

JUNE 1982  
75p

# COMPUTER & VIDEO GAMES

**OWL**  
THE BBC MICRO  
MAGAZINE  
ISSUE ONE INSIDE



**WORLD  
CUP  
MANAGER**

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World Cup Competition

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### HELICOPTER LANDER .....67

Test out to land a P-51 helicopter on 32 or 64 rig in a changing world. A new twist to the popular "landing" series of games.

### DOG BEAR ADVENTURE .....68

Strike back at the Empire in a Bear Wars style adventure for Teddy owners. Your task is to rescue the orphaned of General Doom and rescue Princess Layla, leader of the Forces of Freedom.

### SONG .....83

Escape around with Barney — and help save his life on the Atari.

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### SONG .....83

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## World Cup

Kick into the World Cup semifinals and you're 2-0 down to Czechoslovakia...

If you thought that was the kind of pressure which could only be put on Pro Greenwood this summer, you hadn't reckoned with our World Cup Manager game. It puts on the Story-MAKE but without a PEEK or a POKE. An opponent with enough memory should be able to convert it.

Your task is to try and win the World Cup with Brazil's team. With El Salvador, it's backtracking — but just about possible.

This is your chance to get Over the Moon or Sick as a Pastor area before the World Cup proper kicks off. Page 32.

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Please drop in a line at: Computer and Video Sales, EMAP, Central House, 8 Mark Lane, London EC3R 8AB.

## SINCLAIR'S NEW BABY

Dear Sir,  
I have heard a good deal about the coming of a Sinclair ZX80 microcomputer. Is it going to be out this year and if so will it be compatible with the ZX81. If the ZX81 users can't upgrade our machines into ZX80s, then how much will this new one cost. Please can you help as I have read no many convincing reports about this machine.  
T. Robinson,  
Falcon Wolden,  
Essex.

**Editor's reply:** The ZX Spectrum has already gone into production at the rate of 20,000 units a month. Clive Sinclair said it would be available to the public within a fortnight of entering the machine.

It is on sale in two versions. The HE memory computer sells at £125, while the HE machine costs £175 inclusive of VAT. If you want to upgrade the HE version you can do so by buying an internal expansion board which will cost about £35.

The ZX Spectrum isn't compatible with the ZX80 at present, but all the 81 software will run on the new computer with minor variations. It is only slightly larger than the ZX81 with a calculator type keyboard instead of the sensory keys featured on the ZX81.

The ZX Spectrum incorporates high resolution colour graphics, more memory capacity, a sound generator, a 40 key ASCII keyboard and upper and lower case.

Not only is it compatible with ZX81 software it also has a special port for linking up the Sinclair



The Sinclair Spectrum

printer, and can be plugged directly into an ordinary PAL television set.

Clive Sinclair claims the Spectrum is more powerful than most of the

microcomputers now on the market — including the B.B.C. models A and B.

The most interesting part of the new computer is the disc drive called the ZX Microdrive, which will be available for the machine in a few months time. Manufacturing about 4" x 4" it will provide data storage on floppy discs, and the units can be stacked onto each other giving extra capacity.

Although there is no software specially for the Spectrum at present, Sinclair plans to introduce some later.

## SELLING SOFTWARE

Dear Sir,  
I am writing to enquire whether or not there is any law preventing the sale of software from a private residence. I have written several enjoyable 16K ZX81 games — including a graphics-adventure — a time management program and a wages calculation program, which I am considering selling on

tape, from home, or if some law prevents this, to a software purchasing company, the quality hopefully being high enough for them.

Please could you tell me how much, on average, these companies pay, and if there is any law concerning the first part of my letter?  
Gary Dixon,  
Clarendon, Staffordshire.

**Editor's reply:** The only thing that could affect your private sales is the mortgage or rental agreement covering the residence. It might be wise to check this. At the same time you could find problems with the local rating authority if they consider that the volume of business has changed the basic use from residential to business.

However, I doubt if you'll do enough business to worry them, or the VAT man either. You could find problems though if the volume of trade caught the eye of the tax man.

## DEALER'S DILEMMA

Dear Sir,  
In recent months, we have advertised our 800 Byte HE Rom Pack in your

magazine and in this advertisement we stated that delivery could be expected within 20 days.

However, during the past six weeks, many people who have ordered these Rom Packs have had to wait longer than the stated 20 days due to circumstances beyond our control. Over 25 per cent of the initial batch which we despatched were damaged beyond repair by the Post Office and this has concentrated our having the packaging redesigned which caused the delay.

J. G. Lane,  
Computer Aided Printing Services,  
Petersfield, Hampshire.

## AUNTIE'S MICRO

Dear Sir,  
I have received your magazine since the first issue, and have noted that there have been no programs dedicated to the B.B.C. micro.

At the moment I am awaiting delivery of my model K, and feel that it is a great pity that this micro seems to have been overlooked within your pages.

E. Stephenson,  
Cottonwood,  
Cumbria.

**Editor's reply:** After a slow start, there are now enough B.B.C. Microcomputers finding their way out to the public to justify publishing listings for this machine. For from "overlooking" the machine we have been very conscious of the need to cover it but felt we had to wait until sufficient machines were available. Due to the nature of this magazine Mr Stephenson for our first look at what is going to be a very popular microcomputer.

# The best enhancement yet for the ZX enthusiast - for just £9!



What is the best way to guarantee that you never become bored with your Sinclair computer?

The answer is to subscribe to *Sinclair User*... written specifically for owners of ZX 801s and ZX 81s. *Sinclair User* is the latest monthly from ECC Publications - pioneers of *Practical Computing*, *WHICH COMPUTER?*, and *Computer & Video Games*. Whether you bought your system yesterday or are an old hand, you are probably an enthusiast for your machine. And your biggest problem is likely to be obtaining all the information to satisfy your interest. We promise that *Sinclair User* will be devoted entirely to quenching your thirst for information.

Issue one is published on 1 April and is an absolute must for *Sinclair* devotees. So make sure you guarantee that you get your copy by taking out a subscription **now**.

