are ideal learning machines; the principles of computers are the same wherever you learn them. This makes them particularly good machines for students. Because they actually cost less than the sum of their individual components there are some people who buy them simply to rip apart and rebuild as the thinking brain of a robot, or model railway controller or any one of a thousand other exciting computer controlled projects.

The scores for these three machines appear to be fairly low but it should be remembered that the scores given in *Computer Choice*, both in the Buyer's Guide and the Triple Test are all to a common standard. For a better comparison take a peek at our Buyer's Guide on page 40.

LASER 200, TANDY MC-10 AND ZX81

DISPLAY AND GRAPHICS

Laser 200 ■■
Tandy MC-10 ■
ZX81

Bottom of the pile comes the poor old ZX81 with a zero rating, basically because it only has low resolution — i.e. chunky graphics and is only in black and white. It really is not the machine to buy if you are interested in graphics. The other bad point is that the screen goes blank while the machine is thinking when it is in fast mode, alternatively it just goes slowly when in the slow mode.

Another minus point is that the normal mode of the graphics is in black on white, this is less stable than the opposite white on black, but can be easier to read. When you load software on the ZX81 a weird pattern of lines appears on the screen. Experienced owners can tell just how well a tape is loading from this pattern, so it does serve some purpose.

The Tandy and the Laser have very similar graphic capabilities which isn't surprising because they both use the same silicon chip to achieve those graphics. In many ways the graphics are similar to those of the Dragon 32 micro, or its American cousin the Tandy Colour Computer — sometimes known as the CoCo. Both have either eight or nine colours, depending on how you go about counting them. Let's be generous and call it nine.

There are a possible 128 by 64 pixels on the Laser, which is much better than the 64 by 32 on the Tandy. On top of this, the Tandy graphics don't look as good either. Neither machine has user defined graphics like the Spectrum or Oric. The Laser has a character set with 255 different letters, numbers, symbols and graphics characters which can be printed in light green on dark green, in dark green on light green, or in two shades of orange.

Both micros use the 32 by 16 format for displaying text, which compares with 32 by 24 on the ZX81 and all three only have upper case. Neither machine has commands which allow you to draw lines, circles or whatever; you have to work these out for yourself. The colours available are green, yellow, blue, red, buff, cyan, magenta and organge together with black which appears to fill undefined gaps.

SOUND

Laser 200 ■
Tandy MC-10 ■
ZX81

Sound doesn't come cheaply on home computers, in the case of the cheapest, the ZX81, there isn't any sound at all. You can get round this unfortunate situation by using the output to a cassette recorder and some clever programming. Alternatively you could always try experimenting with a transistor radio near the machine — it does work.

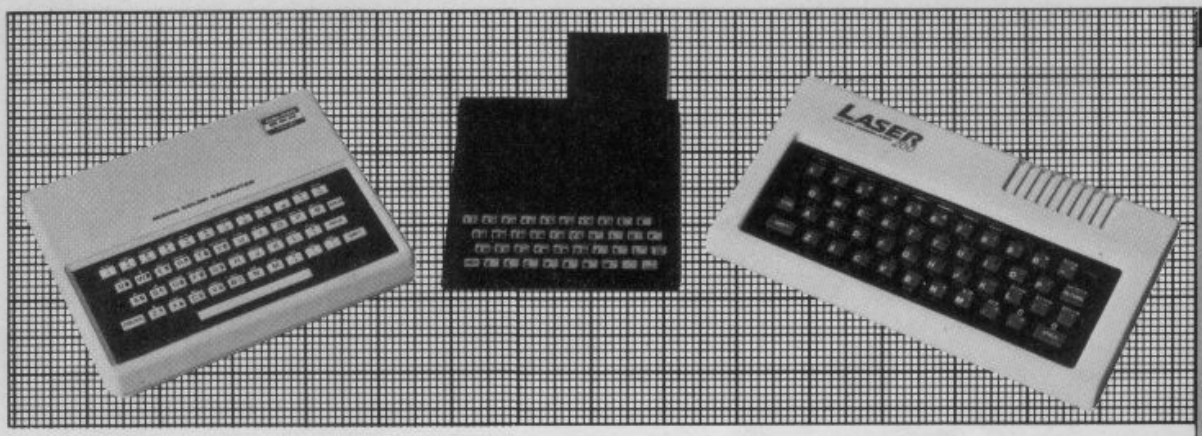
On the Tandy and Laser micros, there isn't much in the way of sound, but there is some. Although the quality is not much to write home about, the Laser does have a built-in beeper, which is similar in many respects to that of the Spectrum computer. The Tandy's sound is output through the televsion speaker, so volume is a matter for the individual's taste. This is an improvement over the beep of the Laser, but otherwise the two are very similar.

KEYBOARD AND CASING

Laser 200 ■■
Tandy MC-10 ■■
ZX81 ■

It may be innovative, but the keyboard on the ZX81 is horrible. It is up to you whether the single keyword entry system is for you or not. On the ZX81 you are stuck with it. For absolute beginners it is a good thing, at a later stage it is not. It allows you to enter special words used by the ZX81's Basic by only hitting one key, though sometimes you have to use the shift key as well. The ZX81 works in such a way that it knows what sort of keyword to expect next and prepares itself to receive it.

There is no space bar on the ZX81, and the keyboard is very small, but then nobody in their right mind would buy the micro to do word processing on. Because there is no feedback, either in a sound form or a positive touch, you don't



TRIPLE TEST: LASER 200, TANDY MC-10 AND ZX81

know that you have entered what you thought you entered without looking at the screen, though for most ZX81 users this will not be a problem. In its favour, the keyboard does seem to wear quite well, and is clever. The case of the ZX81 is adequate, but then as one micro guru once said "In this business, adequate is enough."

Tandy have packaged the MC-10 very well, but the keyboard is again not much good. It does have the advantage of a space bar, so users acquire the right sort of habit for when they meet bigger micros. It uses little rubbery keys, and is three-quarters "full-size", which means it is small. Again there is no audio feedback, and the keys do not auto-repeat as they do on some machines.

One nice feature is that you can use either the keyword entry, or type out the words in full. To get at the keywords you must use the control key. One blunder made by the designers was to position the Break Key just above the Enter key, making it all too easy to accidentally abort the program.

The keyboard on the Laser is a close cousin of that on the Spectrum. It allows both single keyword entry and the full typing out of the Basic words. Like the Spectrum, the space key is not a bar, but is a slightly larger than usual key hidden away in the bottom right corner. Unlike the Spectrum there is only one Shift key. The Laser keyboard gives a click when touched.

BASIC

Laser	■■
Tandy MC-10	■■
ZX81	■■

Microsoft Basic is the standard version of the computer language found on most machines worldwide, including the Tandy MC-10 and the Laser 200. In the case of both machines it is fast and easy to use, though there might not be as many commands as you would wish. The Laser allows you the IF . . . THEN . . . ELSE form of command which is an advantage over the Tandy. On the other hand the Tandy allows the ON . . . GOTO form, which is called a computer GOTO, and means that you can jump to different points in your program depending on the value of the variable between ON and GOTO.

Both machines have the DATA command which allows you to read in a piece of data inside a program. All the mentioned commands are missing on the ZX81, which in addition to those misdemeanours only allows you one statement per line of program. But then the Sinclair Basic is so well-known and widely used in the UK that you cannot go wrong.

All three machines are ideal for learning about programming and the Basic language, though each machine has certain limitations. The Sinclair ZX81 uses a version of Basic called Sinclair Basic, and is a "cut-down" version of the language used on the Spectrum. If you learn to program on the ZX81, using the Spectrum will be easy, but because Sinclair Basic handles strings in a different way to most other Basics, moving to another manufacturer's micro will involve you in a small amount of relearning.

Microsoft Basic — as found on the Tandy and Laser machines, is more or less the standard version of Basic found on machines outside the UK. The only major UK micro to use a version of Basic that is substantially similar is the Oric. But the differences between various Basics are for the most part minor, and once you learn to program in one sort of Basic the others come easy.

EXPANSION

ZX81	■■■■
Tandy MC-10	■■■
Laser	■■■

The ZX81 doesn't have a lot of memory, in fact only one kilobyte of RAM. But you can't even use all this most of the time. You can't get much of a program into a mere one kilobyte, so don't expect to. On the other hand it is all you need to get started, once you are writing longer programs you can then purchase some extra memory. There are many options, but the standard upgrade from Sinclair is a 16k Rampack, which allows you to write and use fairly decent sized programs.

The Tandy has a total of around 3k of RAM for you to play with. Again it is enough for a beginner, but you will soon be looking for more memory. For £39 you can buy a RAM-pack which will take the total memory up to 20k, which is enough for most people.

Like the Tandy, the Laser only offers the user around 3k of RAM to play with. But in the case of this machine an upgrade to a rather useful 20k costs only £30.

Just about everything you could possibly want to add-on to a ZX81 is available, from real disc drives, to higher-resolution graphics, printers and communications devices. Most of these add-ons are not available from Sinclair Research, but from a large number of small and middle-sized companies specialising in Sinclair add-ons.

From Sinclair Research comes the incredible Sinclair ZX printer, which might not be

HOW THEY LIN

ZX81

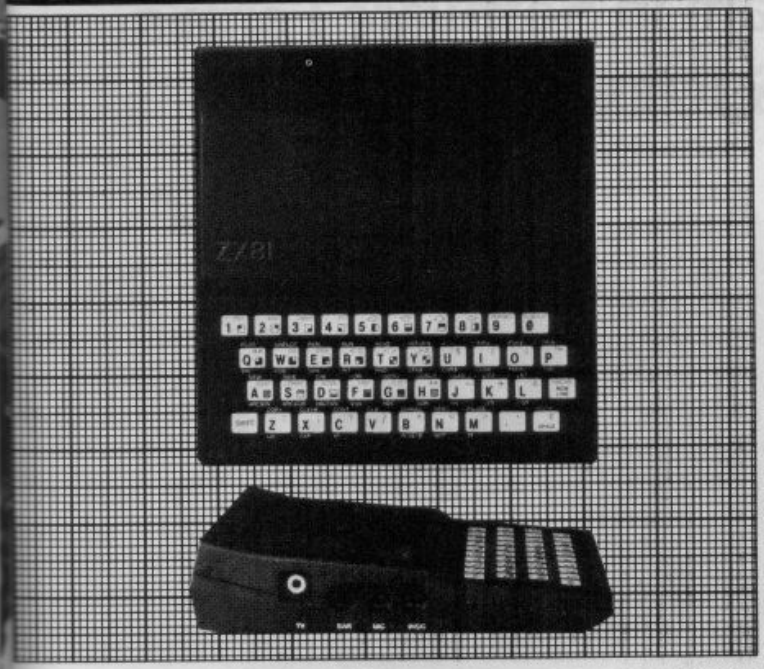
For: The cheapest machine on the market, very large software base, a million users can't be wrong.
Against: Old fashioned, lacks colour and sound, grotty keyboard.

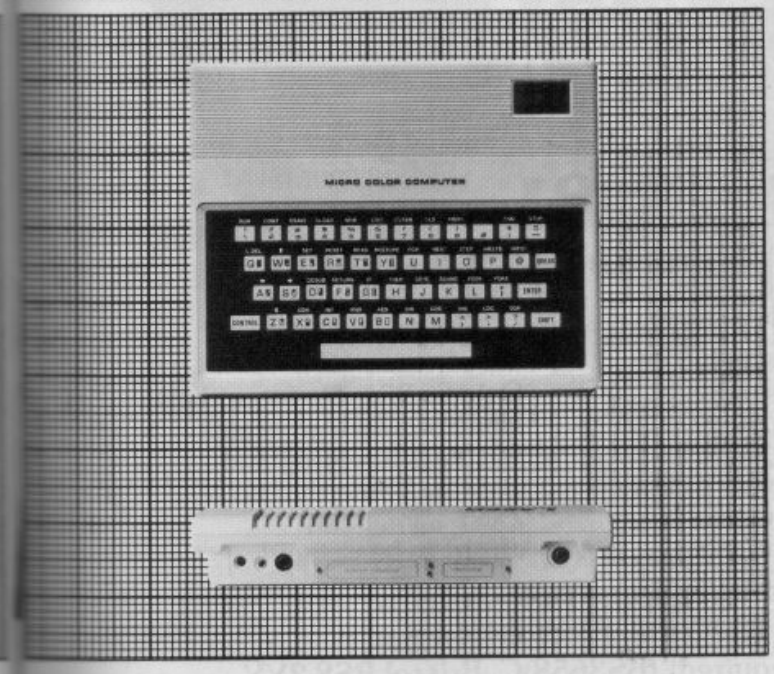
Laser 200

For: Cheapest colour computer around, cheap software, graphics not bad, Basic pretty good.
Against: Hardly any software, low number of other users to swap ideas, etc with.

Tandy MC-10

For: Available all over the country in Tandy stores, Basic acceptable.
Against: Poor graphics, overpriced, awful keyboard.





very good at printing, but is exceptionally cheap, weighing-in at £39. It uses a kind of silverised paper and literally burns graphics or characters onto it. The nicest thing about it is that you can dump the image you see on the TV screen onto a piece of this paper. It is useful for keeping a permanent copy of any programs that you might happen to write.

Tandy have a rather neat little thermal printer which works with the MC-10. It is called the TP-10 and costs around £80, it is worth bearing in mind that it will work with a variety of other micros providing they have the magic RS232 interface. It has one minor drawback, there is no pound (£) symbol, but is otherwise excellent.

A whole range of add-ons appear to be "on the way" for the Laser, including a real floppy disc unit, a light-pen costing £19.95, a four colour printer similar to the Sharp and Oric printers, joysticks costing £19.95, and an extra large memory expansion giving 64k of RAM. There is also a printer interface for people who want to use the machine with their existing printers.

SOFTWARE

ZX81 ■■■■

Laser 200 ■

Tandy MC-10 ■

When did you last see any software for the Tandy? Probably never, because there doesn't seem to be much around. On the other hand, there was lots around for the ZX81, and if you look you will still find some, sometimes it is heavily discounted as stockists are trying to make more space on their shelves for more profitable software for the more up-to-date machines.

There is a huge list of Sinclair ZX81 software, if you want one write to Sinclair Research at the address given in our Buyer's Guide. Among the software is something for everyone, including arcade games and educational software. Also, ZX81 software is cheap, and surprisingly good considering the limitations of the micro.

About 20 packages are available for the Laser 200, including adventure games, a version of space invaders and a mini-chess game. The prices are reasonable; for more details contact the stockists Abbex, on 0532-742450.

VALUE FOR MONEY

ZX81 ■■■■

Laser 200 ■■■

Tandy MC-10 ■■

There is no disputing that the ZX81 is good value for money, at only £49 or less it is a throw-away computer, but ask yourself do you really want an out of date, black and white, rather basic computer. If you do then this is for you. The Laser 200 costs £70 and is the cheapest colour computer on the market apart from the ill-fated Aquarius, which seems to have been left to die by its manufacturers Mattel.

The Laser is a cheaper, less powerful version of the Spectrum class of micro and should be viewed as such. It is only really worth buying if you must have a computer and there are no Spectrums available or if the extra £30 for a 16k Spectrum really is too much to find. If you come into the second category you ought to consider buying a micro secondhand.

The Tandy has little going for it at £99. Face it; a 16k Spectrum is the same price and on that you can play a number of really good games. Unless you have some special requirement that the Tandy provides — and that is pretty unlikely — the Tandy is a machine to avoid.

RATING

EXCELLENT ■■■■■

VERY GOOD ■■■■

AVERAGE ■■■

BAD ■■

AWFUL ■

THE triple test ratings match those in the hardware buyers guide. They vary between a single block, which means that the micro in question is seriously lacking in the department under investigation, to five blocks, which means that in this area the micro is one of the best.

The first program in Software Farm's HIGH-RES RANGE!

FORTY NINER the ZX-81 BREAKTHROUGH!

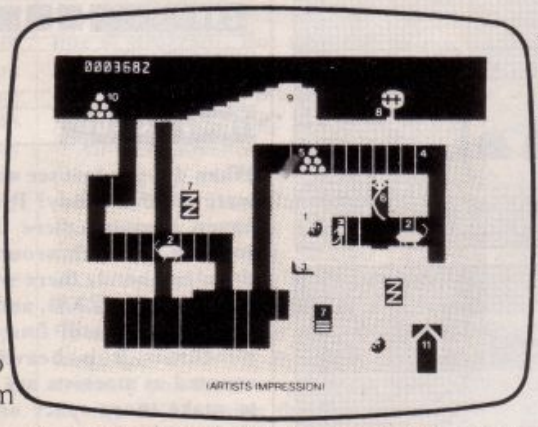
ONLY PROGRAM OF IT'S KIND IN THE WORLD!

ZX-81 Resolution identical to the SPECTRUM without any additional hardware!!

In 1849 the Great American Gold rush started. Almost everyone who could, sold up everything and dashed to the west coast to look for this precious metal – including YOU!

You must dig for those nuggets (1) – But watch out for the giant rats (2) They burrow through the earth (3) to get into your tunnel. You can delay them for a while by knocking down a support (4) which causes a small cave-in (5) to block their way, but you can only destroy them by releasing a snake (6) from it's nest (7), when it heads straight for the surface, destroying everything in it's way.

All the time the Gremlin (8) is busy digging it's way through your waste earth pile (9) to reach the entrance to your mine. Once it does you have no escape!! – so you must stop it getting there by returning to the surface to replenish the main mound (9) with the smaller pile of earth which appears on the surface as you dig (10). The deeper you dig the more points you score – but the further you have to go to replenish that mound! Once all nuggets have been collected, a cave opens (11) allowing you to pass through to the next stage – if you can reach it! This gives you more rats – but less snakes to destroy them with!!



ACTUAL ZX-81 SCREEN DISPLAY

Skill levels
Extra man every 10,000 points
Hall of Fame
Define your own keys for ease of play or use with any joystick
Fantastic and unique graphics on a ZX-81 (with 16K)
Only £5.95 – No more than many ordinary programs
A truly interesting and exciting game that no ZX81 owner can afford to be without

Available from all good computer shops or send cheque/P.O. for £5.95 (inc P&P) to:

Software Farm, FREEPOST (No stamp required) (BS3658)C, Bristol BS8 2YY

Software Farm, 155 Whiteladies Road, Clifton, Bristol BS8 2RF. Tel: (0272) 731411 Telex 444742 AFMADV G

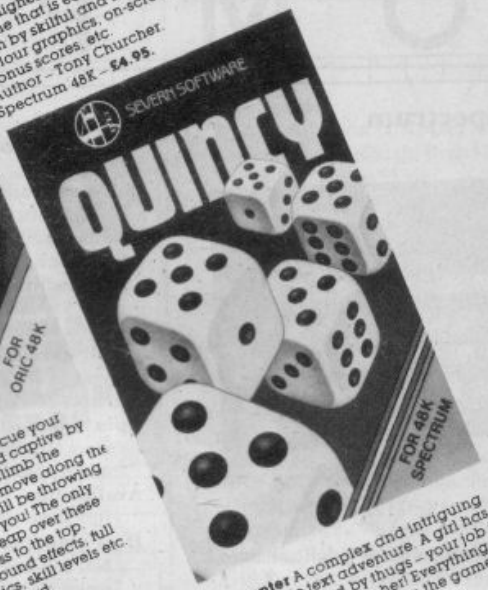
The REAL Challenge!

For your ORIC, SPECTRUM and CBM 64.

Jogger Guide your joggers across a 4-lane motorway and crocodile infested river to reach their safe haven through the gap in the fence. Each time a jogger is safely home the next one will have to encounter more lorries and cars on the motorway but fewer crocodiles and logs in the river. Full on-screen instructions. M/code, sound effects and full action colour graphics.
Oric Author – Adrian Sheppard.
Spectrum Author – Mike Howard.
Oric 48K – **£6.95** Spectrum 16/48K – **£4.95**.

Dinky Kong Attempt to rescue your lovely girlfriend who is held captive by the angry gorilla. As you climb the connecting ladders and move along the gangways the gorilla will be throwing barrels and fireballs at you! The only way to reach her is to leap over these obstacles and progress to the top. M/code action with sound effects, full colour action graphics, skill levels etc.
Author – Adrian Sheppard.
Oric 48K – **£6.95**

Quincy A superb dice game for 2 to 6 players. 3 throws per go to try and score points by obtaining certain combinations, i.e. 3 of a kind, a run, pairs etc. 13 go's to complete a game. The highest score is the winner! It's a game that is easy to learn but can be won by skilful and thoughtful play. Full colour graphics, on-screen instructions, bonus scores, etc.
Author – Tony Churcher.
Spectrum 48K – **£4.95**.