As the name suggests, the content will be geared specifically to helping the user. There will be pages of information on available hardware and software. Our expert writers will analyse established products to help

you make the right choice. There will be exclusive pre-release snippets on products which are about to hit the market. Our aim is to make *Sinclair User* invaluable and we will chronicle applications which are of special interest.

For example, in the first issue we will look at business applications and we visit a school where the pupils are having the time of their lives using their Sinclairs. Each month we will carry eight pages of programs. *Readies* must be every user's one first-rate helpline service. And we intend to carry as much information as possible about clubs.

Last but not least let us say that the best way you can guarantee you like the magazine is by participating yourself. Don't forget to ask us your queries; send in your programs - for which we will pay £30 if we publish and be sure to tell us if you are using your ZX 81 in a special way. Send in your club news and tell us of any interesting people out there in use. And just in case you need further convincing, look at the editorial plans for the first six issues.

Can you continue to get the most out of your ZX, without reading the *Sinclair User*? So why not fill in the subscription order form today?

## Editorial Plans

### April

Hardware reviews  
Software reviews

### May

The Sinclair 128 RAM  
discovered  
Advanced games programs

### June

Diets - a look at the  
scene

Graphics software

### July

The ZX80 memory chip  
examined  
Shipping programs

### August

The Sinclair printer  
and its alternatives  
Class programs

### September

Enhancements for the enthusiast  
to a printer, sound,  
high resolution, speech or  
business software  
for the ZX80

I would like to start a subscription to *Sinclair User*. I understand that I may cancel my subscription at any time and you will refund the balance. I enclose a cheque for £9 for 12 issues (UK only, including postage).  
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# sinclair user



# MAILBAG



## CRASHING PROGRAMS

Dear Sir,  
I happen to be one of the many people who received a ZX81 for Christmas. When I key-in one of the games for the ZX81 and start playing, the system quite often crashes, why? If it is because it needs a large memory then tell me what a hardware is and where to get one.

When trying to program a Breakout game, I managed to get a ball bouncing around the place and get a hit on the bottom but then I ran out of memory. Could you please put in your magazine an article on saving space specially for the ZX81?

Also on the side of the ZX81 there are some holes for plugs, two of them are for recording but the cassette recorder I have comes to have a five-pin socket. Could I take the ZX81 apart and fit a new five-pin socket? I already have a line.  
J. Sebore,  
Walsley,  
Kent.

Editor's reply: You don't say whether you are using a RAM pack. If not, then there is something wrong with the system and it should be exchanged. If yes, then make sure that it is well supported and does not get moved whilst in use. A momentary disconnection at the rear will lose all data.

The ZX81 needs a fairly high input/output voltage for record/load. A five-pin DIN socket, as you describe, would probably not give an adequate signal. You must use a tape recorder with phono sockets — just like the ones on the computer.

## GETTING IT TAPED

Dear Sir,  
I am the actual owner of a ZX81, finding it more than ample for a home computer. I now wish to purchase a tape recorder mainly for use with the ZX81 and wonder if you

could advise me on the best machine to buy.  
I would be interested to know if the Vix cassette unit would be compatible with the ZX81 and if I could expect better reliability than with ordinary tape machines.  
P. Macey,  
Caversham,  
Kent.

Editor's reply: There are several cassettes on the market, but if you want to be sure about compatibility it is best to get one which was built for use with the ZX81. The ECR81 Enhanced Certified Recorder is available from Heathkit Electronics at 17 Church Street, Caversham, Reading.

I know better than to say that it is impossible to guarantee the Commodore cassette unit with the ZX81 but it would be difficult in the extreme. The unit was built especially for Commodore products. It is fast, and more reliable, to use the recorder recommended by Sinclair. If you want a list of these you should get in touch with Sinclair Research.

## OF REMS AND ROMS ...

Dear Sir,  
I am only 13 years old and I took up computing when I first saw your excellent magazine in my newspapers.

I have a few questions to ask. In programs containing machine-code I have seen the particular machine-code routine stored in ROM statements but I thought that ROM statements were ignored by the computer, so how is the machine-code carried out?

I am thinking of purchasing a new 4K graphics ROM module from UK-Imports. I have heard that it contains a full set of Space Invaders graphics characters, and I am wondering if you could print an in-house program for people with this ROM?

Would it be possible to adopt my ZX81 to colour? If not I would like you to congratulate the artist who

drew the picture in the Sinclair advertisements, because it is extremely realistic!

Would you please tell me which is better, the Sinclair ZX81 or the Atmos Atom. This is a matter of excessive arguments between myself and my friends. I don't care what answer you give but please give one!

I think the ZX81 is extremely good value for money because you can buy a ZX81 complete with 128-byte RAM pack and printer for approximately £170.00 and this is just over the price of a ready assembled SE Atmos Atom.

Also, although the Sinclair manual is very comprehensive, is there any book I could get which goes into everything?

One last question, is it possible to get a keyboard for the ZX81 with a case that it can fit inside. I like this idea because I think it will look better and improve your programming speed.  
M. Stewart,  
Ray,  
Lancashire.

Editor's reply: The ZX81 has an interesting way of using ROM statements when in line 1 of a program. Any data after the ROM are put into a special buffer in the memory.

No doubt when a number of people have purchased the UK-Imports ROM sufficient programs will become available.

The extra cost involved in adopting your machine to colour would probably not justify the savings. If Sinclair bring out a colour machine later this year it will probably use ZX BASIC — so upgrading to that would be a better bet.

There are so many books on the ZX81, and most of them leave much to be desired. You will probably have to buy three, or four, to cover most of the possibilities available.

If you look through this, and other magazines, you will see at least six manufacturers of keyboards. Most supply cases to take the ZX81 boards, and at around £30.

## PROGRAMS ON SCREEN

Dear Sir,  
The Games News, Arcade Action, Video Screens and Software Reviews of your magazine are really good and so are the drawings but couldn't we have some photographs of the actual program while it is running? This could also help would be bytes on which hardware to buy.



Finally, who is the little man holding the book on your January issue with the big nose?  
Mr D. Sinden,  
Stroud,  
Kent.

Editor's reply: Game graphics have not always been as exciting and colourful as we might wish. And our early decision to use illustrations instead of screen photographs was based on a belief that through drawings we could capture more of the theme a programmer originally hoped to portray before he was forced to compromise because of limited graphics facilities.

Screen graphics are now reaching new standards and in the future we will not be sticking so rigidly to the illustrations-only policy.

The characters featured on our covers are entirely fictional and any resemblance between the little man with the big nose and persons living or dead, is entirely coincidental.

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## ZX81

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Your ZX81 could look like this

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add-ons).

1K STATIC RAM BOARD for ZX8881 £14.00, 16K RAM PACK £25

1024K RES GRAPHICS BOARD £26 + 102 Pixels 9K RAM on board. Resident software in ROM provides extremely fast hi-res  
features which include MIXED TEXT and GRAPHICS. Screen can be copied to printer £75 + 15 p.p.

## ZX SOFTWARE

DEPENDERS, ROTTERDAM, £3.50 each. INVADERS PLANETSIDE, NIGHTMARE MUSIC, DRAGON MADE LIFE £6.00 each.

CONSTELLATION £7.00, DECTAYOR £7.00, STAR TRIP, BUMPER 7 £6.00 each and more

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# ITION COMPETITION COMI

Can you Beat The Bug on our give-away front cover puzzle and win a BBC Microcomputer?

A much-sought-after BBC micro will be despatched to the winner of our Beat-the-Bug competition.

The puzzle can be done without a computer. Just punch out the small tokens on the bottom of the card and place them on the puzzle as instructed. Then the task is to move the data from computer 2 into computer A and replace it with the data from computer A.

But there is a Bug floating about to make things awkward. The rules of the puzzle are:

- Move two pieces of data first, then move the Bug.
- From here data and Bug are moved alternately.
- Data can only move towards its destination.
- Only one piece can occupy a location at any time.
- The Bug can move in either direction.
- Moves are along the lines to neighbouring locations.

It may look deceptively easy but it does take some careful thinking to work out the answer. Move impatiently it should take a good deal of careful thought before attempting a program to solve it. It is more difficult than the four octagons puzzle we set you with in our first issue. The response to that first puzzle took us by surprise — we weren't expecting 800+ solutions — but this time we think we're ready for you.

We are working out a reasonable time to solve the puzzle so please write on your program how long it takes to come up with the answers.

The objectives are first: to produce the best program to solve the puzzle; to find out how many solutions there are; to find out how many distinctly different solutions there are (discounting reflections and rotations) and what the shortest solution is. Finally to discover if it is possible to get the Bug to end up in the middle or not.

The program will be judged on the following criteria: Does it run correctly (Bug free)? Does it find the solutions? How fast does it



**NEXT**  
**SINCLAIR**

Furman gave arcade managers plenty of food for thought. In America it was the first video

game which proved attractive to women and brought a family touch to the video industry.

In such a male-oriented world as the video industry we wondered if British arcade owners will follow the American business thinking which has since spawned Ms Furman! Are women worth exploiting? We find out in July.

Intobep the pyramid builder is our featured game next issue. Upon the desert of the east, the first pyramid was raised and the strain on the entire country was great indeed, can you guide your workforce of 1000s to success in the desert?

Contra Royale, Solitaire and Missile Command also feature — in our games listings.

The Frontal page features a long look at the recent competition to produce a Sinclair download. Find out about Telesoftware — it could change the face of personal computing.

The Spectrum will always be the Sinclair 90 to owners of that company's earlier models. It's potential is obvious but is it going to take over from the ZX80 and, if so, how quickly? Our July issue will include a 16 page supplement for Sinclair owners.

From those who still haven't exhausted the possibilities of their ZX80, to those who have a yearning for a Spectrum. Something for every Sinclair user and everyone who has been keeping more than one eye on this innovative company.

Keep an eye out for our July issue of the newsgazette or order your copy now.

find a solution? Does it find all solutions and how quickly? Concise programming. Good use of memory space. Imaginative algorithms. Is it well contained? Presentation.

Write the program on any sort of computer, or just in plain Basic and send it on a listing or a cassette to us before June 18. We will include a way of solving the puzzle next issue — just to prove that it is possible.

Send it in to Computer & Video Games, Durran House, 8, Herbol Hill, London EC1R 5B. The judges' decision is final and no correspondence can be entered into.

Make sure you include a name and address and the time the program takes to find one solution. Also be sure to let us know what machine it runs on.

The 15 pieces in our special free Starwell game were very swiftly filled after the May issue found its way into the newsgazette.

Our 15 computer moderated gamers are: David Johnson of Stoke, Paul Rayburn of Littleborough, Steven Draper of Solihull, Marcus Rowland of Westbourne Park, Paul Hardy of St Anne, Anthony Shephard of Barnsley, Seven Shible of Stockport, G.P. Goodwin of Stonegate, Jenny Parsons of Birmingham, I.C. Saxon of West Warwick, Richard Moore of Waterlooville, Stephen Loughran of London NW5, Mark Wapcott of Witley, Anne Bradley of Birmingham and Bernard Andrews of Manchester.

For the many people who entered but were not lucky, we are looking into the possibilities of running a much larger computer moderated game in the future.

It is essential that you use an original subscription. Applications should be sent to the Editor, Computer & Video Games, Durran House, 8, Herbol Hill, London EC1R 5B.

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

**Computer & Video Games.**  
The magazine that makes computers fun.



# ITION COMPETITION COM

## WHO'S GOING TO WIN THE WORLD CUP?

In conjunction with the Silico Shop, we are hoping to add a little more spice to your World Cup viewing this summer.

There's a chance to win an Atari 3600 T.V. Games Centre complete with the soccer cartridge, or a £100 to spend at the Silico Shop, one of the leading stockists of T.V. and electronic games.

All you have to do is pick out the World Cup champions, runners-up and the beaten semi-finalist which wins the third place play-off.

If you are spoilt for choice, there will be no shortage of soccer pundits eager to give you their views on the matter.

And you only have to enter to be sure of winning something! For on top of that first prize and two consolation prizes of Atari soccer cartridges or £30 vouchers, there is a £3 voucher for everyone who enters. This can be spent at the Silico Shop 1-4 The Mews, Hatherly Road, Sidcup, Kent or by mail order.