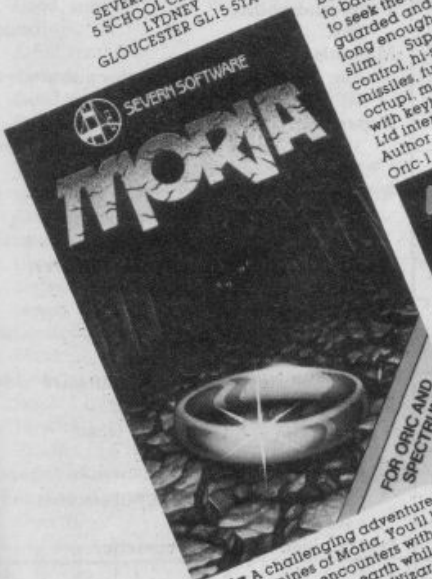
Encounter A complex and intriguing classic-style text adventure. A girl has been kidnapped by thugs – your job is to locate and rescue her! Everything you need can be found in the game but sometimes you may have to manufacture items. Chemistry knowledge will help! Most commands are verb followed by noun although abbreviations can be used. If the alarm sounds you have twenty moves to stop it before you too are caught! It's worthwhile making a map noting what you find and where as the time limit is only 500 moves.
Oric-1 48K – **£7.50**
Spectrum 48K – **£5.95**
CBM 64 – **£7.50**

NEW

SEVERN SOFTWARE

SEVERN SOFTWARE
5 SCHOOL CRESCENT
LYDNEY
GLOUCESTER GL15 5TA

Lone Raider As Captain of the space-ship 'Lone Raider' your mission is to save earth from the alien Zugs, who are aiming to destroy all forms of intelligent life in the Universe. The 'Lone Raider' possesses formidable weaponry such as phaser cannons and neutron bombs. Armed with these you will need to seek the mother ship. She is heavily guarded and your chances of surviving long enough to even glimpse her are slim. . . Superb graphics, volume control, hi-score, 4 screen scenarios, missiles, fuel dumps, mines, sharks, octupi, mother ship etc. Can be played with keyboard or joystick using the Pase Lid interface.
Author – Adrian Sheppard.
Oric-1 48K – **£7.50**



Moria A challenging adventure game set in the mines of Moria. You'll have to try and survive encounters with the monsters of middle-earth while trying to locate Durins Ring. The Wizard and the Trader may help or hinder you on your journey to find and open the hidden doors to freedom – a game that will really test your character and staying power.
Oric Author – Adrian Sheppard.
Spectrum Author – Mike Howard.
Oric 48K – **£6.95** Spectrum 16/48K – **£4.95**.

All Oric titles available from Laskys.
Dinky Kong for Oric also available from W H Smith.
Mail order service available on all titles.

Oric titles recommended by ORIC PRODUCTS INT. LTD.

All Spectrum Software is available on Micronet 800.

TRADE ENQUIRIES WELCOME.

ORIC UTILITIES

Oricade A combined assembler Disassembler and editor for the Oric.
*Handles full 6502 Mnemonics
*Features Save and Reload M/C
*Assembles and disassembles at any address.
*An essential tool for any serious programmer.
Author – Adrian Sheppard.
Oric 48K – **£8.50**.

Oric Extended Basic A must for the programmer! Extended Basic offers the user 13 additional commands to the presently Oric-1 48K commands and yet only takes up 2K of RAM.
Features * Commands include Verify, Write, Recall, Find, Scroll, Draw box, Rotate and others. * Takes up only 2K of RAM, so plenty of memory left for user to program. * Demonstration programs – all detailed in the cassette inlay. * Full instructions.
Author – Adrian Sheppard
Oric-1 48K **£7.50**

NEW

Address File Manager This is a new departure for software for the ORIC-1 micro. It will allow you to keep ALL your important records of NAMES & ADDRESSES. Up to 255 can be kept in each file and files can be SAVED & LOADED using an ordinary cassette recorder. This means an unlimited amount of information can be permanently stored in a convenient format.
Features * Menu-driven. * Prompted Keyboard entry of data with check. * Delete option for old data. * Search by surname (handles multiple occurrences). * Saves and loads NAMED files to cassette. * Prints on Screen or Printer. * Up to 255 records can be kept in each file.
The program gives all information to the user in real-time and can be used by anyone who can operate the Oric-1.
Author – Mike Howard
Oric-1 48K – **£6.95**

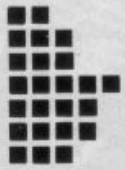
NEW

BUYERS GUIDE TO COMPUTERS

Sinclair Spectrum

Price:
16K £99 48K £129.95
Manufacturer:
Sinclair Research, Stanhope Rd., Camberley, Surrey. Tel: (0276) 685311
Display and graphics:
Limited in scope, but easy to program, very good results are possible
Sound:
Feeble, though easily programmed, small beeper
Keyboard:
The original "dead flesh", uses single key entry of Basic words — i.e. saves time. No space bar
Programmability:
Sinclair Basic is idiosyncratic, but easy to use, and extensive
Manuals:
An example to us all
Expansion:
Sinclair can upgrade the 16K for you, but nothing is available on the market

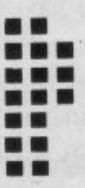
Add-ons:
Just about everything you can imagine can be connected
Add-ons available from manufacturer:
ZX printer, £39.95 available retail outlets
Interface 2, £19.95, allows you to use cartridge software and joysticks
Microdrive, £49.95, with ZX Interface 1, £29.95, will allow you to use cartridges each 85K, you can stack up to 8 of these.
All of these mail order only, available retail next year
Amount of machine-specific software available from manufacturer:
Over 60 packages — produced by third party and sold by Sinclair
Availability:
Just about everywhere
Does it need dedicated cassette?
No, but cassette must have separate ear and mic. socket + 3.5mm jack socket — most do
Cartridges/or not:
Interface 2 allows you to use ROM cartridges
Software supplied with machine:
1 demo cassette, Horizon, and 2 manuals
Software:
A wide range of just about every type of imaginable program, some of the best cheap software around
Star rating:
Sound
Keyboard & casing
Display & graphics
Software
Basic
Manuals
Expansion



Vic-20

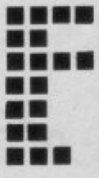
Price:
£140
Manufacturer:
Commodore Information Centre, 675 Ajax Avenue, Trading Estate, Slough, Berkshire SL1 4BG. Tel: (0753) 74111
Display and graphics:
Limited screen width of 22 characters is not much good for serious use
Sound:
Three voices, but difficult to program
Keyboard:
Good, real keyboard
Programmability:
OK, but not much memory
Manuals:
Not too good, but a programming course is available at extra cost

Expansion:
3K, 8K, and 16K RAM packs
Add-ons:
Discs, printers and joysticks are easy to add
Add-ons available from manufacturer:
Joystick £7.50
Amount of machine-specific software available from manufacturer:
Over 100
Availability:
Yes
Does it need dedicated cassette?
Yes
Cartridges/or not:
Yes
Software supplied with machine:
1 compilation tape of 4 programs
Software:
Varies from good to awful, cheap to expensive. Some good cartridge games, but many cassettes require extra memory
Star rating:
Sound
Keyboard & casing
Display & graphics
Software
Basic
Manuals
Expansion



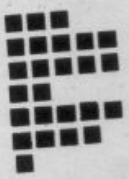
CGL/Sord M5

Price:
£149.95 (includes data recorder)
Supplier:
Computer Games Ltd, CGL House, Goldings Hill, Loughton.
Tel: 01-508 5600
Display and graphics:
Very good, sprite graphics nice, but can be hard to use
Sound:
Three channels, output through TV, not easy to use from Basic
Keyboard:
Poor, and difficult to use. No space bar
Programmability:
O.K.
Manuals:
Fine if you are an expert, otherwise a bit "iffy"
Expansion:
32K RAM pack which incorporates expansion box £60 approx
Add-ons:
Not a great deal of choice because everything comes from manufacturers
Add-ons available from manufacturer:
80-column printer £212
Data recorder £45.95
Joypads £24.95 a pair, no interface needed
Amount of machine-specific software available from manufacturer:
40-50 a lot of it comes from Japan where the machine is made
Availability:
Difficult to find in shops, but stockists have plenty
Does it need dedicated cassette?
No
Cartridges/or not:
Yes
Software supplied with machine:
Basic cartridge and tape with two games
Software:
Not much
Star rating:
Sound
Keyboard & casing
Display & graphics
Software
Basic
Manuals
Expansion



Acorn Electron

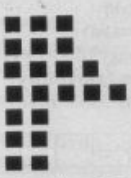
Price:
£199
Manufacturer
Acorn Computers Ltd, Fulbourn Rd., Cherry Hinton, Cambridge CB1 4JN.
Tel: (0223) 316039
Display and graphics:
Very good — nice stable picture on screen and a choice of graphics modes
Sound:
A single channel output through a little internal speaker, easy to program
Keyboard:
Very nice
Programmability:
Use BBC Basic — arguably the best around
Manuals:
Patronising, but helpful to the beginner and more experienced user alike
Expansion:
Not yet
Add-ons:
Not yet
Add-ons available from manufacturer:
Not yet, but range of "boxes" coming
Amount of machine-specific software available from manufacturer:
So far 12 packs have been released by Acornsoft, Acorn's software company, runs a small amount of BBC software
Availability:
Still hard to come by
Does it need dedicated cassette?
No
Cartridges/or not:
No, but unofficial ROM expansion available
Software supplied with machine:
A Welcome tape
Software:
As yet not much, in theory BBC Micro software should run, in practice it doesn't. Expect some good education programs
Star rating:



Sound
Keyboard & casing
Display & graphics
Software
Basic
Manuals
Expansion

Atari 600XL

Price:
£159.99
Manufacturer:
Atari International (UK) Ltd, Atari House, Railway House, Slough, Berkshire SL2 5BZ.
Tel: Slough (0753) 33344
Display and graphics:
Very good, includes sprite graphics
Sound:
Three voices output through TV
Keyboard:
Real keyboard
Programmability:
Fairly simple, improved version of existing Atari Basic
Manuals:
Great if your are an American
Expansion:
16K RAM standard, expandable to 64K with optional memory module — a single plug-in unit costing £89.99, available shortly
Add-ons available from manufacturer:
1010 Program recorder, £49.99
Available shortly:
1050 disc drives, dual density £299.99
Plus 3 printers — 1020 colour printer, £199.99
1025 80-column printer, dot matrix, £349.99
1027 letter quality printer, £299.99
All peripherals compatible with whole range, providing enough memory
Amount of machine-specific software available from manufacturer:
65
Availability:
As the replacement for the Atari 400, it is now readily available
Does it need dedicated cassette?
Yes, the Program recorder £49.99, two track so you can have program on one and voice on the other, as on language learning tapes.
Cartridges/or not:
Yes
Software supplied with machine:
None
Software:
Runs all Atari computer software, very wide range, though can be expensive
Star rating:

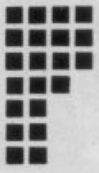


Sound
Keyboard & casing
Display & graphics
Software
Basic
Manuals
Expansion

Commodore 64

Price:
£199
Manufacturer
Commodore Information Centre, 675 Ajax Avenue, Trading Estate, Slough, Berkshire SL1 4BG. Tel: Slough (0753) 74111
Display and graphics:
Good, sprite graphics, but hard to use
Sound:
A full synthesiser
Keyboard:
Good typewriter-type keyboard with four function keys
Programmability:
To make the most of the 64 you really need to spend some money on a better Basic. Though simple programs can be written
Manuals:
Commodore Manuals always leave much to be desired. This one helps neither beginner nor expert
Expansion:
None
Add-ons available from manufacturer:
RS-232 Interface £34.95
Joystick £7.50
Paddles £13.50
Amount of machine-specific software available from manufacturer:
Over 70

Availability:
Some difficulties
Does it need dedicated cassette?
Yes, but you can now buy an interface which enables you to use any cassette player — Commodore disapprove
Cartridges/or not:
Yes
Software supplied with machine:
None
Software:
A lot of good 64 software is being imported from the US, though it tends to be expensive. Cartridges can be excellent
Star rating:

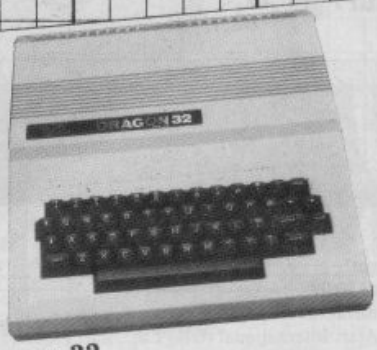


Sound
Keyboard & casing
Display & graphics
Software
Basic
Manuals
Expansion

ZX-81

Price:
£39.95
Manufacturer:
Sinclair Research, Stanhope Rd., Camberley, Surrey. Tel: (0276) 685311
Display and graphics:
Black and White only, low resolution
Sound:
No sound
Keyboard:
Pressure sensitive
Programmability:
Easy, but it can't do much, and is slow
Manuals:
Excellent — it is worth considering buying a ZX-81 to teach yourself Basic
Expansion:
16K RAM pack £29.95
Add-ons available from manufacturer:
ZX printer £39.95
Amount of machine-specific software available from manufacturer:
Over 45 — but it is produced by third party and marketed by Sinclair
Availability:
Miraculously, still around
Does it need dedicated cassette?
No, most are OK, but check before you buy it (same type as Spectrum)
Cartridges/or not:
No
Software supplied with machine:
None
Software:
A very wide range, some is surprisingly good
Star rating:

Sound
Keyboard & casing
Display & graphics
Software
Basic
Manuals
Expansion



Dragon 32

Price:
£175
Manufacturer:
Dragon Data Ltd, Kensig Industrial Estate, Margam, Port Talbot, West Glamorgan SA13 2PE. Tel: (0656) 744700
Display and graphics:
Notorious, the Dragon's display limits the machine
Sound:
Single channel through TV speaker, easily programmed
Keyboard:
Although a real typewriter-like keyboard it doesn't feel as good as many others
Programmability:
Quite good, uses the same Basic as the IBM micro
Manuals:
Patronising and badly thought out
Expansion:
Plans for upgrade
Add-ons:
Joysticks are tacky and disc drives expensive, but there is a wide range
Add-ons available from manufacturer:
Disc drive
Amount of machine-specific software available from manufacturer:
70
Availability:
Should be plenty around
Does it need dedicated cassette?
No
Cartridges/or not:
Yes
Software supplied with machine:
None, although some retailers may include some
Software:
On the whole Dragon software is pretty naff. But there are one or two good packages
Star rating:

Sound	■■■
Keyboard & casing	■■■
Display & graphics	■
Software	■■
Basic	■■■■
Manuals	■
Expansion	■■

Colour Genie

Price:
£168
Supplier:
Lowe Computers, Chesterfield Rd., Derbyshire DE4 5LE. Tel: (0629) 4995
Display and graphics:
Not bad, but rather dullish colours
Sound:
Three voices through TV, like the Vic only easier to program
Keyboard:
Real keyboard
Programmability:
Has extended Basic, fairly standard. Easy to use graphics and sound
Manuals:
n/a
Expansion:
None
Add-ons:
The Colour Genie has holes for every conceivable expansion, all standard interfaces
Add-ons available from manufacturer:
Thermal dot-matrix printer, which is a combined printer, typewriter and calculator, £169
Amount of machine-specific software available from manufacturer:
103
Availability:
Specialist shops only
Does it need dedicated cassette?
No, but the general rule is the cheaper the better, or so says the manufacturer and he ought to know
Cartridges/or not:
Yes
Software supplied with machine:
2 cassettes, one a machine demonstrator and the other a compilation of two games, three utilities and two music synthesisers
Software:
Lowe Electronics have a user group with a fairly large software list
Star rating:

Sound	■■■■
Keyboard & casing	■■■
Display & graphics	■■
Software	■■
Basic	■■■
Manuals	■■
Expansion	■■

Spectavideo SV-318

Price:
£199
Importer:
CK Supplies, Unit 5, Norside, Oldnixon Crescent, Weston-super-Mare, Avon. Tel: (0934) 418838
Memory size
The SV-318 has 32K Ram altogether but only 13K is available immediately
Display and graphics:
Average, sprites, easy to draw on screen
Sound:
Good
Keyboard:
Soggy rubber keyboard
Programmability:
The MSX Basic is OK to start with
Manuals:
Not ideal for a beginner
Expansion:
48K at £33, 96K at £102
Software supplied with machine:
Four free cassettes
Software:
Little as yet, but promise of much to come
Availability:
Only from CK Computers
Does it need dedicated cassette?
Yes, £40 including four tapes, Introduction to Basic, Home Economics, Filing and Armoured Assault
Cartridges/or not:
Yes
Star rating:

Sound	■■■
Keyboard & casing	■■
Display & graphics	■■■
Software	■■
Basic	■■■■
Manuals	■■
Expansion	■■

Oric 1

Price:
16K £99.95 48K £139.95
Manufacturer:
Oric Products International, Coworth Park Mansion, London Rd., Ascot, Berkshire SL5 7SE. Tel: (0990) 27645
Display and graphics:
In theory as good as the Spectrum, though actual use is difficult
Sound:
Wonderful, especially effects like ZAP and PING
Keyboard:
Rubbery, fiddley and annoying, but does resemble a typewriter slightly
Programmability:
Oric Basic is good — though there are one or two "bugs"
Manuals:
Very naff — example of how not to do it
Expansion:
Oric claims a Microdrive with proper 3 inch discs will be available next year, was to have appeared last summer
Add-ons:
Terrific little printer available, discs and communications promised soon
Add-ons available from manufacturer:
At the moment if you buy a micro Oric will give you £40 off their printer which normally costs £169.95.
Amount of machine-specific software available from manufacturer:
None
Availability:
In some high street stores and many specialist shops
Does it need dedicated cassette?
No
Cartridges/or not:
Yes, or rather it could. The expansion slot would take cartridges but, alas, no one makes any
Software supplied with machine:
A Welcome tape
Software:
Still early days, though signs are that Oric software will only be average
Star rating:

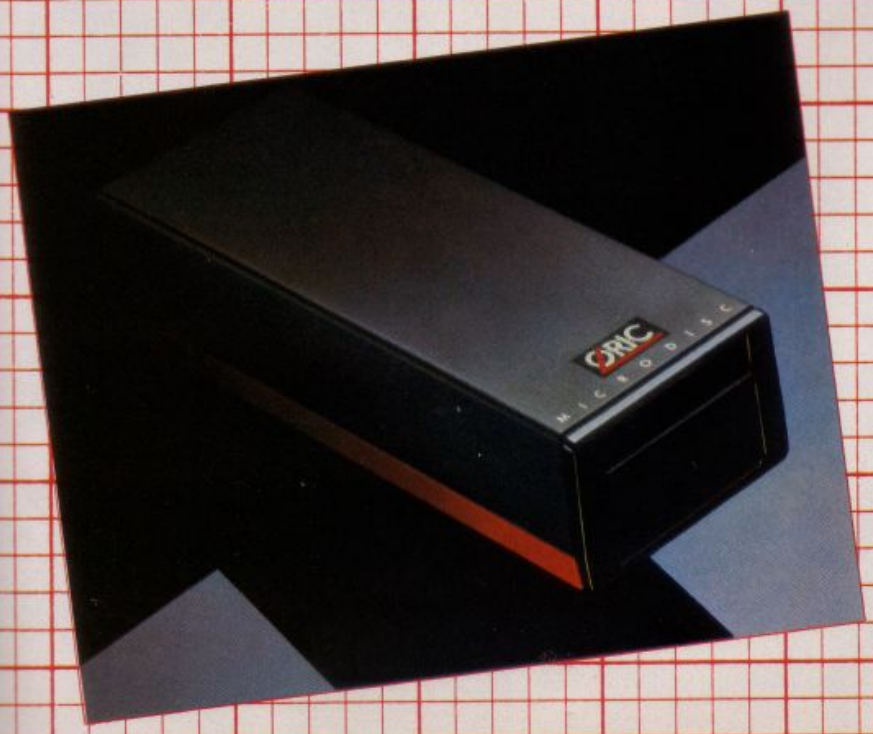
Sound	■■■■■
Keyboard & casing	■■
Display & graphics	■■
Software	■■
Basic	■■■■
Manuals	■
Expansion	■■

THE wraps are off the new Oric, and very 1984 it looks, too. In futuristic black and red, its smart appearance should certainly help to sell it. Of course Oric will be hoping that improved features of the model, called the Atmos, will make it a major machine in the coming year. Oric Sales Director Peter Harding calls it "an Electron beater".