We're not eligible to enter but if you want our advice it's Scotland, England and Northern Ireland (but not necessarily in that order). But you may want to choose another combination.

And if, in the unlikely case, that our three make early exits from the competition, then you'll



still have some interest in following the World Cup through to its well-telvised end.

You could even key-in our own World Cup Manager game and check to see if your prediction came true to form.

We have included three World Cup questions which will be used on a tie-break if the result of the competition is so predictable that more than one reader guesses correctly. And we need to know whether you want an Atari system and cartridges or would prefer a voucher, so please fill in all the entry form below and send it off to the Silico Shop. To receive a £3 voucher, include a stamped addressed envelope with your entry.

### COMPETITION RULES

- 1) No employees of Computer & Video Games, Silico Shop, or their relatives may enter the competition.
- 2) All entries must be on the original coupon, not a copy thereof. Entrants must complete the entire entry form to be eligible.
- 3) All entries must be postmarked no later

than June 15th 1982. Any entry which is incomplete, illegible or late will be disregarded by the judges.

- 4) The judge's decision is final and no correspondence will be entered into, in the event of a tie the first correct entry drawn will be the winner.
- 5) Only one prize per entry will be awarded and no cash alternative will be offered.
- 6) Winners are selectable either by visiting the Silico Shop, 1-4 The Mews, Hatherly Road, Sidcup, Kent or by mail order. Winners are valid up to 31st October 1982.
- 7) Winners will be notified by post. A list of winners will be printed in the September issue of Computer & Video Games.

### WORLD CUP COMPETITION

Using your skill and judgement, write down who you think will finish:

WINNERS .....

RUNNERS-UP .....

THIRD PLACE .....

In this year's World Cup competition?

1) Which country currently holds the World Cup?

2) Which is the only country to have won the World Cup three times?

3) Who is the only player to have scored three times in a World Cup Final?

Do you already own a T.V. game? ...

If so which system do you own?

If you wish you may either have the Atari TV Games Centre and cartridges or the voucher?

Game  Voucher  (please tick)

Name: .....

Address: .....

Post Code: .....

Send your entry, including an S.A.E. to: World Cup Competition, Silico Shop Ltd., 1-4 The Mews, Hatherly Road, Sidcup, Kent DA14 4DD.

Closing date for entry is Friday, June 18 1982.

## BRAINWARE ANSWERS

The answer to our May Mind Boutsie problem is Question one, 2011 Question two, there is no solution to this one; Question three, 4,630,937,683.

The correct solution to last month's Nevra Crossword is printed right and the winners' names will be published in next month's issue.

For more puzzles to tax your brain turn to page 17 for this month's Mind Routine and Nevra Crossword.

FO RTH LANGUAGE  
 A E O A L R  
 C X GALAXIAN  
 TILT G I  
 O PSEUDO MODE  
 RI P S I E  
 S O L A H A T T A C K E R  
 N E C I R M U  
 S A V E M I C R O N N  
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# Brainware



## MIND ROUTINES

Finding the pathway through this alphabet maze should set your braincells buzzing.

Each square contains a letter and a number. The number shows how many squares can be travelled to reach the next destination. You only "visit" a square when you stop at it and take its numeric value for your next move.

Starting from square E (labelled Start) and moving either horizontally or vertically — not diagonally — by the number of squares indicated, you must visit each square on the diagram once.

No square should be visited more than once and you must finish at the G (labelled Goal) square.

For example your path could start SEDE...

What path should you take to achieve your goal?

A	B	C	D	E
F	Goal	H	I	J
K	L	M	N	O
P	Q	R	Start	T
U	V	W	X	Y

## WIN OUR CHAMPAGNE

The champagne winners for our April issue are hemispheres apart. We have one for them and one close to home.

The Mind Routines winner is Mr I. Devine from Westville 3030.

Natal in South Africa, who correctly pointed out that the number of stolen bags was 1399.

The Nevada Crossword winner was Mr S. F. Huxley of Russell Court, Woburn Place, London WC1 who was first out of the hat with a correct entry.

Bottles of champagne are on the way to these both.

Two more bottles of champagne are up for grabs this month for the first two correct answers out of the hat for this Mind Routines puzzle and the crossword below.

Please send your entries to Computers & Video Games, Durrant House, 8 Herbet Hill, London EC1R 5B to reach us before June 13.

The answers to our May issue's Brainware problems can be found on page 11.

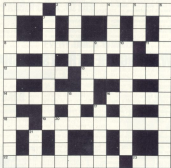
## NEVERA CROSSWORD

### ACROSS

1. Lettuce function (2)
2. Getting the program working with gravity on the end of the french insect drink (5)
3. Game for a school teacher's brain (10)
4. Ego initialization of data (2)
5. Ten inside ten back and one for I terminator (4, 1)
6. Jubilee LP CD? (3)
7. Flaps produced by Vic (7)
8. Jump the beginning of the program (3)
9. Tool missing the ducks race (2)
10. Tols-off the centre forward in novel warfare game (3, 7)
11. Syntactical significances not of charges (6)
12. Annoy the glitch (3)

### DOWN

1. Letter sent by modem (13)
2. Gateway to the program? (2)
3. Comic proceed after break (4)
4. Print without quiet function (2)



5. Play Wizard's Quest for example, going around counting high class King (2, 11)
6. Cavalier restless mixed into rime (3)
7. Anger clipping point from the wire (2)
8. Enterprising crystal (6)
9. Our latin GIMO system constant (2)
10. Polish and cease (3)
11. Go-a singular ?? (1, 4)
12. One piece of hardware (4)
13. Basically assign or rent (3)

# NEW PRODUCTS NEW PRODUCTS NEW PRODUCTS NEW PRODUCTS

# GAMES NEWS

## MASTERMIND THE DEFEAT OF WARLORDS

MS-DOS 7

Control Technology have just brought out seven good quality games programs on one cassette.

The first of these is Breaker — an extremely colourful version of the game with good sound effects.

Countdown 2000 is the second game on the cassette. It is based on the film of the same name. During the game you have the unfriendly task of knocking down as many pedestrians as you can.

Soundz is a mini-driven program and is far more serious one than the other games on the cassette. It can produce all sorts of sound effects from sounds of nature to engine noises.