To give Oric its due, criticism of the old machine has certainly not been ignored. The nasty rubbery keyboard of the Oric 1 has been replaced by the real thing, and it includes cursor control keys and a function key for the programmers among you. The other big moan, of unsatisfactory manuals, has also been attended to. The new user manual has been written by an outside author, Ian Adamson, and really things can only get better.

The Atmos's new ROM appears to have ironed out all the bugs in the old machine. Oric has also come up with a special machine-code program on the 'welcome' tape, designed to overcome all the cassette loading problems known to man — well, all the most usual ones. It enables you to override the error checking facility and auto-run your program, if it works, it could save wasted hours trying to load stubborn programs.

Before long we will have the new Atmos in our sticky paws. The only way to find out if it's as good as the manufacturer says is to try it ourselves, so keep an eye out for the Atmos in future issues.



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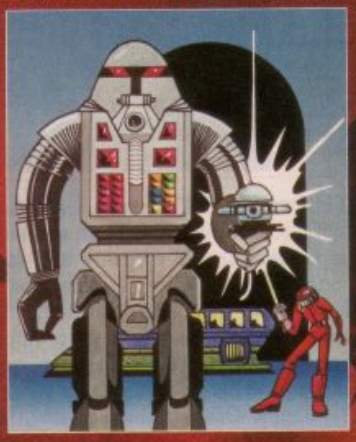

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THE DEVIL RIDES IN

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Bytes

THE memory size of a home computer is usually measured in kilobytes, or thousands of bytes. Each byte is one piece of information and roughly corresponds to a single character. So a 48k computer is roughly capable of holding 48,000 characters in its memory.

A byte is equivalent to eight bits, and is the fundamental package of information used by the micro. Because there are eight binary digits, there are a possible 256 values that a byte can have. If you examine a byte of a computer's memory by PEEKing it, you will discover that it has a value between 0 and 255.

Bytes can be used to represent either numerical information or characters. This explains why many home computers offer the user a choice of 256 possible characters, because that corresponds to one character for every possible combination of eight binary digits.

Bits

A BIT is the smallest unit of information that can be kept inside a computer. The name bit is short for Binary digit and is a single-digit number in the binary arithmetic system, which is what the computer uses internally to process information.

The binary number system is sometimes referred to as base 2. We normally think and work in the decimal system, base ten. In binary, each digit can only have one of two values, that is zero or one. Our binary digit — the scoutmaster, has the value zero shown on his hat.

Binary is particularly useful inside a computer because a computer uses an electronic signal, which can either be on or off. The on state can correspond to the value one and the off state to zero.

To
the

by Paul Bond

FROM Tortuga past Porto Rico and then across the bowstring of the Leeward Isles towards Martinique — the pickings were rich. Slow fat merchantmen dreaming of big mansions and pampered families waking to sharks' teeth, our glittering cutlass blades held against their quivering throats. Ar-Har, me hearties, them was the days — now it's just a few Malays in Zodiacs, zipping round the sterns of oil tankers, shinning aboard and machine-gunning the crew. No finesse.

Sometimes I wish I'd never shot that albatross. Look what my five centuries of wandering the seven seas has brought me to — reviewing games for *Computer Choice*. How Morgan, Montbarre and Bluebeard himself would laugh. I adjusts me eye-patch, takes off me peg-leg and settles down in front of one of these new-fangled contraptions.

Plunder by Strategy Games for the 48K Spectrum is a game of Elizabethan strategy. It is 1587 and Spain is amassing a huge invasion fleet. To finance the Armada, the dastardly Spaniards are running gold from the Americas back to Spain. It is your job to fall upon the Spanish like a hawk unleashed, taking from their argosies every kind of spoil in order to stop the treasure reaching Spain in time. Otherwise your most hated rival, Sir Francis Drake, will grab all the glory by stopping the invasion in the English Channel.

This is a most impressive game, easily as good as the mafioso masterpiece, Gangsters, from the same company. The screen display is a gridded

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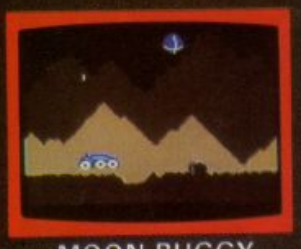

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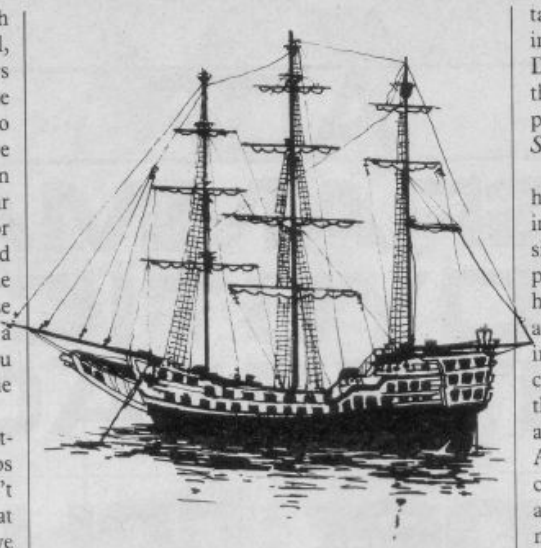
map of the ocean, with two land masses on each side of it. You move your vessel around, represented by a dot on the grid, using the keys N, S, E, W and so on. Having sailed with Drake myself, let me tell you navigation was never so easy. Ah, but you know what us old seamen are like for stories. Especially when you're getting on for 424. As you sail along, the look-out spies your quarry. You are offered the option of attack or retreat. I didn't crew with that Gascon-fiend Montbarre on his bloodstained French patache for nothing — always attack. You can then choose whether to fire or board. You can call up a separate read-out to see how many cannons you have, and how many men. You lose control of the ship if you have less than nine men on board.

On this particular voyage I ran into merchantmen, troopships and warships. I left the warships alone, because they fight back, and I didn't become a pirate for hard work. I had a go at sinking the troopship, but it surrendered and we made a profit of about 1,600 gold pieces. I used a combined strategy of softening up merchant vessels with gunfire and then boarding. Where it falls down on real life is that there is no option of putting the entire crew to the sword, keelhauling the captain, or making the cabin boy walk the plank. Frankly, if the decks weren't slippery with blood every day, we knew that another recession was beginning to bite. However, I suppose that this sort of thing would not go down very well in the average drawing room — except on the video.

The graphics are simple, but elegant; when you engage a passing sloop, two ships are shown one above the other taking pot-shots at each other. The look-out reports many strange and wonderful things apart from ships: a mysterious glittering white mist, and an uncharted island, where valuable jewels are to be had for the taking. Watch out when you put into port. You have to physically guide your ship to the quayside from the top of the screen using the cursor keys. It is obvious that the dozy blighters on board have forgotten to reef the mainsail prior to docking. She comes down at such a lick you would think she was one of those crude carriers that are always carving bits off the Canvey Island terminal pier. "IDIOT! You have crashed the ship" says the readout. As you slowly sink beneath the waves, you realise that Sir Francis Drake is going to get all the credit. There are three levels of difficulty and three types of game.

Rolling hills, rich with tropical vegetation, sweep down to kiss the azure waters of a natural harbour. A square-rigger rides majestically at anchor in the calm crystal mirror of the bay. Such is the scene portrayed in the title graphics of A&F

"IDIOT! You have crashed the ship."



"I asked for a status report, high winds, rough seas . . . I was still in port!"

Software's Swashbuckler for the Dragon 32. But what is this? A bird flaps slowly across the ship, a cannon ball flies lazily upward and plop! — the bird hits the waves. It brought back frightful memories of my own foolish deed. You know how they go on about that poor Dutch devil who is continually stooging around off Cape Horn scaring people — Wagner wrote an opera about him — well, he hasn't been at it half so long as I have. Still, at least I get shore leave.

The game itself is for two to four players. You can play it by yourself, but there's not much point. The first one to collect a set number of points wins. You have a display of a sea chart showing various ports and three islands. When in port you have options to buy and sell crew, jewels and food. If you engage another vessel in combat the micro decides the outcome on the basis of a complicated algorithm linked with how much treasure and crew you have on board. You can have a crew of seven sailors and seven fighting men. Don't engage a hostile vessel without any mercenaries onboard — you'll lose.

Seems like the sailors must have a pretty strong union and won't do any fighting without danger money. You have to pay the scurvy swabs and feed them, so don't spend all your money on goods in port. Actually paying for things comes a little hard to me, of course, the conventional policy in my day was to put the town to the torch and murder everybody. But once I got the hang of it, I found the experience of exercising my low brute cunning quite enjoyable. The game itself is graphically a bit of a let-down after the impressive opening title, and for my money, Plunder on the Spectrum had more depth and variety to it. It is fair to say that this is one of those bits of software that prove that the Dragon 32 still holds plenty of promise if thoughtfully programmed.

Smuggler, again from Strategy Games, puts us in the 19th century. As master of a trader sailing from Great Britain to the Continent and the Med, you have to amass a £250,000 fortune by trading; buying cargoes cheaply at one port and selling them at a profit in another. Like anybody trying to build up a little nest egg for themselves, your big bugbear is the Revenue man. What's the point of working and slaving when you have to give it all to the tax-man? — it would seem they are already saving up for when cruise missiles are invented. What a waste. They'd be better off taking a leaf out of Elizabeth I's book and licensing a few hearties like meself and Sir Francis Drake to go around robbing and plundering on the high seas. It does wonders for the balance of payments, and would make a good story for the *Sun* newspaper.

You start off with a class one vessel which you have to provision and load with a cargo. For instance, tools are cheap in England but expensive in France. Perfume is cheap in France, but pricey in Blighty. Once you have stocked up, you have to sail — if your creditors will let you. I must admit, in one of the goes I had at this game, I got into a bit of a closed loop. I would pay off my creditors the minimum advised, try to set sail and then be forced to go back to the bank. The amount owed seemed to fluctuate at random. Another time I managed to sail to Ireland, but I couldn't seem to get rid of my cargo — which admittedly was whiskey. Smuggling, as I say, has never really been my game, however I think the real problem was that I was trying to trade legitimately from time to time. You can choose in the game to pay duty, or to smuggle. The whole thing only served to convince me that, on the whole, where banks are concerned it is best to stick to robbing them.

The graphic representation of your trading area is very good. There are eight countries and you must take into account the number of days' sail and what kind of winds are blowing. These all affect your profit margin. Nautical ditties such as A Life on the Ocean Waves chunter away when different displays are put up. A good game, but I should check that you understand how to play it first.

"If the decks weren't slippery with blood . . . another recession was beginning to bite."

Back to piracy proper — if that is not a contradiction in terms. In Abrasco's Pirate for the Dragon 32, the shoe is on the other foot — that is, providing you've got another. You are the captain of a galleon whose brief is to free the seas from pirates. The screen display once again shows a gridded sea chart and you can tack north, south, east and west by pressing the appropriate keys. In the Royal Navy? I never thought I'd be in it again after I left Drake, which was pretty much like being a pirate anyway. If the lads ever found out about this I'd be about as popular as a Greenpeace captain at a British Nuclear Fuels board meeting.

This is straightforward steering about, shooting at things with occasional look-out reports from the crow's nest as in Plunder, but not as sophisticated. The map is a matrix showing a quarter of the entire world. Galleons are displayed as Gs, pirate ships as inverse crosses, islands as ordinary crosses in a second screen which gives you an aerial view of a particular sector. The third element is the quartermaster's report. One time I asked for a status report and got high winds, rough seas, three men overboard, one mast blown away. I was still in port. Like they say, worse things happen at sea. One for Columbus here. In this game you can sail off the edge of the world. You see a yellow blob — the sun, a blue rectangle — the sea, which sort of shrinks as your barque vanishes off the screen. So perish all software pirates.

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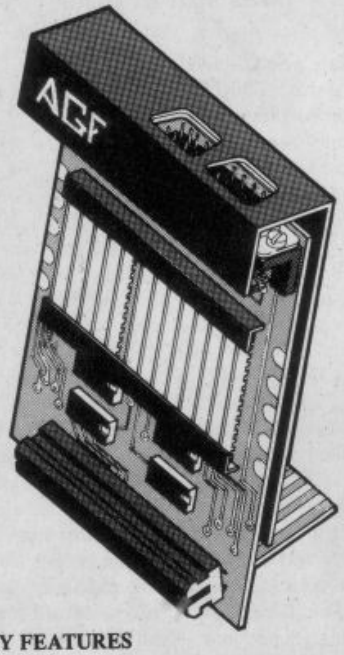

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MY COMPUTER

by Deborah Horne,
13 year old *Computer Choice* reader

THE PACKING of the Sord is good; remove the cover and you will find the computer, a power supply, cassette lead, a television lead and two books — a user's guide and a Basic-I manual.

The power supply needs a mains plug, and there are only two wires in the lead. It was quite simple to fit the mains plug. The power supply gets warm, but the computer doesn't. On the demonstration tape, there is a TV adjustment program and two games called Zac banic and Baseball. The games have good sound, colour and graphics.

In the manual it shows an on/off switch on the side of the computer — but there isn't one. There is an on/off switch on the side of the power supply unit which is useful. Following the instructions for setting up the computer was difficult. The Basic-I cartridge was easy to put in, but the console flap was difficult to lift up. The manual did not make it clear that a cartridge must be installed for the computer to work.

The keys were nicely spaced out and you could see the writing on the keys fairly well, except for the graphic symbols which were blue and difficult to see. When the screen appears, the lettering is nice and clear. (You may find on your screen that not all the letters are visible at the edge.)

When fixing the tape leads to the cassette recorder, it did not say in the manual which sockets to put the plug lead in. It gets a bit tedious having to pull out the remote plug to rewind the tape. The loading of the tapes was easy to do, often the manuals do not explain loading very well, but the Basic-I manual was good. One of the first things I noticed when I loaded the programs was that it was very difficult to see the graphics on a black and white television.

The game Zac banic is best played with the joy pads, which can be bought as an accessory. With the game Baseball there were no rules in the manual so although the game was very good, it was difficult to play — find someone who knows the rules.

The Basic-I manual shows how a program is run and it explains what each line does. At the end of the manual it provides a dice game and shows how it was set up. Even a beginner would understand most of the manual. When first trying some of the programs, the editing system was difficult to understand, but easy to get used to. The computer had a few useful bits on it which did help in programming, such as CTRL X— moves the cursor from wherever it is to the top left hand corner. CTRL X— will delete the rest of the line to the right. Another thing that I found was that you have to put in all the spaces in a line or it will not work. To use the lower case, upper case and graphics mode was very easy.

On the whole the computer is quite good to work with, and has a few interesting points. The user's guide and Basic-I manual were fairly easy to understand and it gives you a fairly good introduction to the BASIC language.

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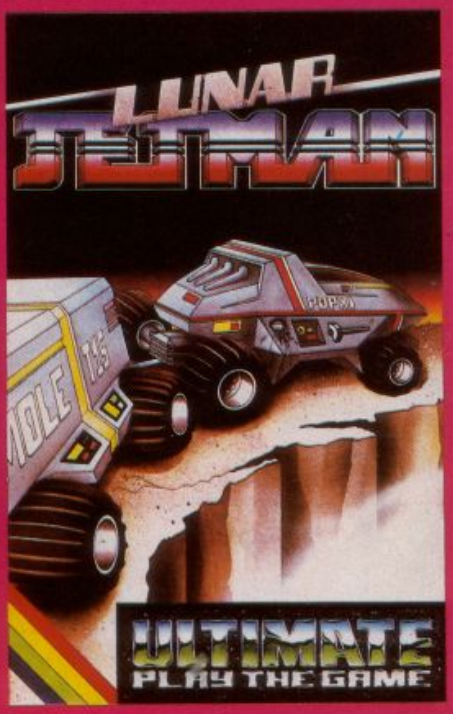

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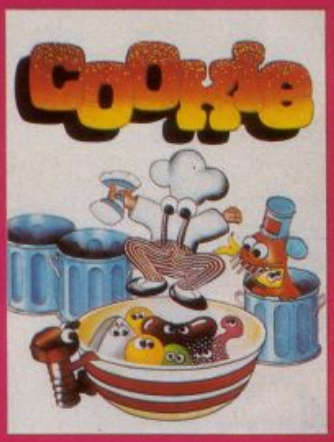

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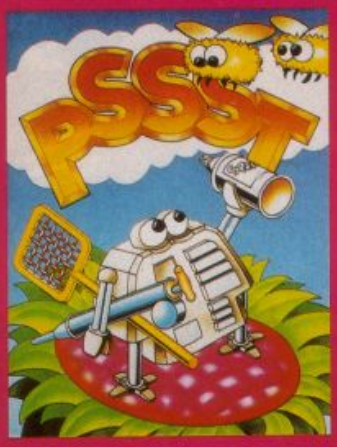

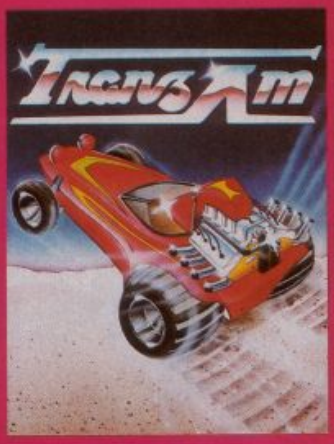

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ULTIMATE PLAY THE GAME is a Trade name of Ashby Computers & Graphics Ltd., The Green, Ashby de la Zouch, Leics. LE6 5JU