In Mindzoo you have control of an astronaut and you must dodge the warlords that hurtle by him or her in space.

The Mastermind program runs along the lines of the original board game and is in full colour.



Squash could turn you into a champion or make you feel like a lone loser — just like the real thing.

Finally, Warlords turns you into the master of a castle that is being attacked with huge footmen. You have to try and stop these footmen from demolishing your castle.

MS-DOS 7 is available from Control Technology on cassette. It costs £5.95 and runs on the unexpanded Vic-20.

## BEWARE THE WANDERING WUMPUS ...

WUMPUS

The Wumpus is a deadly creature which lives in a cave system and no-one has ever seen a live specimen.

This is because the revving Wumpus must be successfully tracked down and shot before the hunter actually sets eyes on him.

Certainly the Wumpus is a very tough alter creature. It smells abominable, but that can help the Wumpus hunter.

The object of Starpoint's new

version of Wumpus is to search for and kill the Wumpus. But your speed is made more difficult by deep pits and Superbat's.

At any time you may tumble into a pit and plunge to your death.

If you manage to miss the pits a Superbat may swoop down and pick you up. Once again you could find yourself falling into a pit, or into the open mouth of the Wumpus.

One occasion you are given is an "I smell a Wumpus" warning when you are one or two rooms from the beast.

When you encounter the Wumpus you have one chance to shoot it with your created arrow, or die in the attempt.

Wumpus comes from Starpoint and the cassette costs £5.95.

## SURPRISING ATTACKERS

2X GALAXIANS

Orbits of the 2001 would not believe that an arcade game such as Galaxians could be transferred to the Sinclair — but now it has happened.

2X Galaxians has all the usual features of the game. The Galaxians move across the screen and you have to hit them with bullets from your base ship at the bot-

tom of the screen.

The Galaxians swoop down in random formations and drop bombs, trying to destroy you. You have four lives which are indicated on a scoreboard at the right of the display.

The board also shows you who has scored the greatest number of hits in a game. The Galaxians also have the task of surprising the player. One minute you think that you have nearly finished them off and the next, more Galaxians arrive.

If you manage to score more points than anyone else has the computer will ask for your name and will display it in the highest score box until someone else beats it. The graphics are very good.

2X Galaxians runs in 10K and is available on cassette from Arts Computing. It costs £5.95.

## WALKING THE STREETS OF SHAME

It's naughty but nice! Hobbes has brought out a game called The Naughty One which allows the players to indulge in all kinds of illicit activities in bars, gambling dens, and houses of ill-repute.

You can earn yourself a slave or get parts of your opponents bodies. But paper money will not buy what you want — you have to use items of your own clothing.

The bank manager is no generous figure of respectability either. He is a gambler. If you get too debt with him you could lose all your clothes.

THE NAUGHTY ONE

You can unleash your appetites by gambling for their clothes. In sections set up by the gambler. You can go into big businesses with such profitable enterprises as message parlours or worse.

You can also give out naughty texts to other players to perform. But be careful. The other players can do all these things to you.

But this is a game in which you can lose more than your clothes.

You could also be seduced — and there are a few other surprises in store.

The Naughty One is produced by Hobbes. It comes in two versions. The mini or cassette version is available for the Atari and the 2001 at £9.95. The main version comes on diskette and requires 10K. This is available for the Atari and Apple II. It costs £24.95.



# NEW PRODUCTS NEW PRODUCTS NEW PRODUCTS NEW PRODUCTS GAMES NEWS

## NOW FIND A FRIENDLY MONSTER...

### SWORD OF PEACE

The king of a far off country has died and as his heir you must prove your worth by going down into a mine that is crawling with monsters.

Artic Computing's *Sword of Peace* is a classic adventure game. You must move around the maze, entering sets of maze co-ordinates, to find the objects of state. These include the Orb of Stars, the Rubic of Stars, and the Sceptre — and finally the *Sword of Peace*.

The game is played on several different levels. When you find an object you are automatically



transferred to the next level of the maze.

The monsters are divided into two categories good and bad. You can actually have a good

vampire! To begin the game you are given a series of four spells which you can use against bad monsters.

Your first two encounters with

good monsters are very advantageous. First, you are given a direction metre. This tells you the number of moves you are away from an object. Nothing is ever that easy though.

The direction metre only gives you one number to use. For a co-ordinate to work you need two, so you do not know whether you are moving in the right direction.

This is remedied in your second encounter with a good monster. It will give you a direction metre which shows two numbers. This shows you the number of moves you need to make in each direction before coming across the object. Combined with the first metre it is invaluable.

Good monsters can also teach you spells. They are not guaranteed to work and you can lose a lot of points during battle. When you have been through all the levels of the maze and have all the Objects of State you set out and are proclaimed as the new king.

*Sword of Peace* runs on the ZX81 8K, and is available from Artic Computing. The cassette costs £5.95.

## HOW THE KINGS AND PAWNS COME TO LIFE

Many people have complained about the graphics capability of the ZX81. Now this seemingly impossible has happened. You can play high resolution chess on a Sinclair.

ZX Chess needs a few pieces of hardware to produce the graphics but the effect is really startling. The board display shows in clear detail actual chess pieces as they look on a real board and not just capital letter representation.

The hi-res graphics version

### ZX CHESS

needs three pieces of hardware. These are the Graphics mother-board, connector, and character generator. The price of these items is not too high for the effects that you can produce.

It is also possible to play ZX Chess 2 without the enhanced graphics. There are seven levels of play. Four of these can be used within competition time limits. You get the option to play black

or white using all the legal moves including an en-passant.

ZX Chess needs 18K and is produced by Artic Computing and is available at £10.95.

## EVERY ONE A WINNER!

### OTHELLO, CHEQUERS AND CASINO

Kuma Computers are really confident about their new versions of the three oldies for the Sharp SA2 80K. They want to know who the best person to beat their Othello or Draughts is.

Othello boasts good quality colour graphics representation of the eight playing board and 64 double sided playing counters.

The game is between you and the computer. As well as the good graphics the game also has a quick response time and does not keep the player waiting too long when making a move.