THE NAME of the GAME

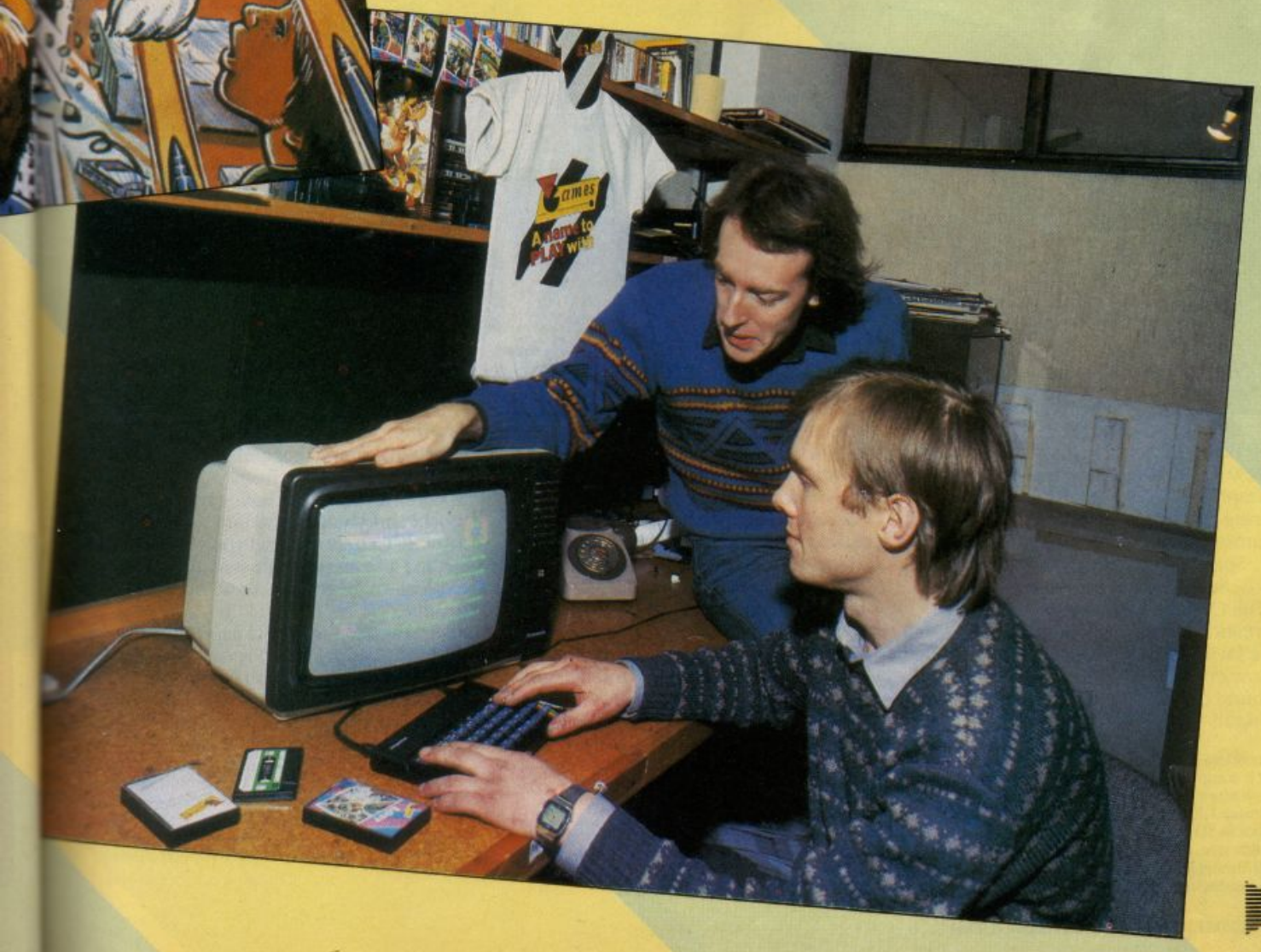
by Deborah Goldfinch

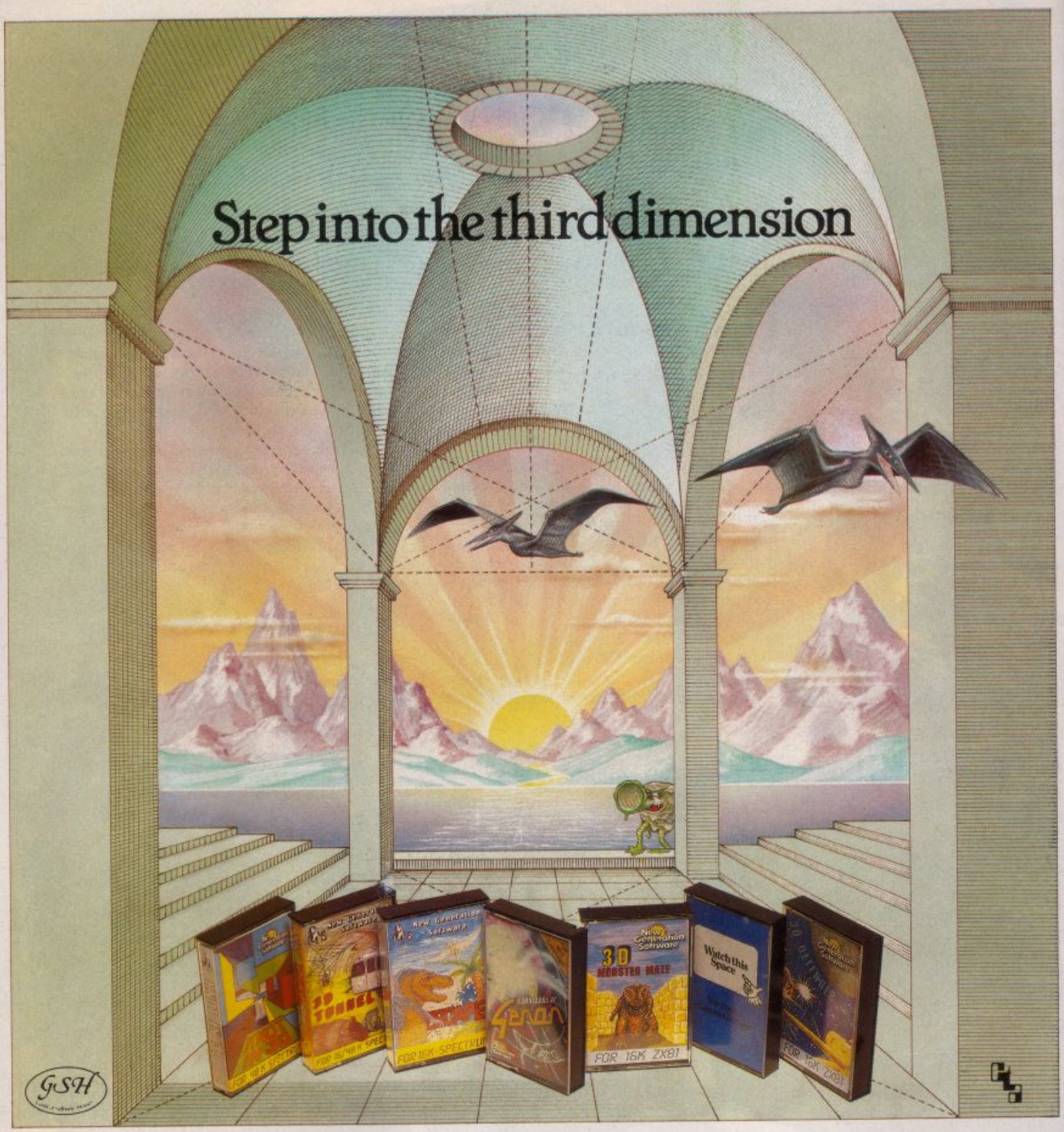
In February, Virgin Games celebrated it's first birthday. Nick Alexander, Managing Director of this fast growing young company tells us the story of how it all started — and much, much more!

VIRGIN Games began, Nick tells us, as something of a coincidence. Richard Branson established Virgin Records some twelve years ago. Nick came to work for him from a background of record industry marketing and computer software. There was talk of him going into a job with Virgin retail, but Nick felt he wanted to stay in the software field. "Richard said he had been thinking about a software company, so why didn't I set one up?" And so it all began.

Nick tells us "I like Virgin very much. It's a friendly organisation, it's almost like an extended family. Very few people leave Virgin, which is nice and everywhere you go in all the other buildings dotted about, you feel as though they're all friends." The young company has young customers, too. "What has surprised me is quite how young they are," says Nick. "Something like 25% of our customers are aged between eleven and fourteen. It's very encouraging for the future because the habits they acquire today will probably last a lifetime. They are the people that, two or three years ago, would have been getting into music and records at that time in their lives."

Nick feels that the record market will not experience the same boom that happened in the '70s again, and that a company based in the home entertainments field needs to move into the new technologies which will replace the record industry in time. Nick says that computer software is the new generation gap, too. "When I was a little lad you terrified your parents by going around smelling of incense; nowadays you talk to them about computers and that actually intimidates them even more. They're not in a position where they can slap you down and say 'behave' because it actually seems to be a good thing for you to be doing."





Take a giant step closer to reality with New Generation Software. The 3D Graphics of New Generation programs bring the screen alive and makes other games look as flat as snakes and ladders.

Spectrum owners will find that seeing is believing when they open the door on 'THE CORRIDORS OF GENON', the latest creation from New Generation. You will be saving the Universe from the evil that now controls all things. But beware – the sound of footsteps approaching could be Bogul!

Hurtle into a void leaving a trail for your unseen pursuers in 'KNOT IN 3D'. Weave your way through up to five trails but be careful, you could get knotted! Or travel through the depths of a moving tunnel full of bats, rats, spiders and toads in '3D TUNNEL', with a special surprise in the 48K version.

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New Generation Software

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Many of the Virgin games available have been written by young programmers and I asked Nick if Virgin "recruit" them. "People who have written a game probably have two or three software houses that they like and they'll probably get in touch with them. All our ads remind people that we're ready and willing to look at anything!"

I asked him how many games that are sent to them are original. "It's difficult to say when a game is truly original; there's now a much heralded statement that there are only seven original computer games, like there are only seven jokes, but you might just as well say there are only seven original plots for novels." Nick says it's like bracketing all historical novels together, or all thrillers. There are good ones and bad ones, and enough variations on the theme that people who like that particular theme will read a hundred thrillers, or historical novels. "The subtleties in the game are often what makes this one interesting, rather than that one. I think you can be too fussy about saying it's not original if it bears some vague similarity to something else."

An average of five games a day arrive in Virgin's post bag. Steve Webb, their technical manager, looks at them all. He looks first for quality of screen graphics and beyond that "playability". Nick says that this is probably the most important thing to give it lasting enjoyment. If it makes good use of the computer it runs on, if it brings something original to the game form — then it's certainly worth considering. Some people who send games in have been known to end up with more than a published game! Nick explains, "It's how we met our technical manager Steve Webb. He wrote Logix and sent it to us." It's an unusual puzzle game and Virgin put aside 50 pence for each game sold, with the first person to solve the game winning the bounty — £500.

All of Virgin's games feature a Programmer Profile giving details of the author, and this has proved very popular. "We've had our first fan letter in for Steve Lee who wrote Falcon Patrol, our best selling game at the moment." Nick explains that most people who are buying games do some programming themselves and like to know the background and interests of successful programmers. "Generally, people are more interested in other people than they are in faceless companies. Profiles encourage others to write in, and they put a human face on things. Many games packs don't even give the programmer's name; and to a lot of software companies, once you sign your game away, it's as though you never existed!"

I asked Nick if there was a danger of some software companies taking advantage of young programmers. "There must be a danger and I'm sure it does go on, but it can work both ways!" He explained that most software houses find that a lot of the programs they are sent have actually been "lifted" from magazines or books, or from other commercially available programs. "There are dodgy people and nice people on both sides." So what advice would he give to people sending programs in? "I think most of the software companies that are reasonably well known are honest and trustworthy, it's not worth their while *not* to be. If they intend to be in the market for a while, they would be foolish to rip somebody off because it would do their reputation no good at all."

Virgin Games have come up with some novel ideas that they hope will give their customers that little bit more than just a game to play. Nick mentioned the Programmer Profiles that come with every pack, and each one also has a tear-off strip that enables people to join the Virgin Games Gang. They get a year's free membership and entry in the next Games Gang prize draw. They also get the Gang's newsletter — a paper produced to give the members information about what's coming up in the future. At the moment there are about 1000 members; the oldest is 72 and the youngest seven, but most of the Gang tend to be in their teens or twenties.

The Newsletter publishes some of the many letters it gets from them. Nick says "We hope to get some feedback from them about what they like, what we're doing that's good, and anything we should be doing and we aren't. If you communicate with your customers you have a better idea of what they want. Most of the letters we get are addressed to the Laughing Shark." The Laughing Shark is a cartoon strip that Nick drew ten years ago and couldn't get anyone to publish. "So now," he says, "I've published it myself." The shark mascot appears on all the Games Gang material and is quite a unique creature. When the shark was small, he was caught in the radiation of an underwater nuclear test and grew wings. At the same time he developed a devastatingly awful sense of humour. Nick doesn't draw the shark any more, but he still sometimes writes the scripts.

> "Most of the letters we get are addressed to the Laughing Shark."

I asked Nick about a problem that many players have, of buying a game that has a wonderful, colourful illustration on the pack, getting it home and running it through their micro, only to find that it does not live up to the promise of the pack illustration. Virgin hope to solve this problem by including a screen shot of the game on the pack. "All our packages contain a screen shot, I think this is the best way of giving an idea of the game, so at least people know what it looks like on the screen. You do get these very glossy packs, then load up and find it's all in text or very crude graphics. The screen shot is the easiest way of trying to get across what it's *really* like."

Another bonus from Virgin is the Virgin Games Fun Bus. A lot is talked about the similarity of the software and record businesses and this is, says Nick, the equivalent to the musicians concert tour. "But you can't really take a computer programmer to the Hammersmith Odeon, put him on stage and let him entertain people." So the black and white striped double decker bus was launched, games were installed in it, and it was taken on tour so people could climb aboard and play. It has twelve micros specially mounted like arcade units and people can also talk over any computer problems with the programmers or even get career advice.

Virgin are also launching ten board games this year — the first one still with the music theme. Nick explained, "The first one is called 'Hype', a game about the record industry. There seems to be quite a resurgence in board games at the moment. A lot of people have come to us with board games and said could we do a computer version, but when you look at it you realise that this game is good on a board and this game good on a computer and it's a different sort of medium — so it doesn't mean *everything* should be on a computer."

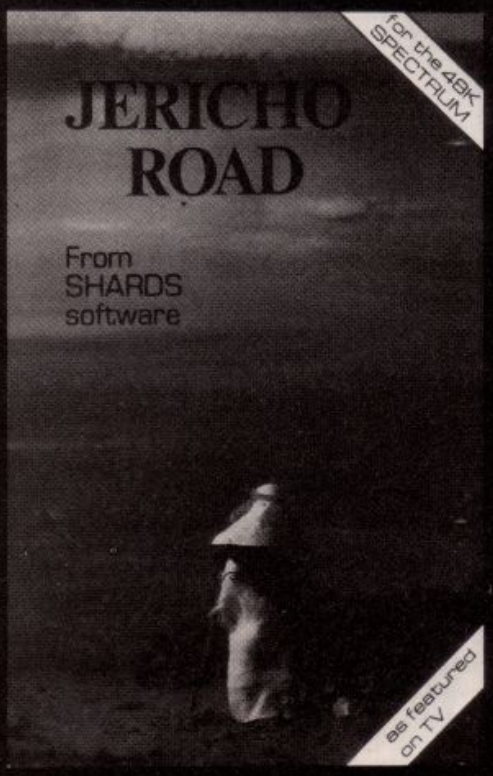
And the music plays on . . . when Virgin Games were looking for someone to present their first £500 prize of software, Bill Wyman of the Rolling Stones agreed to do it (he has two Apple 2s and is using them to keep a computer archive of the Stones), and Steve Hillage produced specially mixed music tracks for the first eight games from Virgin.

With the close tie-up between software and music, Nick says that Virgin have exciting plans for '84. He tells us that "something will be appearing in the early spring which comes into this area."

He is unable to tell us full details of this just yet but says, "Somebody who is known as a pop star, not as a programmer, is now moving into computer software and has written a couple of very interesting programs with a direct music tie-in. A lot of musicians have got computers over the last year or so, perhaps because they are getting easier to use and people with a more creative, perhaps erratic bent, are finding they can use them too and a lot of the chore is taken out of programming."

Who will the mystery star be? We'll just have to wait and see, but with Virgin's knack for coming up with exciting ideas, we can be sure of something worth waiting for!

Plans for the future? "We are here for the long term so there are an awful lot of things going on. We're moving in many different directions — this is just the start!"



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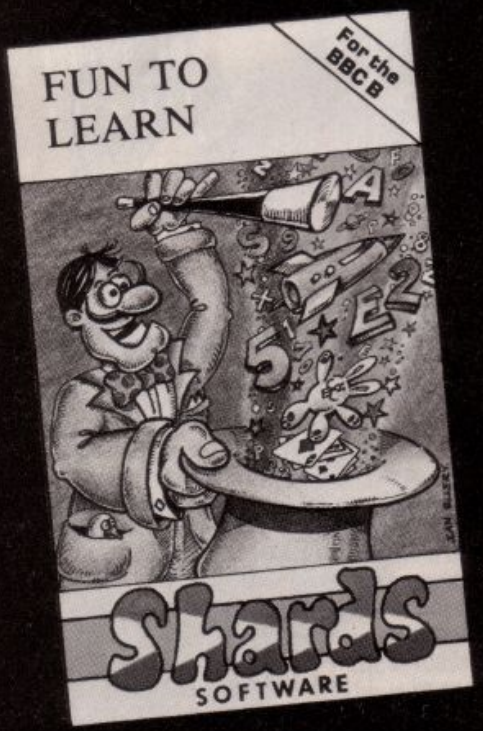

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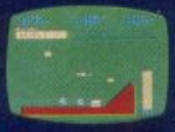

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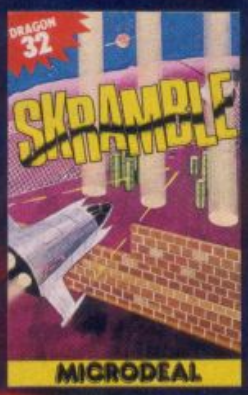

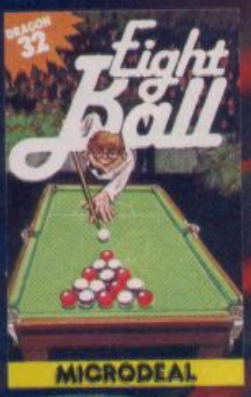

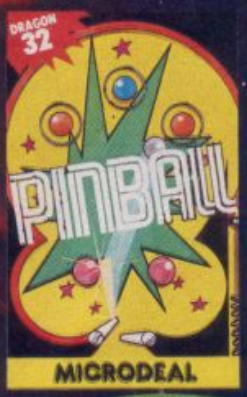

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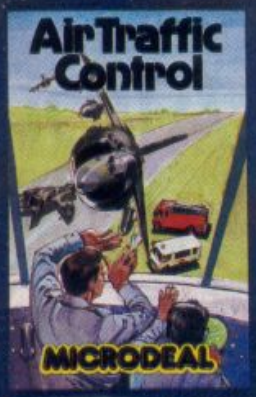

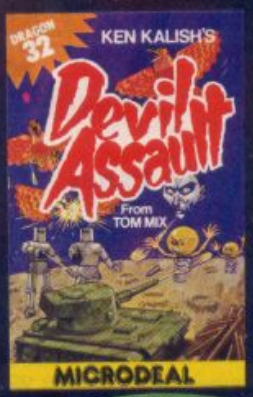

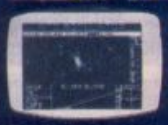

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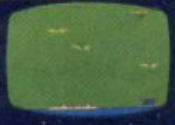

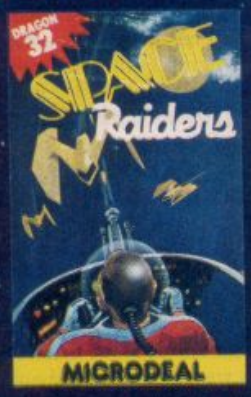

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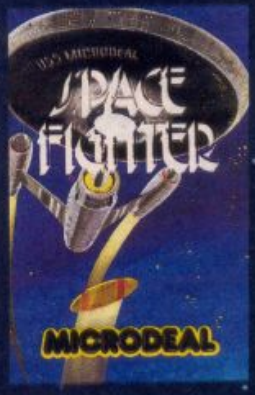

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ZSTALINBCDEFGHJKMOPQRUVWXYZSTALINBCDEFGHJK

THE BLACK BOX OF IVAN KONDRATOV

by Fin Fahey

A LONG July evening in Leningrad, 1999 A.D. Doctor Anna Preston, physicist, gazed into the black rushing waters of the River Neva and sighed. She still couldn't quite believe that the Hero City, Venice of the North, had survived yet another World War.

Throughout the northern hemisphere, the radiation had cleared, the chemicals denatured and the climate settled down. Survivors emerged from shelter to find that World War III had not gone off as planned. No one was quite sure why, since the perpetrators of the conflict were dead, but most of their weapons had stayed in their silos or submarine launch tubes. Both sides had struck mostly at each other's military targets and their cities had suffered what was blandly known as collateral damage. In Leningrad's case this had meant the deaths of three-quarters of the population from fall-out and chemicals as their shelter systems failed. The remainder had been able to hold out underground under appalling conditions. Leningrad was a UN city now. The survivors had no desire for revenge after hearing of the fate of Los Angeles, Manchester, Hamburg and so many of the great cities of the West. But London lived, Paris and New York too. Reconciliation was in the air. Peace had broken out.

Anna began to walk to the Leningrad Technological Institute, across Kirovsky Bridge. The city had sustained little blast damage. To the West, along the river, the silhouettes of the Winter Palace and the Peter-Paul fortress stood out against the white sub-arctic sky. Outside the huge complex on Moscovsky Prospekt, the Russian guard gave her UN pass a cursory glance and waved her through the revolving doors. Back in the damp and cavernous sub-basement, feeling much the better for her stroll, she contemplated the enigmatic black cube for perhaps the hundredth time. It measured five metres each side.

Anna felt a bit depressed. If the lasers failed that was it. Yet another impossible assignment. She felt in the pocket of her pale-blue UN jump-suit for a Balkan Sobranie. Her mind ran back to the briefing in London, capital of the emerging English Commune, three days earlier.

". . . and there are no other clues, Major?"

Major Airedale gazed at her abstractedly.

"Just the note Anna, just the note."

Beyond his tweed-clad left shoulder, the window revealed a Trafalgar Square filled with scaffolding presided over by an enormous jib crane. Nelson's Column was being restored. Whitehall hadn't yet been decontaminated, so the Major's office was in the building that had once been Canada House. Major Vladimir Hekey, suavely resplendent in the uniform of the West Russian Defence Force, leaned forward intently.

"You knew Ivan Kondratov well, Doctor Preston, both as a friend and a scientist. You may have a new insight into his mind. He was a complex man."

"Ivan was a brilliant physicist, Major, but he loved puzzles. It may not be easy."

Hekey lit up a coarse Turkish cigarette with a moûe of distaste. The reviving economies didn't cater much to smokers these days.

"The cube was found two weeks ago during restoration work. It's clear that Dr Kondratov constructed it, but none of his papers have been found except this one wretched note. The vault may hold anything — perhaps an industrial process vital to world recovery. It must be opened."

Delegate Pirc, representing the Ukraine Soviet, raised her eyebrows.

"Or perhaps it contains the key to a new weapons system, Major."

Her tone was acid. The Ukraine had suffered particularly badly from

YZSTALINBCDEFGHJKMOPQRUVWXYZSTALINBCDEFGHJKMOPQRUVWXYZSTALINBCDEFGHJKMOPQRUVWXYZSTALINBCDEFGHJKMO

the war, as always.

Even though the super-powers had been broken up, many previously subject peoples harboured understandable resentments. Bill Kowalski, the big American, glanced embarrassedly at the Cuban delegate.

"Please, Comrade Pirc, there is no question of nationalism entering this equation. We of the New York Federation are constrained to believe that the contents of the vault must be extracted and utilised as appropriate under international supervision and control."

His speech made, he folded his hands piously.

Anna re-read the note. Ivan had written in English capitals. **"STALIN IS THE KEY. TWO STEPS FORWARD ONE STEP BACK BUT REALLY IT SOUNDS LIKE A LONG WAIT." IVAN.**

Major Hekey waved his cigarette.

"I knew Dr Kondratov too, Dr Preston. I was KGB liaison at the Leningrad Institute. He hinted very broadly to me that he was on the verge of uncovering the secret of controlled nuclear fusion. It looks as though he found it. If he'd only made it to shelter . . ."

"And somehow this vault was constructed in secret Major?"

Hekey shrugged and smiled.

"Even the KGB could not be everywhere, Doctor. I can spare you some time over the note. In the sub-basement containing the vault is a bust of Stalin, an unlikely commodity in the USSR, I might add. The second sentence starts with a quote from Lenin. One step north from the Old Man's bust . . ."

Pirc glanced suspiciously at the Russian.

". . . we found a trapdoor. Inside — a small but heavy black cylinder. It fits perfectly into a hole at the front of the vault — but nothing happens. We believe that the last sentence implys a time factor. The vault may open after many years. The UN Recovery Commission feels that is not good enough."

"Well Major, you seem to have it well worked out. I don't see what you need me for."

Major Airedale sighed. "Anna, old girl, I know I can't order you . . ." He noted the West Russian frown.

"Just for you, Freddie, just for you, eh?"

"Exactly — splendid!"

They all rose.

Anna was regretting the decision. She was developing a headache. The cube absorbed electromagnetic radiation at any frequency like a sponge. A diamond drill would not scratch it. She didn't dare to go much further, such as use lasers, for fear of damaging the contents. Bleary-eyed she read the note again. It clicked. Ivan was such a sucker for word games. Taking a pad she wrote:

STALINBCDEFGHJKLMOPQRUVWXYZ

Hmm . . . Two steps forward and one back makes one forward as Hekey had noticed. Then shift it forward and put the Z at the start:

ZSTALINBCDEFGHJKMOPQRUVWXY

Below this line she wrote the alphabet in its regular form so that each letter on the top line corresponded to one in the line below. She looked at the note again. The word IVAN was written in big sloppy capitals, utterly unlike Kondratov's normal precise script. Taking each letter of the name, she traced it to a letter on the top line: "CUZH." Well it was worth a try. She stood before the vault and feeling a bit silly, shouted "CUZH." No result. She thought for a moment . Of course, in Russian "C" is a soft sound.

"SUZH" she shouted.

A small hole appeared in the blank black wall. Taking a powerful lamp, she entered.

The cube was empty, but for an ordinary office desk and chair. The top of the desk was covered with papers. Anna sat down to read, swiftly becoming absorbed.

"Ah, Doctor Preston, I was right to have faith in you!" Startled, Anna looked up to find herself on the wrong end of a KGB service-issue 7.62mm automatic. Behind Major Hekey two armed guards stood, sub-machine guns at the ready.

"This knowledge is the property of the Soviet Union, Doctor."

"There is no such entity as the Soviet Union, Major."

Hekey smiled.

"A very temporary state of affairs. Not all Russian have gone soft in the head. I believe Kondratov had discovered the ultimate weapon. An X-ray laser, Doctor. No armour, no material in the world could stand up against such a beam. Like the traitor he was, Kondratov denied victory to his own government. But now the Soviet Union will be re-united, and we shall triumph over the class enemy!"

It suddenly sank in.

"I should have guessed, Major. STALIN IS THE KEY could be read as STALINIST HEKEY. Ivan tried to warn us."

Hekey levelled the pistol.

"Too late, Doctor. I myself executed the traitor Kondratov — he must have anticipated death and locked up his secrets. It is regrettable, but I fear you must meet the same fate."

There came a sudden flare of lurid green light. The laser beam sliced into the two guards who died instantly and noiselessly. Hekey dived behind the desk before the beam could reach him. Anna threw herself down as a wild-eyed Jerry Cornwall leapt through the door clutching Anna's portable five magawatt laser unit.

Hekey fired back, dropping Jerry with a slug just under the right shoulder blade. Jerry was thrown against the wall and the laser unit clattered across the floor.

The Russian stood.

"And now we shall end this nonsense . . ."

The sharp crack of an M18 carbine put a full stop on his sentence. Hekey went down, a spreading red stain over his heart. Within a few seconds the vault was alive with hard-faced New York Marines, led by a triumphant Bill Kowalski.

"Well, folks, the Fifth Cavalry's here. Guess we'd better get you a medic Mr Cornwall. You'll be fine."

Anna felt weak with tension.

"Nice to know you can rely on the UN in a pinch, Bill."

Kowalski's eyes narrowed.

"Well not so fast Anna. There are certain countervailing constraints on active UN involvement at this moment in time. This is from now a strictly New York operation. Kondratov's work is safer with us. Gee, you can't put the defence of liberty in the hands of a bunch of UN fairies! The Russkis can't be trusted and the government is kinda pinko."

"No offence" he added quickly.

Anna sneered.

"You and Hekey, Bill, you're the same underneath. Everything you do ends up with a big heap of corpses!"

"Aw come on, Anna, we're the good guys."

The Americans did at least drop them off promptly at Southampton. Kondratov's papers were rushed across the Atlantic by flying boat.

Jerry had suffered no long-lasting damage. The bullet had passed straight through him. He was looking a little miserable though, propped up in a London hospital bed.

Anna patted his hand.

"Well it was good of you to look out for me Jerry."

He grunted, "We failed, Anna — who can say what Kowalski and his ex-Pentagon chums will do with a death ray?"

Anna chuckled, "There's no death ray, Jerry. Ivan's papers were a front. The equations are superficially plausible, but make no real sense."

"But then . . . ?"

"The vault, Jerry. Hekey and Kowalski only saw it as an obstacle. They were looking for an offensive weapon. But the vault *is* the secret. Ivan Kondratov invented a field generator which can turn ordinary materials into a super-strong fabric capable of withstanding anything. The power source and generator will be built into the vault walls, which are probably really made of back copies of PRAVDA."

Jerry burst out laughing until he winced with pain.

"It can probably be used with any material, Jerry — glass or perspex even."

"An impenetrable dome over every major city . . ."

". . . and think of the applications in our space program."

"Of course it would have made great tank armour."

"Shame, eh."

They both laughed again. Then Jerry frowned.

"But we still don't know how it's done, Anna."

Anna smirked. "The last line of the note — really it sounds like a *long wait.*" From her top pocket she produced a small black cylinder. It was the rod which everyone had assumed was the key to the vault.

"It's heavy, Jerry, in fact it could be said to be a *long weight*. A crossword clue."

She held the black rod out.

"This cylinder is a miniature vault, so . . . SUZH!"

The cylinder turned grey and split along its long axis. Inside were little boxes and micro-circuitry — presumably the power source and field generator. She extracted a shiny cube with gold-plated contacts.

"An IBM Microbubble memory. Ten gigabytes of online store. Should tell us all we need to know."

She began to laugh again. In spite of the pain from his shoulder, Jerry just couldn't help joining in.

Coded Messages

You never know when you might need to send a message in code. This might not help you let the milkman know that you want two pints of gold top, but maybe one day . . .

Fin Fahey explains how a simple code works, and how you can use your micro as an encoder and decoder. The program was written to run on the Dragon and Oric computers, though it is so simple that conversion to other machines is a piece of cake.

Message Encoder Text

HERE'S a short but compact encryption program to try out on your Dragons and Orics. Using it you can reproduce the encryption procedure used by Ivan Kondrator to ensure the security of his vault. There is, however, one crucial reversal. Using the code word **"STALIN"** and shifting the alphabet left by one, Anna derives the voice-key **"CUZH"** from the word **"IVAN"**. In doing so, she is not *decoding* IVAN but *encoding* it (or perhaps one can say that the encryption procedure can work in either direction, as long as you know which!).

This form of encoding a message has a long and venerable history. In essence, we are simply substituting a different character for each letter of the alphabet. Rather than invent a new alphabet with new symbols (this has been done, and it was very common procedure in, for example, Tudor times), it is simpler to use the existing alphabet and apply a series of reversible transformations to it. In the case of the Kondratov message, two transformations are made. The first is to take a key-word, and remove from the alphabet all the letters of this word. The key-word is then placed at the beginning, or the end of the alphabet, thus **STALIN** as a key gives rise to:

STALINBCDEFGHJKMOPQRUVWXYZ

Obviously this is not enough, since all the letters from R-Z appear in their customary places. We can therefore rotate the alphabet by a specified amount. In the story, this is one place forward giving a code alphabet:

ZSTALINBCDEFGHJKMOPQRUVWXY

Encoding and decoding is now simplicity itself — we write the conventional alphabet next to the code alphabet:

ZSTALINBCDEFGHJKMOPQRUVWXY

ABCDEFGHIJKLMNOPQRSTUVWXYZ

To encode a message we can go in either direction, taking each letter from one of the alphabets and using its equivalent in the other. In the story the decoding procedure is upwards, in the program downwards.

The program allows one other "alphabet-scrambling" procedure — if you choose you may exchange each of the letter pairs in the alphabet. Doing this for the above code gives a code alphabet:

SZATILBNDCFEMGKJOMQPURWVYX

Fatal Flaws

Well, codes of this sort, and this is as far as our program goes, will preserve the original word structure of the message. This is a potential help to anyone trying to crack the code. Thus encrypting the message **"IS ANYBODY THERE?"** with the above code gives us (going upwards): **"CP ZHXSJAX QBLOB?"**.

To make this message even more obscure we could apply transformations in the message itself. Rotating it one, for example, would give: **"BCP ZHXSJAX QBLO"**. Adding these facilities to the program would be a simple matter — the exercise is left to the reader.

Other techniques of encryption could be, for example: reversing the alphabet; making every other letter in the message meaningful and substituting a random letter in the other places; encoding the coded message again a given number of times.

Just A Cipher?

All the above encryption methods of course suffer from a fatal flaw — given a large enough message, or sample of messages, they can be cracked just by using letter frequency tables. The commonest letters in the alphabet are in decreasing order: **ETAOIN SHRDLU.** Hence if we find **H** is the most frequent letter in the coded message, we might reasonably suppose it stands in for **F**. With enormous computer facilities available even codes using alternate letters are not safe — the computer can try out hundreds of methods of cryption in a few seconds. An advanced computer-based cypher technique, known as a trapdoor code, is said to be uncrackable — so far!

Codes or Cypher?

Throughout the above account we have used the words cypher and code interchangeably. Strictly speaking we have been talking about cyphers. A true code is not crackable by computer techniques, as it follows no arithmetical rules. For example: **"TIME FOR LUNCH"** might mean **"SELL ALL OIL SHARES NOW"** or **"THE INVASION WILL BEGIN TOMORROW"**. True codes suffer from the disadvantage that the recipient requires a code book to understand the message. Code books can be stolen, and once this happens there is no choice but to invent a new code, which can cause confusion.

How The Program Works

This program is basically an exercise in string manipulation. You'll find that the techniques used in it are useful in a lot of other applications — writing your own Adventure game for example. Analysing language input is largely a matter of shuffling strings.

The main program functions are mapped out in lines 100-200. The program asks you to specify the code. You can then enter a message to be decoded or encoded, and at any time you can go back and specify a new code.

Sub-routine 400 sets up the code. The first thing we might want is a key-word (if we don't, inputting "A" for obvious reasons will leave our code alphabet intact). The key-word input as I$ is checked character by character in the course of a loop from line 450 to line 620. First of all the program checks that the ASCII value of the character is upper-case alphabetic (line 470). Then it goes through a loop from lines 510 to 530 which checks it against all the key-word characters accepted so far. If the character is felt to be valid, it is added to key-word K$ at line 550 and recoded from the alphabet string CA$. Lines 580 to 600 scan CA$ to find the position of the character. Line 610 closes up the alphabet around this position. We come to the end of this validation loop at line 620, and the program plunks K$ back onto the start of the now-reduced alphabet CA$. Line 650 gives you the chance to rotate the code alphabet by a shift of zero to 25. If you specify this, line 690 takes an appropriate-sized chunk off the end and puts it on the beginning. Finally if you want to swap pairs of letters (line 720), the program goes through a loop from lines 760 to 780 in which a temporary string W$ is set up with the letter pairs reversed. CA$ is set to the value of W$ and the sub-routine is exitted.

The Encode sub-routine at line 1000, takes the message you have entered, I$, and encodes it character-by-character in a loop from 1030-1080. Line 1050 finds the character position in a normal alphabet from the ASCII code. Line 1055 ensures that any non-alpha characters (space, numerals, etc) remain unaltered. Line 1060 adds the equivalent character from the code alphabet to word string W$. When all characters are coded, the encoded message is printed out.

The Decode routine at line 1500, is almost the same. We cannot on the other hand find the character position by ASCII code, as we are dealing with a jumbled alphabet, hence a loop is introduced (lines 1550 to 1570) to scan the code alphabet for the character. Once the position is found, the normal ASCII code can be deduced (line 1580) and the routine proceeds as above.

The program incorporates a very wide range of string handling techniques, and we hope you will find a study of the code in detail rewarding. It also makes the vital point: "Always validate your inputs!". As Ivan Kondratov would have said: **"NJJA FRTE!"**.

```
10 REM MESSAGE ENCODER
20 REM    FIN FAHEY
30 REM   JANUARY 1984
40 REM
50 REM
60 REM    CONTROL SECTION
70 REM
100 GOSUB 400' SET UP CO
DE
110 PRINT
120 PRINT "ENCODE/DECODE
(E/D)";
130 INPUT I$
135 IF I$<>"E" AND I$<>"
D" GOTO 130
140 IF I$="E" THEN GOSUB
 1000
150 IF I$="D" THEN GOSUB
 1500
160 PRINT "DO YOU WANT A
 NEW CODE";
170 INPUT I$
180 IF I$<>"Y" AND I$<>"
N" GOTO 170
190 IF I$="Y" GOTO 100
200 GOTO 120
370 REM
380 REM     NEW CODE
390 REM
400 CLS:PRINT:PRINT:PRIN
T
403 K$=""
405 CA$="ABCDEFGHIJKLMNO
PQRSTUVWXYZ"
410 PRINT "ENTER KEY WOR
D(A IF NONE)";
420 INPUT I$
435 REM
440 REM  GET THE KEY WOR
D
445 REM
450 FOR N=1 TO LEN(I$)
460 C$=MID$(I$,N,1)
465 X=ASC(C$)
470 IF X>90 OR X<65 THEN
 PRINT "KEY NOT ALPHABET
IC":GOTO 403
480 REM
490 REM    CHECK CHAR UNI
QUE
500 REM
505 X=0
510 FOR M=1 TO LEN(K$)
520 IF C$=MID$(K$,M,1) T
HEN X=1
530 NEXT M
540 IF X=1 THEN PRINT "C
HARACTER REPEATED":GOTO
403
550 K$=K$+C$
560 REM
570 REM    EXTRACT FROM A
LPHABET
575 REM
580 FOR M=1 TO LEN(CA$)
590 IF C$=MID$(CA$,M,1)
THEN X=M
600 NEXT M
```

```
610 CA$=LEFT$(CA$,X-1)+M
ID$(CA$,X+1)
620 NEXT N
630 CA$=K$+CA$
645 REM    ROTATE CODE ST
RING
650 PRINT "ENTER SHIFT (
+/-N)";
660 INPUT X
670 IF ABS(X)>25 GOTO 65
0
680 IF X=0 GOTO 710
690 CA$=RIGHT$(CA$,X)+LE
FT$(CA$,26-X)
710 REM    EXCHANGE LETTE
RS
720 PRINT "EXCHANGE LETT
ER PAIRS(Y/N)";:INPUT I$
730 IF I$<>"Y" AND I$<>"
N" GOTO 720
740 IF I$="N" GOTO 890
750 W$=""
760 FOR M=1 TO 25 STEP 2
770 W$=W$+MID$(CA$,M+1,1
)+MID$(CA$,M,1)
780 NEXT M
800 CA$=W$
890 RETURN
970 REM
980 REM     ENCODE MESSAG
E
990 REM
1000 PRINT "ENTER MESSAG
E TO ENCODE"
1010 INPUT I$
1020 W$=""
1030 FOR N=1 TO LEN(I$)
1040 C$=MID$(I$,N,1)
1050 X=ASC(C$)-64
1055 IF X>26 OR X<0 THEN
 W$=W$+C$:GOTO 1080
1060 W$=W$+MID$(CA$,X,1)
1080 NEXT N
1100 PRINT:PRINT "THE EN
CODED MESSAGE IS:"
1110 PRINT:PRINT W$
1200 RETURN
1470 REM
1480 REM    DECODE MESSAG
E
1490 REM
1500 PRINT "ENTER MESSAG
E TO DECODE"
1510 INPUT I$
1520 W$=""
1530 FOR N=1 TO LEN(I$)
1540 C$=MID$(I$,N,1)
1550 FOR M=1 TO 26
1560 IF C$=MID$(CA$,M,1)
 THEN X=M
1570 NEXT M
1580 W$=W$+CHR$(64+X)
1590 NEXT N
1595 PRINT
1600 PRINT "THE DECODED
MESSAGE IS:"
1610 PRINT:PRINT W$
1700 RETURN
```

MESSAGE ENCODER

PROGRAM DOCUMENTATION:

Sub-Routines:

S/R 400	:	Specify a new code
S/R 1000	:	Encode a message
S/R 1500	:	Decode a message

Program lines:

100-200	:	Control section
400-420	:	Enter code key
450-470	:	Check that all the characters in the key are alphabetic
505-550	:	Check that none of the characters in the key are repeated
580-630	:	Remove each of the key letters from the alphabet and put the key-word at the start
650-690	:	Rotate the code alphabet by one or more character positions
720-790	:	Exchange each pair of letters in the code alphabet