The Sharp version of Chequers, or Draughts, also has a good response time. The colour graphics are good, showing the traditional checkered board and pieces.

Finally, Casino is a new version of a game of Draps. Cash is essentially an American game which is played in the glittering casinos of Las Vegas.

If you fancy yourself as a gambler and cannot afford the airfare to

LA, then this game is for you. All three games are available on cassette from Kuma Computers. Othello and Chequers cost £10.95 each. Casino is £14.95.



## THE EMPIRE STRIKES BACK

### THE FALL OF THE ROMAN EMPIRE

Nero fiddled while Rome burned — but now there is a chance for you to change that city's history.

The Fall of the Roman Empire transports you back to Europe during the dangerous days of 69 AD. It shows you to play at being a Roman emperor for 30 years, or more.

You have control of the vast legions of Rome and the cities that you have gained by conquest. The people of those cities must go back to you.

The only problem that you have is the little matter of invading Rome, who launch attack forces at you from Germany.

They attack your troops and cities, murder the people of your cities and burn the buildings.

From those cities that escape the Huns you may raise taxes to pay for damage done by the invaders. You can also replenish your battle weary troops, building them up for another confrontation with the enemy.

The game gives you 30 years in which to either rise or fall. You could find yourself ruling either than changing history.

The Fall of the Roman Empire is supplied by Program Power and runs on the Aztec Atom. The cassette is available for £5.95.

# MAZOGS



## A MAZE ADVENTURE GAME FOR sinclair ZX81

### MAZOGS

is a brand new game for the Sinclair ZX81, unlike any other game you've seen on the ZX81. This is without doubt the best game available for this computer, and if you don't believe us, ask somebody who has seen it, or go down to your local computer shop and ask for a demonstration.

MAZOGS is a maze adventure game with very fast moving animated graphics. A large proportion of the program is written in machine code to achieve the most exciting graphics you have ever seen on the ZX81.

You will be confronted by a large and complex maze, which contains skeletons within it, glittering and fabulous treasure. You not only have the problem of negotiating treasure and bringing it out of the maze, you must also face the guardians of the maze in the form of a force of fearful swamps. Even if you survive these attacks you could still prove to die if you get hopelessly lost. Fortunately, there are various ways in which you can get help on this dangerous mission.

There are three levels of difficulty, and the game comes complete with comprehensive instructions. The cassette on which the game is supplied is of the highest quality, and loading is guaranteed.

Mazogs is available from Bug-Byte and most good computer shops at £10.00 inclusive.

# BUG-BYTE SOFTWARE

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# NEW PRODUCTS NEW PRODUCTS NEW PRODUCT

# GAMES NEWS

## DON'T GET RATTY IN THIS MAZE

### RAT RACE

When it comes to sniffing out a ripe grapefruit, there's a new breed of Commodore mouse which is positively ratty equipped.

Mind you, he has to be to survive in the dangerous mazes of *Rat Race*. One of the most compulsive and well contained computer games around, *Rat Race* gives a great deal to the arcade game *Rally 3*. Only the theme has been changed. Instead of racing cars the contestants in *Rat Race* are a lone mouse and steadily rats and cats.

The mouse's aim is to survive long enough to consume every cheese in the maze. And the ants of it of a cracking pace with three rats in close pursuit. To throw the rats off his trail he can lay a fake scent which confuses them and gains him time. But one it springs as it takes so valuable time.



There are 10 cheeses in the maze, the first is worth 100 points, the second 200 and so on. But there is one super cheese which is worth twice the normal value and it is advisable to eat this one first as it doubles the score for all the remaining cheeses.

When all 10 cheeses have been eaten the mouse is given a bonus score for remaining time.

But you couldn't have a mouse game without a sprinkling of cats.

The black cats are sprinkled

through the maze, and although stationary, they must be avoided or they will cost you one of your three lives.

An ordinary mouse could not be expected to live for long in this environment but the Mousus Commodore has evolved a sophisticated radar system which displays the whereabouts of cheeses and rats.

The game comes in cartridge form for the VIC-20 and is produced by Commodore. It is available from its dealer network at £13.95 plus VAT.

## ESCAPE FROM A DOOMED PLANET

Watch out for this mammoth new game for the Apple II. Called *Time Zone* it lives on six diskettes and allows the player to travel in time over several million years.

The Earth is threatened with a war that it cannot survive. As a citizen of the planet you sweat your doom outside your house. The year is 1981 A.D.

Near the house is a meadow

### TIME ZONE

which you go to investigate. There is a strange round object in the middle of the meadow. You walk up to it and look round it cautiously.

There is a door in the side of the object. No-one seems to be watching so you gently push the door open. Suddenly reality

becomes blurred and you find that you are in time again. You could be transported anywhere.

The makers say that the game could take anything up to a year to play as both sides of the diskettes are used in the game, so you would need a lot of time on your hands in order to play it properly.

*Time Zone* is available from S&S software and costs £29.95.

## JELLYMEN ARE A REAL NIGHTMARE

### JELLY MONSTERS

Children's parties will become a much more sinister affair after playing the game *Jelly Monsters*.

The VIC-20 version of Pac-Man gets under this name and features the monsters on its cover — and a pretty nightmarish touch they are too.

With a maze full of dots, four monsters and four large eating-up stars, the game follows the Pac-Man format.

The small dots are worth 10 points each, the large dots are 50 points each and whenever one of these is eaten, the chasing *Jelly Monsters* turn blue and you have a brief respite from their constant pursuit.

This is your opportunity to chase and eat them.

This is a Commodore cartridge for the VIC-20 and joins a growing library of games in this form, presently standing at eight. Also new but are *Road Race* and *Star Battle*.

*Road Race* gives you a set time to travel as far as possible up a winding road, marked only by posts on either side. It is similar to the night driver arcade game.

*Star Battle* is the equivalent of *Galaxian* with a hovering group of bat-like space creatures flying in formation at the top of the screen and a lone laser base firing from the bottom.

The Commodore plug-in ROM cartridge cost £13.95 plus VAT.



# TV GAMES CENTRES TV GAMES CENTRES TV GAMES CENTRES

# VIDEO SCREEN

## BECOME A KING OF THE ICE

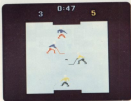
### ICE HOCKEY

Experience the excitement and rough and tumble of ice hockey and without collecting the bruises.