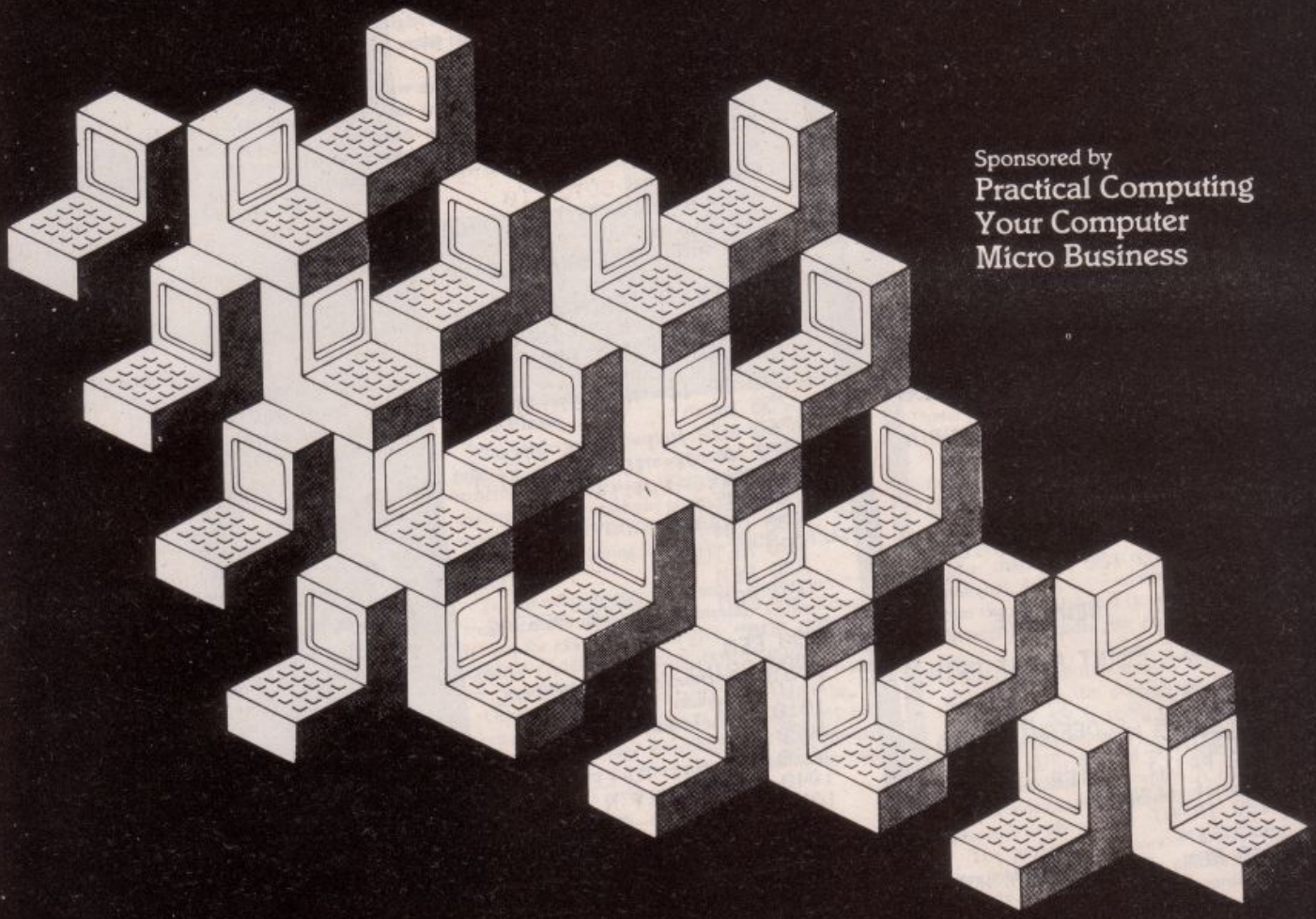
Numeric Variables:

N, M	:	General purpose subscripts
X	:	General purpose indicator

Strings:

I$	:	Input string
K$	:	Code key
CA$	:	Code alphabet
C$	:	Single character of alphabet (for validation)
W$	:	Temporary work alphabet

Success Breeds Success



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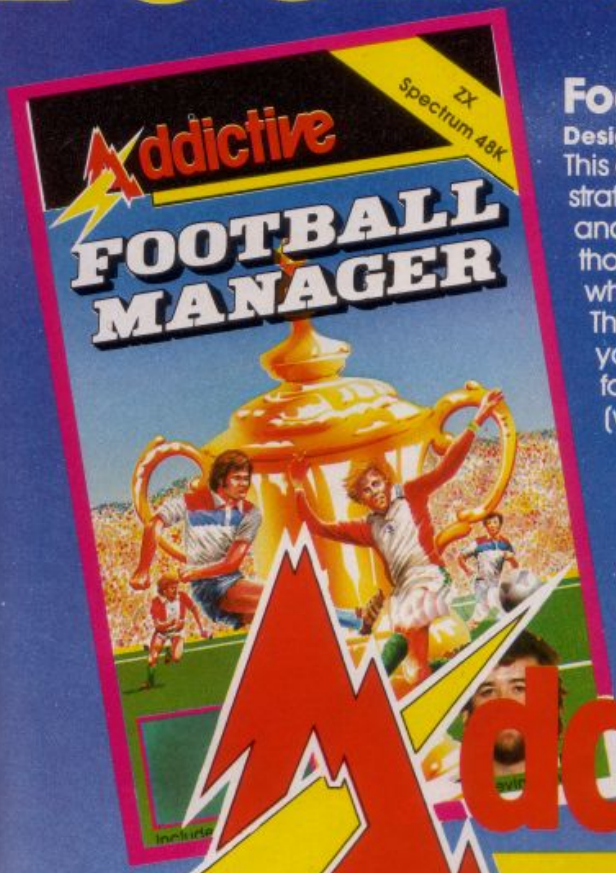

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★ Managerial rating
★ 7 skill levels
★ Save game facility

Addictive

*ZX81 Chart, Home Computing Weekly 16.8.83

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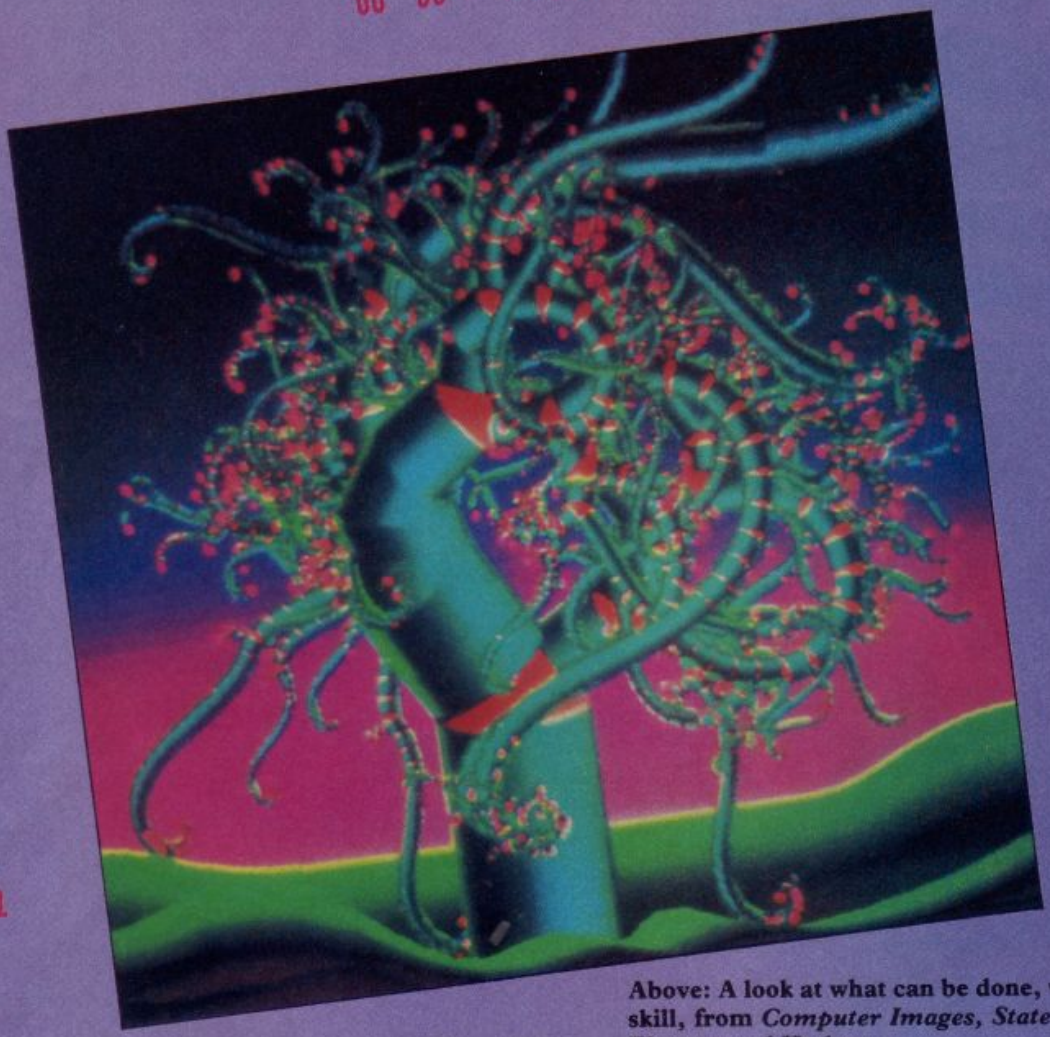
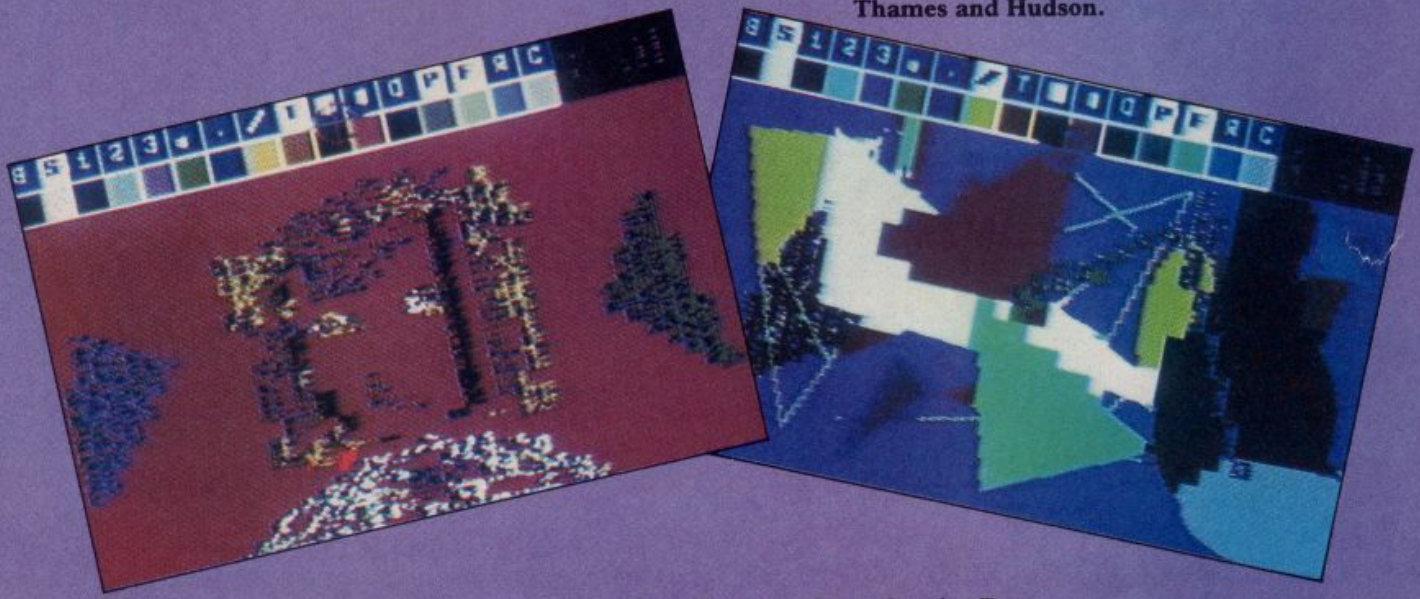
COMPUTER PAINTING

Light pens at work by Meirion Jones and Mike McCann



Above: A look at what can be done, with a lot of skill, from *Computer Images, State of the Art*, Thames and Hudson.

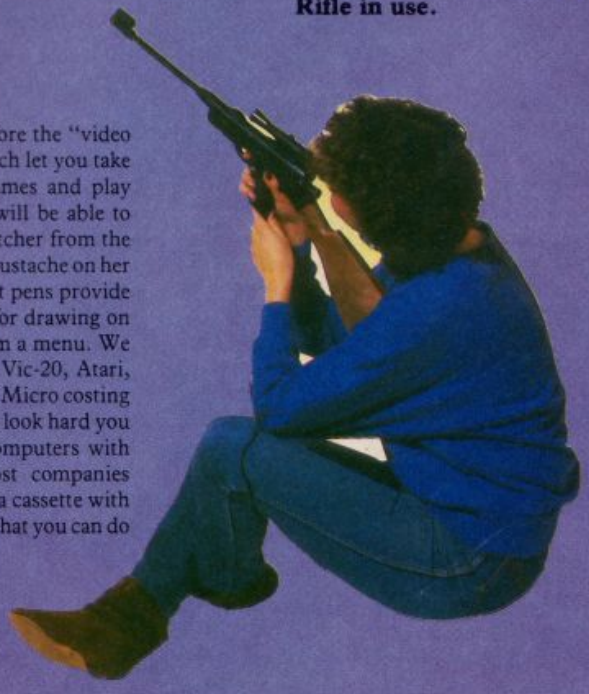


A little more crude perhaps, but great fun to do using Dams Pixstick on a Commodore 64.

Left: Grouse Shoot for the Stack Light Rifle.

Below: Two Spectrum light pens, from dk'tronics and Trojan Products.

Below: The Stack Light Rifle in use.



ONE DAY a light pen could help you shoot Esther Rantzen or scrawl graffitti down Coronation Street. The little gadget which could allow you to commit these outrages in your living room looks like a fountain pen except for the wire linking it to your computer. You can just draw on the screen with it as if it were a wax crayon.

LIGHT pens can also be built into plastic toy rifles or laser guns which you can fire at targets on screen from the other side of the coffee table.

It will be another year or so before the "video grabbers" — home computers which let you take pictures from television programmes and play with them — appear. Then you will be able to take a photograph of Maggie Thatcher from the Nine O'Clock News and stick a moustache on her or whatever. In the meantime light pens provide a fun alternative to the keyboard for drawing on screen or for selecting choices from a menu. We looked at pens for the Spectrum, Vic-20, Atari, Dragon, Commodore 64 and BBC Micro costing between £17.50 and £30 but if you look hard you can find pens for all the home computers with prices starting around £10. Most companies charge more than this but include a cassette with some programs on it which show what you can do with a light pen.

Strictly speaking the pen itself is not a pen but a sensor. If you open one up you will find that all it consists of is a light sensitive cell in a tube attached to the lead which connects it to the computer. Special luxury versions may have an on/off switch and a little red light to show you whether the pen is picking anything up from the screen or not. The computer works out where the pen is on the screen and then draws points or whatever it has been commanded to do at that place thus giving the impression that the pen is drawing on the screen.

The clever bit, of course, is how the computer works out where the pen is. One way makes use of the "scan lines" on your television. As you probably know the TV picture does not change one frame at a time like cinema film. There are 625 lines of dots on the television screen and an electron beam scans across line-by-line updating the picture 50 times a second to give the impression of movement. Some light pens give a signal every time the beam passes them, and by accurately calculating the time since the last pass, the computer can calculate where the pen is on the screen. The exact method used depends on the limitations of the computer. If you have an old television or one with fuzzy colour some light pens will not work at all with them.

The great advantage of the light pen is supposed to be that you can use it in a natural way like a pencil or a crayon — you can see what you're doing as you do it, rather than relying on the nasty artificial QWERTY typewriter keyboard and then watching the display.

Touch and draw

For the most enthusiastic of the back-to-nature-with-microtechnology brigade even the idea of using a pen is too artificial — after all they've only been around for a few thousand years. They want to take us back to the Neanderthal days when the leader of the tribe just pointed and it was done. This variation on the theme is called a Touch Screen to draw on the screen with your finger or touch the option you want to select.

You don't need to have glass fibres implanted in your hand to do this. All you need is a special and expensive television which has a grid of infra red light beams criss-crossing just in front of the screen. As you break the grid the television tells the computer where your finger is. Some people argue that the problem with both touch screens and light pens is that, except for artists at their easels, we are not used to scrawling on a vertical surface in front of us but prefer to write on a horizontal table top. This has resulted in the idea of the mouse — an input device about the size of a small furry animal, which, as you move it around on the table top in front of you, moves a cursor around on screen.

At any rate, none of the light pens we looked at will allow you to throw your keyboard into the dustbin of history just yet. After all the light pen has only been around for 20 years. Qwerty keyboards have been around for a century but Sir Clive Sinclair only found out last month how to make a proper keyboard. (See Sinclair micros in the news pages).

The light pens we looked at ranged from the Dams Pixstik, which allows you to create brilliant displays, particularly on the Commodore 64, quickly and painlessly and then animate them thanks to the excellent software supplied, to the Datapen which was a better pen with a built-in button and light emitting diode, but came supplied with unimaginative software, which at least encouraged you to think of your own uses for the pen. Somewhere in between were two workmanlike offerings for the Spectrum from dk'tronics and Trojan.

The odd one out was a toy gun with a built-in light pen from Stack called the SLR which stands not for Self Loading Rifle but for Stack Light Rifle. So long as you sit less than about 10 feet from the television this pen really is mightier than the sword. The Hong Kong built plastic gun comes in three pieces — lock, stock and barrel — which snap together easily and are perfectly adequate, together with a slot-in telescopic sight which is not. There are versions of the SLR for the Spectrum, Atari, Vic-20 and Commodore 64 and in each case a wire leads from the gun to a socket which plugs straight into the computer. Even on the Spectrum the socket plugs in securely without wobble. You have a choice of three games. Grouse Shoot, Shooting Gallery or High Noon which come in a cassette with the SLR.

Grouse Shoot consists of two crude outlines of trees on a blue sky with green clouds. Every so often a grouse flutters upwards and you have to shoot it before it reaches the top of the screen. Once you realise that the gun does not shoot straight and work out which bit of sky or tree to aim at if you want to hit the grouse it becomes very difficult to miss. For every bird that gets away the computer adds another black bar at the top of the screen. The grouse gets away if it reaches the black area. If your aim is poor enough and you keep missing, the black bars advance down to the horizon and so night has fallen and the shooting has to stop. A charitable view of the game might be that it has been written by a secret anti-blood sports activist in an attempt to make people associate grouse-shooting with boredom.

The second program, Shooting Gallery, is even worse — suffice it to say that it makes the original bat and ball video games look like the ultimate in sophistication. Only High Noon approaches the standard of commercial programs. Gunfighters swagger across the screen and you have to hit them before they hit you. You've seen it all before — usually with Clint Eastwood in the starring role. One man walks on — gets shot, another man walks on — gets shot, three men walk on — get shot, and so on. At least Stack is producing a range of new titles for the SLR and is co-operating with other software houses — such as Anirog of Dartford — to try to make sure that a wider choice of games is available. But inevitably all of these will be of the shoot-em-up variety.

Shooting straight may not be a matter of life and death with the other light pens, but it is important to be able to adjust the computer so that you know that it thinks the light pen is where you can see it is. The easiest to adjust was the dk'tronics unit for the Spectrum. This has a confidence inspiring little black box with a knob on it. The first program you load from tape has a short routine to help you set up the pen. All you have to do is turn the knob until the setting is roughly right then you fine tune using two keys on the keyboard. The Spectrum power lead feeds into the black box where it powers the light pen as well as continuing on to power the Spectrum.

This is a much more satisfactory arrangement than the other light pen specifically designed for the Spectrum — the Trojan. This plugs into the back of the computer but then has a battery hanging loosely from it to provide pen power. But even without a little black box it is not difficult to adjust the Trojan. The Datapen on the other hand could be intimidating for beginners. The notes tell you to "Change the number —55 and —37 by 4 times the error" in a total of eight program lines. In a way targeting is least important with the most sophisticated of the light pens we tried, the Pixstik for the Commodore 64. This is because it uses a clear crosshaired target about the size of a halfpenny bit as a cursor, so you would not want the pen to actually cover it. Even so it would be better if the program first offered you the chance to set up the cursor as near to the pen as you wanted it.

When you load the program, after a title page, the main display appears. This is a blue screen with a palette of colours and alternative functions running along the top. All you need to do to start drawing is move the cursor — your brush or pen if you like — to the appropriate colour, push shift to dip the brush in the ink and then hold down the shift key while you are drawing, releasing it when you want to leave no mark. Choosing a function is the same as choosing a colour. The functions along the top read B, S, 1, 2, 3, block, dot, line, T, big square, little square, O, P, F, R, C.

Dams Pixstick for the Commodore 64

If you wanted to draw a picture for instance, you could pick up a black ink on a light blue background and draw a cat. The line would be quite thin but if you wanted to make the cat look fluffy you could turn on P, for paint, which gives you a rougher texture. Alternatively you could turn on the BLOCK function which gives an instant cubism effect to your drawing. You have to move the pen quite slowly and carefully. You can make short cuts by using the standard shapes. LINE allows you to draw a line between any two specified points. You just move the pen where you need it then tap the shift key and then do the same at the other end.

In the same way you can create triangles with the T command, squares with the big square command, and oddly enough circles with the little square command. The O creates elipses. You can either fill these shapes with colour or leave them as outlines using the F command. You can also change the screen colour using S and the border colour B. If two of your shapes in different colours cut across each other the colours will run. Sometimes this is quite an interesting effect but usually you want to avoid it and this is where pens 1, 2 and 3 come in. If you draw one shape in pen one, do the next one that overlaps it in pen two and so on. C and R clear and reset the pictures. But that is not all. Say you have drawn a picture of a cat sitting outside a house. If you push F7 on the Commodore keyboard a black strip appears on the bottom of the screen with the word Command? at the top of the strip. If you push key P the word Put will appear and you can store that picture in Put O. You can now store three more frames with subtle differences — such

as smoke gradually coming out of the chimney frame by frame and then animate it cartoon style with the command ANIMATE. You can even BOUNCE it so that the smoke goes all the way out then back in again.

You can save and load your pictures on tape. This is all great fun, but the major drawback is a lack of advice on how you could incorporate any of these ideas in your own programs, or make any use of the Pixstik light pen except with the excellent program it comes with. There are other quibbles. A button on the pen would have been much handier than having to push the shift key all the time. Apart from anything else there is always the risk of nudging the shift lock by mistake and wrecking your masterpiece on screen. Also a ghost cursor occasionally appears, to cause total confusion.

The Spectrum light pens from dk'tronics and Trojan have many of the same functions as the Pixstik — at least in theory. In practice from the moment that they come up with their dull black and white displays of grid and the letters for the functions you have your doubts. Every time you try to plot a point the dk machine flashes a head-splitting white line right across the screen. By the time you had drawn a face, you really would feel like shooting the television. Most of the time with the Trojan light pen was spent trying to chase the cursor into a corner so you could regain control of it. But a big advantage of both the dk and the Trojan was that they encouraged you to use the light pen for your own programs, and they both allowed you to enter text from the keyboard onto the screen display. The Trojan also had the great one-liner somewhere in the program "Press enter to exit".

The award for the worst software supplied must go to the Datapen. Most of it seemed to consist of placing symbols from the Vic's character set on to a grid. to be fair it was only supposed to be a demonstration and they do a 60-line printout with helpful REM statements which makes it clear how to use a light pen in your programs. Also the pen itself is excellent. Unlike the others it has a button — not much to ask surely — and an LED which shows whether it is picking up anything from a particular part of the screen. There is even a useful booklet giving advice on targeting and improving stability.

Make sure that you have seen a particular light pen in action before you buy it. Unless you have a pet project of your own check that there is software available that will take advantage of the pen.

DATAPEN — £25 available for BBC, Vic-20, CBM64, Dragon 32
Data Pen Micro Technology, Kingsclere Road, Overton, Hants.

STACK LIGHT RIFLE — £29.95 available for Spectrum, Vic-20, Commodore 64 and Atari
Stack, 290-298 Derby Road, Bootle, Liverpool L20 8LN

TROJAN — £17.50 available for Spectrum
Trojan Products, 166 Derlwyn, Dunvant, Swansea, W. Glamorgan

PIXSTICK — £29.95 available for Commodore 64, Vic-20
Dams Office Equipment, Gores Road, Kirkby Industrial Estate, Merseyside

dk'tronics LIGHT PEN — £19.95 available for Spectrum
dk'tronics, Unit 6, Shire Hill Industrial Estate, Saffron Waldren, Essex

Thanks to The Buffer Shop, 30 Streatham High Road, London, for lending us the Trojan, Datapen and dk'tronics light pens, and to Devron Computers, Moorgate, London, for the Stack Light Rifle.

COMPUTER IMAGES

VIEWED as a book of graphic art, *Computer Images, State of the Art* by Joseph Deken is outstanding. The fact that all the images have been generated by a computer (with a little help from a human or two) only makes it all the more remarkable.

The book is a collection of images produced for a number of reasons. Purely as an art form, the medium lends itself to abstract work; for advertising, Pirelli — the tyre people — used it to make an unusual display of their product; thermographic images (thermo — based on heat) in medicine can show doctors the internal acivity of the body; and of course, for education, some flight simulators these days are remarkably life-life — and are used to train pilots. The author provides a comprehensive explanation throughout the book which is divided into eight sections. We used one of our favourite pictures from the *Crafting Images* section for this month's cover. And in this article you'll see a rather psychedelic image of a tree which comes from the *Image Evolution* section.

The first section of the book deals with *Computer Images*, here you'll see the computer is often used to enhance real-life situations. Some of the special effects were produced for ads, some for films — some just as art for art's sake. Because a computer screen is made up of pixels (tiny square points of light) you tend to get a mosaic effect. The colours don't blend smoothly into one another, but this need not detract from the final picture. Nevertheless some of the results are remarkably smooth looking and could easily be mistaken for a real painting.

***New Worlds of Sensation* is the title of the second section and looks at the pictures generated by our own bodies and those of the creatures around us. Different parts of the body give out different amounts of heat which a computer can analyse and then display graphically. As well as being nice to look at, the technique can be used to help doctors make more accurate diagnoses, and also to gather information that might otherwise be undetectable. The technique is also used by geological explorers to scan thousands of kilometres in a single investigation. The planets are finally revealing some of their secrets to satellite sensors which relay data back to earth.**

Computer artists use CAD — computer aided design — to express their graphic ideas via the computer, and this topic is discussed in *Crafting Images*. In effect, the artist must act as an interface between all the technological wizardry available to him — the Walt Disney film Tron is a good example of this sort of thing.

***Visualisation and Communication* shows us that until we put satellites in space we really had no idea of what our globe looked like — we weren't quite as bad as our ancestors (some of whom thought the earth was flat), but we now have an ever increasingly accurate and detailed account of our planet. Three dimensional images of buildings can be produced so that we can see if we *don't* like it before its too late — and more important whether the idea is architecturally sound.**

The fifth section shows us *Constructive Imagery*, at present computer devices are often more cumbersome and less accurate than everyday cameras, and indeed the final picture may look very much like an ordinary photograph. But a computer can store information in its memory and construct an image that never really existed. By changing the computer's information an artist can change the lighting or perspective of a scene.

Simulations are becoming more and more important in training, *Reality Revisited* shows us the type of images enjoyed by trainee pilots and tank personnel. Better to practise on one of these than risk crashing the real thing.

It would be easy to mistake the last two sections *Fantasy* and *Image Evolution* as being one and the same thing. But while *Fantasy* is a look at the results of artists indulging themselves in their wilder dreams, *Image Evolution* uses the computer as an electric ecology; the final image comprises an infinite variety of information reactions that result in a final picture — new species can be invented.

Even if you're not at all interested in reading the words in this book, it is worth taking a look at the pictures (all of which are in colour). Unfortunately it is quite expensive, but if someone owes you a present it certainly is a visual treat. Computer art is rapidly becoming more available and more acceptable to the average mortal — this book proves it.

***Computer Image, State of the Art*, by Joseph Deken, published by Thames and Hudson, £15 (hardback), £9.95 (paperback).** **Sally Clark**

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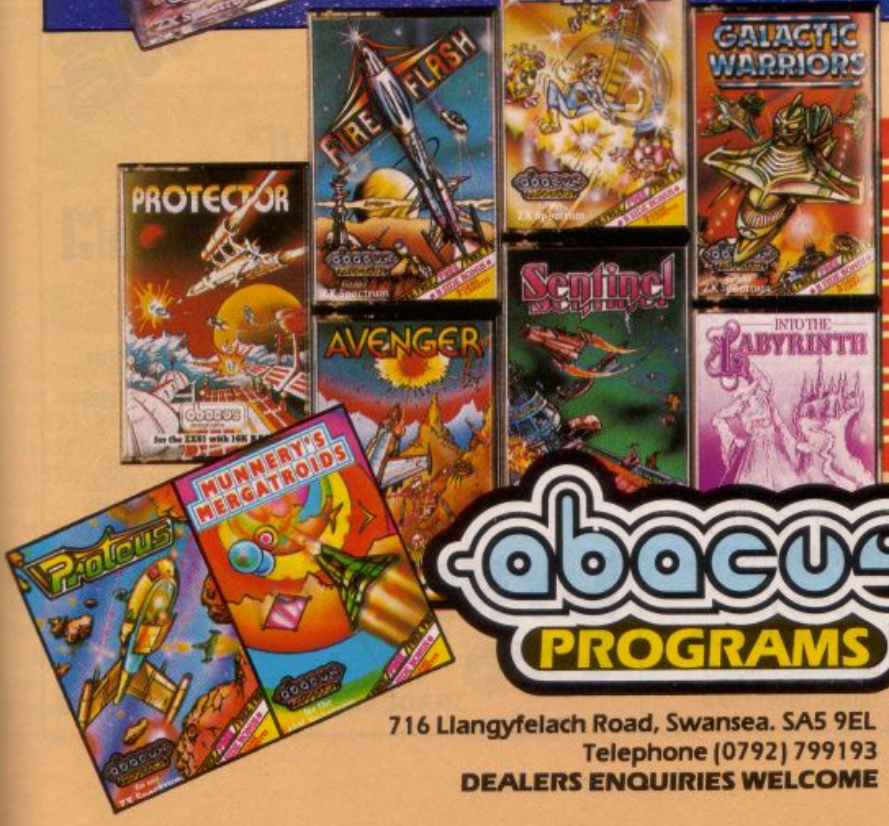

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STARTING OUT

O.K. folks, its time to get those computers out. In this month's Starting Out Boris Allan shows why you can't always trust your computer to perform simple arithmetic accurately. Although the programs were written on the Commodore 64, they work equally well on other machines.

GET hold of a calculator, if you can, and enter the number 33333333.

Find the square root of this number, which (on my calculator) is equal to 5773.5026.

Now take the result and multiply it by itself (i.e. square it).

The new result, on my calculator, is 33333332, so that the answer I now have differs from the original number by 1.

I have tried this sequence out on another calculator, and the square root is given as 5773.50267, which differs from the square on the other calculator by an extra digit worth .00007. Obviously this must be a more accurate value than the other. The first square root is too low.

As the first square root is too low (at least one digit has been "chopped" off the end), that is the reason why, when squared, the result is too low.

On the second calculator, the square of the square root is 33333333 and so the answer is exact, or is it? To check this out on the second calculator, I stored the square root of 33333333, squared the square root, and subtracted that result from 33333333. The answer was −.0397338867.

How did I store the numbers, and perform the calculations? Well, my second calculator does not use fixed numbers of digits, as did my first calculator, and also my second calculator was programmable. My programmable calculator is called a Commodore 64 (I could have used one of many other programmable calculators).

The program was;

```
A = SQR(33333333) :
PRINT A*A, 33333333-A*A
```

and the response showed that, though the square of the square root (i.e. X*X) seemed to be 33333333, in fact X*X was more like 33333332.96. Though this was not as far out as 33333332, it was still not exactly correct (and was lower).

The reason why the answer from the Commodore 64 was also lower is that the Commodore 64 calculator also chops digits at the ends of numbers. The reason why the error is not as great is that there are more digits stored in the Commodore 64 (31 in fact). The digits the Commodore 64 uses in its calculations are not decimal digits, but binary digits (otherwise known as "bits"). Binary digits can only take the two values 0 or 1, compared to the ten different values for decimal digits.

There is no need to worry about binary arithmetic, or bits, or such like, just remember that a computer (any computer, not just the Commodore 64) can never be totally accurate for all cases for all numbers. What might appear to be two exactly equal numbers, might not be equal as far as the computer is concerned.

This program should work for any computer;

```
10 FOR I=1 TO 10
20 X = SQR(I)
30 PRINT I, X, I-X*X
40 NEXT I
```

because if J was X*X then the two numbers should be equal, but they are not.

Here is an instructive program to try out on any computer, it counts the number of exact square roots from the first 1,000 numbers;

```
IF I = J THEN ...
```

and on the Commodore 64 there are three examples where the square root is not exactly correct when squared in line 30. On the Acorn Electron there are two examples of inexactness. We can now see some problems arising with the use of "equality" tests, e.g.

```
10 N = 0
20 FOR I=1 TO 1000
30 X = SQR(I)
40 J = X*X
50 IF I = J THEN N = N+1
60 NEXT I
70 PRINT "NUMBER CORRECT IS ";N
```

where the answer for the Commodore 64 is 56, which means that only 5.6% of the square roots tried were exact. The time taken was 63.1 seconds (approximately). On an Acorn computer 506 square roots were exact (50.6%) and I forgot to time the program. It might be worth comparing other computers to see how accurate, they are, and this is related to accuracy.

A further simple program you might like to enter is;

```
10 FOR I=1 TO 10
20 X = I^2
30 PRINT I, X, I-I*X
40 NEXT I
```

which produces a good few errors for the Commodore 64. In line 20, the 2 is the power to which the variable I is raised, and I raised to the power of 2 is I squared (or I*I). Funnily, for the Electron there are no errors here.

Why not try;

```
10 N = 0
```

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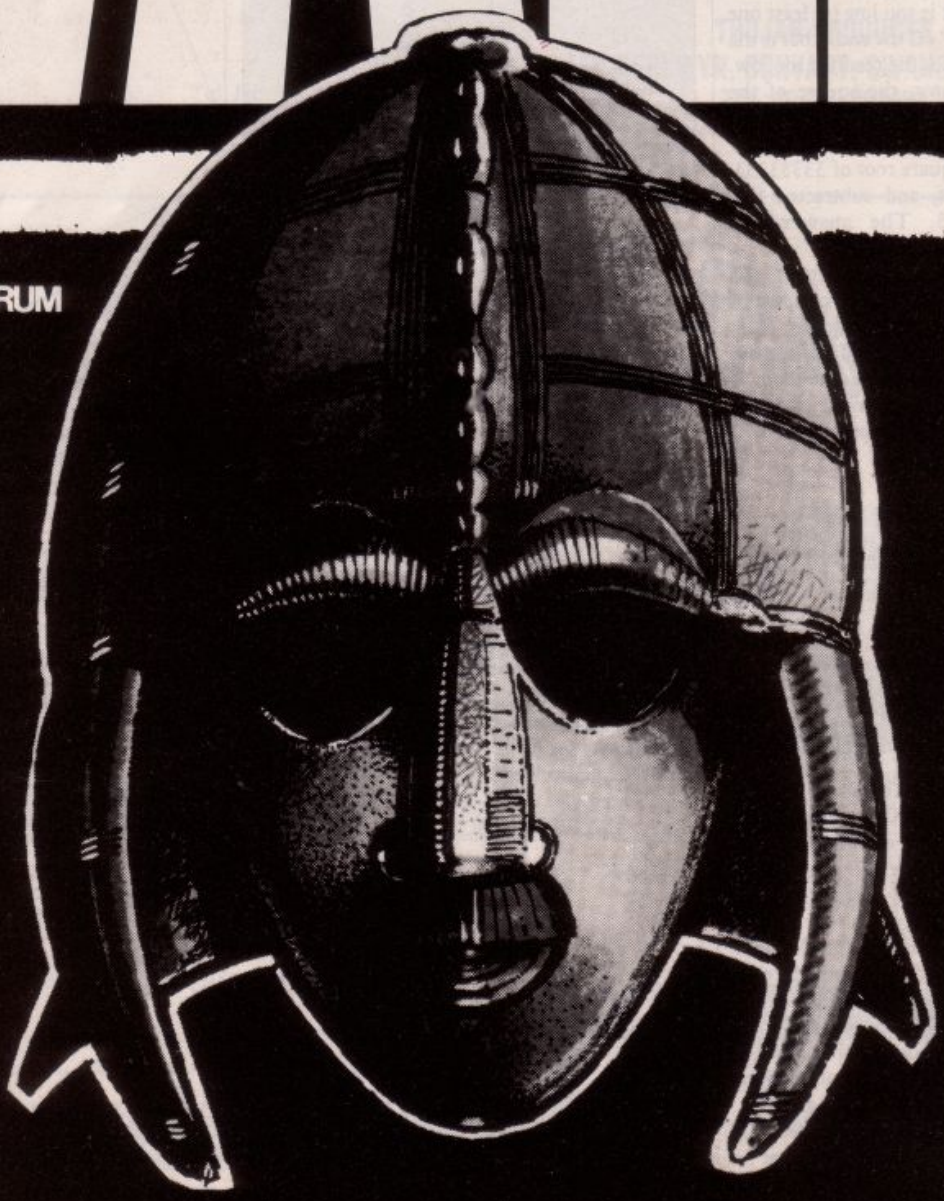

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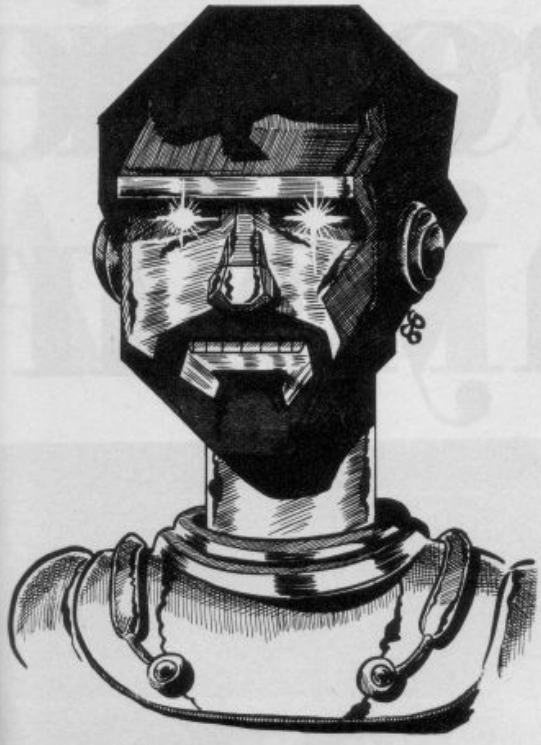

JUST when things are going really badly, with luck they get worse. When Marv gave me a present the other day I knew that it was going to be a waste of my valuable time. Marv was the right idjit who gave me the collected thoughts of an Aquarius (on cassette). The cassette was a C0, as I remember. He surpassed himself this time. Who in their right mind wants an elephant which spends all its time sitting on computers? Worse than that, it keeps on forgetting to use the door to come in, and the wall is for ever complaining. For my next present Marv has promised me something really amazingly useful, lord know's what that will be. Anybody any ideas? Have you heard of the Chinese computer with wheels? It's an Oric-shaw, very noisy and always crashing. Bolt-neck is muttering again, and holding that nitric acid spray rather threateningly. He's very persuasive at times.

Send your problems to: **SiRob, Computer Choice, Quadrant House, The Quadrant, Sutton, Surrey.**

● ● ●

INTRIGUING QUESTION 1 from Mrs L. S. Dale of St. George, Bristol (bet she's a right Dragon): "What is a randomising factor?"

Dear Lucretia (is that what the L stands for?) a randomising factor is something any idjit knows, so I asked Marv. "19472046395561847259934384576541" he answered, so I showed him Bolt-neck's picture. That shut him up. I had better answer.

Here is a formula:

X = (X*37 + 1) MOD 100

does that help? No? Good, I hoped it wouldn't. Start at the right hand side.

The number X is multiplied by 37 and 1 is added, then we only keep the last two digits of the answer (that's what MOD 100 means). Let X start as 1 or (as two digits) 01.

X	New X
01	()38
38	(14)07
07	(2)60
60	(22)21
21	(7)78
78	(28)87

and so on. the numbers 38, 07, 60, 21, 78 and 87, are fairly unpredictable in their order: they are called "pseudo-random" numbers or "random" numbers for short. Computers use various methods to produce random numbers, but most are a bit like this.

The number for X we started with was 01, so what happens with 02?