Ice Hockey sticks to the traditional idea and comprises of two teams playing with a puck on the ice rink. It's quite possible for the players to finish the game in a bloody fight — which often happens in real life games! It's even more likely with the absence of a referee and without any penalties given to the teams.

Both teams have a goalie providing defence and a forward player to perform the attacking role. The puck can be passed from player to player and each one can shoot from various angles.

The players have a number of tricks up their shoulder-padded sleeves to collect and out ma-



noeuvre their opponents. They can knock each other down in an unobtainable attempt to take possession of the puck, they can tackle in a variety of ways by body checking, and tripping, and they can also use their stick handling techniques to win the ball.

There are also game variations allowing you to speed up the

movement of the puck for an extra test or slow it down.

Ice Hockey is produced by Activision for use with the Atari Video Computer System and will be on sale from stockists in June. It costs £29.95, which is more expensive than others because of the extra memory used in writing the game and the greater sophistication achieved.

## ATTACK OF THE ALIEN MARAUDERS

### GALAXIS

An advancing troop of alien marauders armed with deadly laser weapons are attacking your space outpost. You must destroy the aliens before they get your ship.

In Galaxis you must fight off wave after wave of invading creatures.

This game is a version of the arcade game Galaxix. Your ship is given three chances to build up the highest score possible. A series of invaders move across the top of the screen and suddenly peep off in formation swooping down towards you.

Master ships also join up the invading ranks and these perform a similar swooping action in an effort to out-maneuvre your space fighter.

bonus ships are given when you reach a certain number of points and the game gets more difficult as it progresses. The more aliens you blast out of the sky and the more waves you complete the faster the subsequent attack will be.

This is the latest game out for the Interton VC4000 television game centre. It's a UK ROM cartridge and can be found at most UK stockists for £19.95 from June.

## POWER IS THE NAME OF THIS GAME . . .

A world war is being waged with one country trying to conquer the earth.

Two armies battle it out both on the video screen and on a board in this second game in the Master Strategy series for the Philips 61000 game centre.

In Conquest of the World a knowledge of strategic playing is vital. The object of the game is for the two opponents to capture as much enemy territory as possi-

### CONQUEST OF THE WORLD

ble, using armies made up of tanks, battleships and submarines not to mention troops.

This is the follow up cartridge to Quest for the Rings in which you use a game board to position your armies and work out logistics, while you watch land and sea battles take place on the screen.

The theme of this war game is a confrontation between the world's super powers in a bid to achieve world domination. Representing the real life relationships of countries during the

early 1980s is the board, mapping out the lie of the land and the deployment of forces. Using the game board you can keep track of the whereabouts of all your troops.

When one of the players has conquered the other and achieved the position of world leader the game is over.

Conquest of the World is scheduled for a June release by Philips in the UK.

The price will be £29.95 approximately.



# ES CENTRES TV GAMES CENTRES TV GAMES CENTRES VIDEO SCREEN

## ARCADE ACTION FOR ADVENTURERS AND SPACE ACES

April is sticking to the winning idea of producing versions of popular arcade games.

Defender is scheduled for release during the summer months and is a re-rendering of the arcade favourite. Planning to attract fans of the original game Atari is bringing out a similar version which will sell for £29.95. One of the more expensive games but it should be one of the more sophisticated.

Yar's Revenge should coincide with Defender's release date if

### DEFENDER, YAR'S REVENGE, EUTOPIA, SPACE WALK

things go according to plan. This game is for gamers with a taste for Adventure, but further details are still under wraps.

It promises to be a test for experienced Adventurers though and also falls into the more expensive price bracket.

A game shrouded in mystery is due out from Ace for the Intellivision television games centre. Called Eutopia it tells of the story of two islands partitioned in the

middle of an ocean. The object of the game is to take command of the two islands, thwarting the opponents' positions.

You have at your disposal numbers of men who can be deployed at various points. Your men can either build tactical plants or build shipping fleets.

For each conquest you make points are up for grabs. Depending on the condition of the frame, or the playing area, the score

differs. To further your cause you, as the ruler, can plant troops on the opposition territory. Ace expects to sell this cartridge for £24.95.

Libertex Space Walk, the other forthcoming addition to the Intellivision software series. With four levels of skill to test your space adroitness you can blast various mannequins from the skies.

There are a number of alien ships and beings for you to fight — including the deadly space wrecks, and the narrow bullets which are fired with a lethal accuracy.

Both these games should be in the shops by the end of July, both retailing for £24.95. £1000 owners should keep their eyes peeled for a new addition to the games range. Already out in America, Monkeyness is a game set to be a barrel of fun.

## WHEN THE WEST WAS WILD!

### STAMPEDE

You'll feel right at home as the stamp is fired at your video screen as you attempt to lassoo a stampeding herd of cattle.

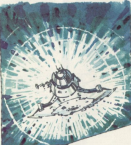
That's the idea in a newly released Activision game for the Atari video computer system. Set in the Wild West the number of cattle you owned represented your wealth. In this game you have to keep that number high.

You control a cowboy riding his range equipped with a lasso. He can only ride on the left-hand side of the screen and at the press of a button he unleashes his lasso to capture a steer.

This requires a good deal of hand and eye co-ordination to judge the distance to successfully rope a steer correctly. The screen is filled with multi-coloured steers stampeding the range and for each one you lasso you score a varying number of points.

Don't let any of them escape your mounted cowboy and except for ropes, it means hot points. Your spooked cow stop the galloping cattle either by roping them or by riding up close to a cow and nudging her back.

Mavericks in the herd make things more difficult. They don't move at all or are bound to wander all to the left hand side of the screen eventually. These wanderers must be lassoed or



you miss out on points.

The magic score to reach is 1,000. Then you automatically receive a bonus horseman. So for the black mavericks to quickly build up your points as they are worth more than others.

The cows move at different speeds and there are interesting features written into the game. When your cowboy's pony runs into a stray steer he'll give an abrupt lurch, and if he stumbles on a rock he'll trip up.