X	New X
02	()75
75	(27)76
76	(28)13
13	(4)82
82	(30)35

and there is a new sequence of random numbers 75, 76, 13, 82, and 35. Sooner or later the sequences will repeat. The numbers we use to start (01 or 02, or anything else) are the randomising factors.

To get different sequences we commence with different randomising factors, and using a different system of calculation 19472046395561847259934384576541 might be a randomising factor. Another word for randomising factor is "seed".

Incidentally, Lucretia, what is the maximum possible number of different random numbers we can get with the above formula? Answers on a postcard please.

That was a long answer to a stupid question. They tell me Claire Rayner needs a job . . . (or was it a diet . . . ?)

● ● ●

COLOUR BLIND QUESTION 2 from an affluent Marcus Dingley of Surbiton, Surrey: "I have a BBC Model B, and at the back it has an 'RGB' socket — what is it for? I've been told that it's for a colour monitor, but what does the RGB mean?"

RGB means Red-Green-Blue, and that answers your question. The Editorial presence has unfortunately made itself felt (he tells me electric shocks are good for me). I now have to explain what the significance is of these colours (Or Else! ED).

If you go in for painting, you know that you only need the colours red, yellow and blue, to be able to mix all the other colours you need (with white to lighten). To make brown, for example, you add together red, yellow and blue, and get a sludge remarkably similar to Bolt-neck's complexion. With light, things are different.

Where light is concerned, the three prime colours are red, green and blue. To get a yellow light, for example, you add red light and green light. A colour monitor works on this basis, that is, to produce all the different colours you add different light colours together.

A television also works on the same principle. Consider the Spectrum. If you look at the Spectrum's colour code (on the top row of keys) blue is 1, red is 2, and the code for green is 4. The code for yellow is 6 (which is blue and green, or 2+4), and if you add all the colours together (1+2+4) you get 7, which is white light.

○ ○ ○

QUICKY QUESTION 3 from Robert Kirkbridge of Bramhall, Stockport: "Why does cartridge software load so quickly?". Here's a question for you, Robert, "How long is a piece of string?"

When you switch on your computer, the BASIC system starts up almost immediately (unless you have a Sharp), because the BASIC system is already stored in the computer's memory. (It's a bit of a ROM story this.) To load in a program from cassette tape takes time because the program has to be put into memory.

To plug in a cartridge you have to switch off, and plugging in the cartridge changes the ever present BASIC system for the cartridge system. It's so quick because the computer thinks the cartridge is always there, not BASIC. The cartridge contains its own memory which is swapped for that normally used by BASIC.

I'm off, I have to talk to the National Gallery about exhibiting my pictures . . .

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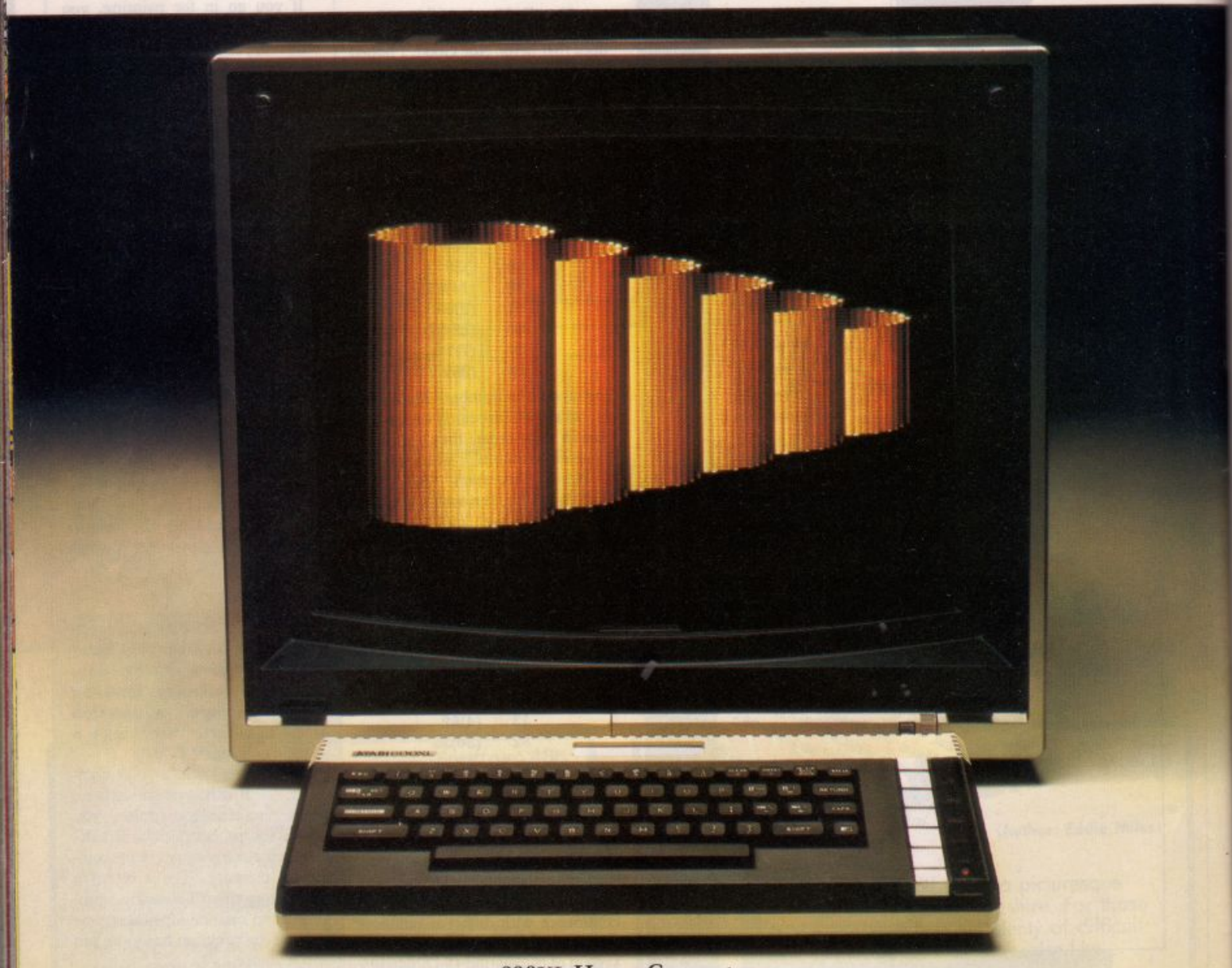

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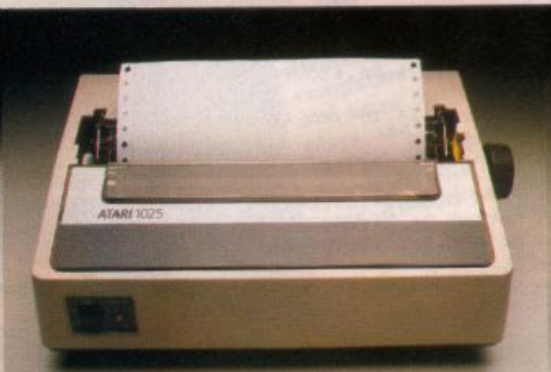

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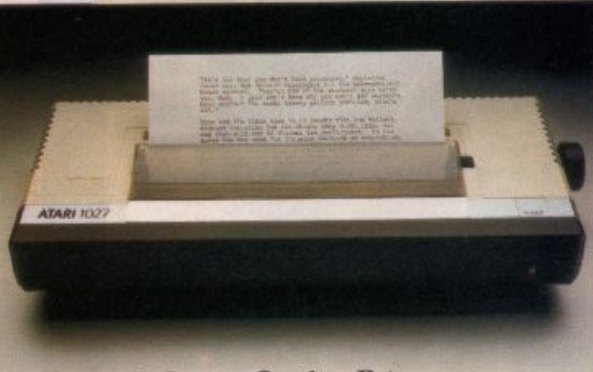

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SOFTWARE CITY

SPECTRUM

IN THE January '84 edition of *Computer Choice*, you asked if anyone knew of a use for "POKE 23606, : POKE 23607," on the Spectrum. On the tape I have shown a use for these pokes, but first let me explain a little bit about locations 23606(7. If you look at page 173 of the manual you will see it is entitled "The System Variables" and at the very bottom you will see the name "CHARS". To the left of that you will see its address, 23606, and that it occupies 2 bytes of memory.

Under the heading "Contents" it says about CHARS "256 less than address of character set (which starts with space and carries on to the copyright symbol). Normally in ROM (at address 15360) but you can set up your own (referring to a character set) in RAM and make CHARS point to it." Basically what this is saying is "the place where the computer gets its character data from." The program on the tape illustrates the character set being redefined.

As you probably already know, each character is made up of an eight by eight grid of pixels, so it is possible to use the PSION character generator program to design characters. There are 96 characters in all that can be re-drawn, so that means that 768 bytes (96×8) are required to store a complete character set. The best place to store the data is just below the O.D.G.'S, so that is the reason for the "CLEAR" command in line 10.

Because the first 32 characters are non-printable, CHARS has to be poked (using the method on p.173) to 256 less than the first character (32×8=256).

If you decide to try defining your own character set, you will need to look on page 183-186 to see which order the characters come in. Remember, you can only define as far as the copyright symbol. If you are stuck for inspiration for a character set, why not flick through a Letraset catalogue?

Kai Weber, Reading, Berkshire.

P.S. To save the character set without the basic program type: SAVE "CHARS" CODE USR "A"—768,768
It is important to have lowered RAMTOP by using "CLEAR USR "A"—769" before the code is loaded into your own programs, otherwise the Basic might overwrite the character set.

```
  10 CLEAR USR "a"-769
  11 PRINT "PLEASE WAIT"
  15 FOR f=USR "a"-768 TO USR "a
": POKE f,0: NEXT f
  20 FOR f=USR "a"-768 TO USR "a
"-296: REM define space to Z
  30 READ a: POKE f,a: NEXT f
  40 FOR F=USR "A"-247 TO USR "A
"-42: READ A: POKE F,A: NEXT F:
REM define a-z
  50 LET addr=USR "a"-768-256
  60 POKE 23606,addr-256*INT (ad
dr/256): POKE 23607,INT (addr/25
6)
  70 PRINT "THE CHARACTER SET HA
S BEEN      REDEFINED"
  80 PRINT "To restore normality
 type"'"'POKE 23606,0: POKE 2360
7,60'"
7000 DATA 0,0,0,0,0,0,0,0
7010 DATA 0,24,24,24,24,0,24,0
7020 DATA 0,100,100,0,0,0,0,0
7030 DATA 0,36,126,36,36,126,36,
0
7040 DATA 0,16,124,80,124,20,124
,16
7050 DATA 0,98,100,8,16,38,70,0
7060 DATA 0,60,32,126,68,68,124,
0
7070 DATA 0,24,24,24,0,0,0,0
7080 DATA 0,56,48,48,48,48,56,0
7090 DATA 0,28,12,12,12,12,28,0
7100 DATA 0,0,84,56,124,56,84,0
7110 DATA 0,24,24,126,126,24,24,
0
7120 DATA 0,0,0,0,0,48,48,16
7130 DATA 0,0,0,126,126,0,0,0
7140 DATA 0,0,0,0,0,48,48,0
7150 DATA 0,2,6,12,24,48,96,0
7160 DATA 0,126,102,106,106,114,
126,0
7170 DATA 0,24,24,24,24,24,24,0
7180 DATA 0,124,4,124,96,96,124,
0
7190 DATA 0,124,12,60,12,12,124,
0
7200 DATA 0,96,96,96,104,124,8,0
7210 DATA 0,124,96,124,4,4,124,0
7220 DATA 0,124,96,124,100,100,1
24,0
7230 DATA 0,124,12,12,12,12,12,0
```

```
7240 DATA 0,124,100,124,100,100,
124,0
7250 DATA 0,124,100,100,124,4,4,
0
7260 DATA 0,0,24,0,0,24,0,0
7270 DATA 0,0,24,0,0,24,8,8
7280 DATA 0,0,24,48,96,48,24,0
7290 DATA 0,0,0,126,0,126,0,0
7300 DATA 0,0,24,12,6,12,24,0
7310 DATA 124,12,12,60,32,0,32,0
7320 DATA 0,126,74,90,94,64,126,
0
7500 DATA 0,124,100,100,124,100,
100,0
7510 DATA 0,120,104,124,100,100,
124,0
7520 DATA 0,124,100,96,96,100,12
4,0
7530 DATA 0,124,100,100,100,100,
124,0
7540 DATA 0,124,96,120,96,96,124
,0
7550 DATA 0,124,96,120,96,96,96,
0
7560 DATA 0,124,100,96,108,100,1
24,0
7570 DATA 0,100,100,124,100,100,
100,0
7580 DATA 0,60,24,24,24,24,60,0
7590 DATA 0,24,24,24,24,24,120,0
7600 DATA 0,96,104,104,124,100,1
00,0
7610 DATA 0,96,96,96,96,96,124,0
7620 DATA 0,126,106,106,106,106,
106,0
7630 DATA 0,124,100,100,100,100,
100,0
7640 DATA 0,124,108,108,100,100,
124,0
7650 DATA 0,124,100,100,124,96,9
6,0
7660 DATA 0,124,100,100,100,100,
124,24
7670 DATA 0,124,100,100,124,120,
108,0
7680 DATA 0,124,96,96,124,12,124
,0
7690 DATA 0,126,24,24,24,24,24,0
7700 DATA 0,100,100,100,100,100,
124,0
7710 DATA 0,100,100,100,100,36,2
```

```
4,0
7720 DATA 0,106,106,106,106,106,
126,0
7730 DATA 0,100,100,56,100,100,1
00,0
7740 DATA 0,98,98,126,24,24,24,0
7750 DATA 0,124,12,12,124,96,124
,0
8000 DATA 0,0,124,4,124,100,124,
0
8010 DATA 64,64,124,100,100,100,
124,0
8020 DATA 0,0,124,100,96,100,124
,0
8030 DATA 4,4,124,100,100,100,12
4,0
8040 DATA 0,0,124,100,124,64,124
,0
8050 DATA 0,28,16,56,16,24,24,24
8060 DATA 0,0,124,100,100,124,4,
124
8070 DATA 64,64,124,100,100,100,
100,0
8080 DATA 16,0,16,48,48,48,48,0
8090 DATA 4,0,4,12,12,12,12,60
8100 DATA 64,64,72,72,124,100,10
0,0
8110 DATA 32,32,48,48,48,48,48,0
8120 DATA 0,0,126,106,106,106,10
6,0
8130 DATA 0,0,124,100,100,100,10
0,0
8140 DATA 0,0,124,100,100,100,12
4,0
8150 DATA 0,0,124,100,100,124,64
,64
8160 DATA 0,0,124,100,100,124,4,
4
8170 DATA 0,0,124,96,96,96,96,0
8180 DATA 0,0,124,96,124,4,124,0
8190 DATA 16,16,56,16,24,24,24,0
8200 DATA 0,0,100,100,100,100,12
4,0
8210 DATA 0,0,50,50,54,52,28,0
8220 DATA 0,0,106,106,106,106,12
6,0
8230 DATA 0,0,100,100,56,100,100
,0
8240 DATA 0,0,100,100,100,124,4,
124
8250 DATA 0,0,124,4,124,96,124,0
```

SOFTWARE CITY

SPECTRUM

THIS PROGRAM is a useful scrolling routine for the Spectrum.

Andrew Radford, Ashbourne, Derbyshire.

```
>LIST
  10 INPUT A$
  20 A$=" "+A$+" "
  30 FOR N=0 TO 20
  40 FOR M=0 TO 31
  50 PRINT AT N,M;A$
  60 NEXT M
  70 NEXT N
  80 FOR N=20 TO 0 STEP-1
  90 FOR M=31 TO 0 STEP-1
 100 PRINT AT N,M;A$
 110 NEXT M
 120 NEXT N
```

SPECTRUM

MY FRIEND Jason Richardson and I, Barry Morcom, have written a short program using the OUT 254 Command. the program produces an orange border and a Beep. This program is for 16K and 48K Spectrum.

Barry Morcom, St. Albans, Herts.

```
>LIST
 100 LET A=200
 200 FOR I=1 TO 100
 300 OUT 254,A-14
 400 OUT 254,A
 500 NEXT I
```

ATARI

HERE IS a program for the Atari 400/800 computers. Line 10 reads the data 80 and 90 and turns them into sound. This program plays the theme tune to the popular Frogger video game. The numbers in line 80 and 90 could be changed to play another tune. Also the value of x in line 40 could be changed to give different duration.

Duncan Husband, Nr Evesham, Worcs.

```
>LIST
  10 READ A
  20 IF A=999 THEN END
  30 SOUND 0,A,14,15
  40 FOR X=1 TO 50: NEXT X
  50 SOUND 0,0,0,0
  60 GOTO 10
  70 END
  80 DATA 47,60,60,60,47,60,60,60,45,45,47,47,53,0,45,45
  90 DATA 47,47,53,53,35,35,40,45,47,53,60,999
```

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SOFTWARE CITY

SPECTRUM

I HAVE written an all machine code "white noise" generator. The routine uses "OUT 254" in machine code, going through the ROM and outputting all the numbers to port 254. The routine is stored in a REM statement and when disassembled takes the form:-

```
23670  LD BC,0      point first memory into
                    BC
       LD a(BC)     get contents of (BC) into a
       LD c,a       put a into e
       LD a,7       put border colour into a
       OR e         mask last three bits to
                    equal 111 (BORDER 7)
       OUT(254),a   output to speaker,
       LD a,55      contents of a
                    put last memory address
       CP B         (of ROM) into a
       RET Z        compare it with B
       INC BC       return to Basic if the same
                    increment memory
                    address
       JP 23763     jump back to start
```

To get the routine into the computer, simply type in the following:-

```
  1 REM at least 20 characters
here
  10 FOR f=23760 TO 23777
  20 READ a: POKE f,a
  30 NEXT f
  40 DATA 1,0,0,10,95,82,7,179,2
11,254,62,55,184,200,3,195,211,0
2
```

Once run, line 1 should have turned into garbage. Now delete lines 10-40. The program has used the ZX-81 trick of storing code in REM statement, so that it can easily be merged into other programs. To call the sound effect, type "RANDOMISE USR 23670". If you wish to amplify the sound, connect the "MIC" lead to the recorder, disconnect the "EAR" lead, turn the volume right up and press PLAY.

Kai Weber, Reading, Berkshire.

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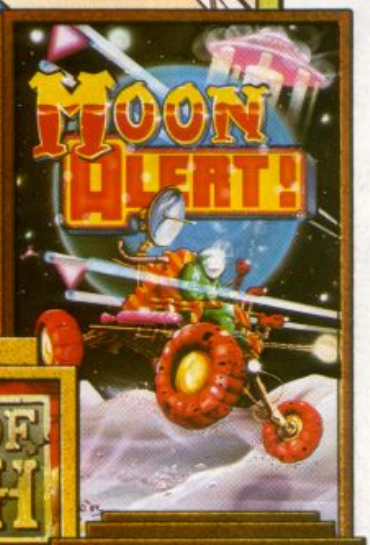

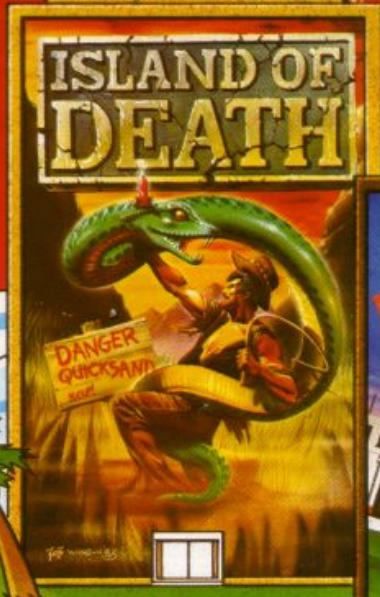

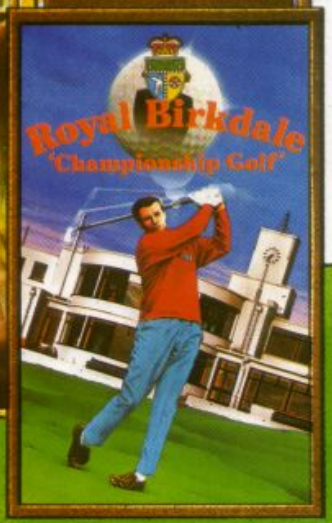

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