Various skill levels are available and on the higher levels the cows move so quickly it really does become a stampede. The Stampede is available from Activision studios for £19.95.

## FAMILY FAVOURITES

Keep your eyes open for a new home games centre dedicated to arcade games.

Called the Home Arcade Centre it will be on sale at the end of June.

Swindon based HomeArcade is launching its new system with a total of 17 games cartridges, six of which are versions of home-spicing arcade favourites.

The Home Arcade incorporates the hardware used by the Mattel Intellivision centre. These differ from conventional hand

### HOME ARCADE

controllers because they consist of a smaller disc with which you make your manoeuvres. Others are a joystick device.

Retailing at around £89 Home Arcade follows in the footsteps of Hammer's other video games centre, the Intellivision VC4000. According to Hammer the new centre is based on a more advanced system than the Intellivision.

Software for Home Arcade springs initially from a HomeArcade team who then pass it on to an American sub-contractor which designs and writes each program. The manufacturing process is taking place at the Ford's Gininton factory.

Scheduled for launch in June are versions of Phoenix, Defender, Crazy Climber, Pacman, Selectric and Desert.

Plans are afoot to continue bringing out new games cartridges for the new games centre which will be of an equally standard and meet public demand. Future releases include Centipede, Jungle and Galaga.

At the same time HomeArcade will carry on marketing the Intellivision VC4000.





# CHESS



There is more to chess problems than: What Happens Next? It is also possible to ask: What Has Happened?

I left you with two "retrograde analysis" problems last issue with an invitation to look back into the history of the position.

In figure one, the problem is which side made the last move? As with many retrograde analysis problems, the key to solving it is to ask what was the last move. If you try this you will find that white has no legal last move — e.g. Pawn from b4 to b5 is not a possibility — why? But Black has several — e.g. Kd4-c5. So Black moved last.

It might seem that programming a reverse move generator for Chess is straightforward, but in fact it is extremely awkward.

Suppose that White has a Bishop on c8 say. It could have reached there by an ordinary move or by a capture. Alternatively it could have moved to c8 on a promoted Pawn from c7 or on a capture with promotion from b7 or d7.

A Black Pawn on g8 might — in general — have reached there from f7, g7 or h7 but the one on g8 in figure one has obviously come from f7. How can this obviousness be programmed?

As part of an artificial intelligence (A.I.) project, a researcher in Bristol, Brian Alden, has recently written a program which reasons out the solutions to quite a number of retrograde analysis problems.

Among the routines used by the program are the following:  
PCMOV: generates possible reverse moves for a specified side  
LEGCHK: checks legality of reverse moves  
BSCCHK: tests whether a King is in check  
ECHECK: identifies moves which could have placed a King in check  
WHFCAP: determines which men could have been captured on a specified square

CPGTOR: tests whether any pieces are constrained by the Pawn structure

The initial version of the program was written in RT-11 Macro for PDP-11 computer and occupied approximately 5K words of memory. A much improved and extended version in POP-2 for a DEC-20 computer is currently being developed. Neither program is commercially available.

As an example of the program in action, here is how it solves last month's second challenge problem.

In figure two, the rightmost Pawn has been carelessly placed between squares g8 and h2. Where should it be? It is White to move and you know there have been no under-promotions.



To arrive at a solution the program performs the following chain of reasoning. Since Black moved last, PCMOV generates all possible reverse moves for Black, namely Nb1-c3, Nb1-d3, Nd1-b2, Nd1-e3, Ee2-d3 and Ee2-b2.

LEGCHK now checks the legality of each of these moves.

- The Knight moves all place the White King in check, so these moves are eliminated.
- Ee2-d3 places the Black King in check by White's Bishop on e1 — detected by routine BSCCHK. Routine ECHECK cannot find any legal way in which White could have delivered check, so the check is imaginary and Black's move is eliminated.
- Ee2-b2 also places the Black King in check. This time ECHECK returns the following possibilities as to how

such a check could occur. The White Rook could have moved to b5 — possibly with a capture. A White Bishop or Queen could have moved from h3 to c3 to uncover check, and then be captured by the Black King. A Knight move from b4 to c3 is impossible, since two White Knights are still on the board and there have been no under-promotions.

The Queen moves from h3 to c3. Rook moves from b3 or b4 to h3 and non-capturing Rook moves from c3, d3 or e3 are eliminated, since in each case BSCCHK returns the information that the Black King is still in check. This leaves only a Rook capture from c3, d3 or e3, or a Bishop move from h3 to c3 as explanations of the check on the Black King.

Next, WHFCAP is used to determine which Black men have been captured by b5.

- The captured man cannot be the Black Queen's Rook, since that piece is found by CPGTOR to be constrained to move on squares c8 and b8 only.
- It cannot be the King's Bishop, since that piece moves on the wrong colour squares.
- It cannot be a Queen or a Pawn, since either case White would have been in check and there is no previous legal move by Black which would eliminate this check.

This exhausts all possible captures on b5.

This leaves only one possibility: Black's last move was with the King from h3 to c3, capturing a White Bishop which has just moved from h3, discovering check.

The home square of this Bishop is f1. If the carelessly placed White Pawn were on g8 the Bishop would be constrained and unable to leave f1 to be captured. The White Pawn must therefore be on h2 in figure two!

# ATARI SOFTWARE

## DYNACOMP

**FORSETT 1982** Using computer graphics and sound effects, this simulation puts you in command of a private plane from 1920. You'll control the engine, fuel, altitude, and communication. You'll also be able to land, take off, and fly through a variety of weather conditions. You'll also be able to make a crash landing and save a life or two. **\$29.95**

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**ALPHA 1982** This is a full color space game which places you in the center of the "universe" heading for Jupiter in space. The game has been designed so you can play it on any of the 1000s. You'll control your ship and fly through a variety of planets and stars. **\$29.95**

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# GO TO WORK ON THE ZX81

Go is in essence very simple. It comes as no surprise therefore that the basics of the game are easy to program.

The latest ZX81 BASIC program shown allows you to use your T.V. screen as a Go board. The program is an advance on the traditional board. It is merely a starting point for better things to come!

The most obvious extension is to add in the rules of play. A major element, capture, takes place when stones are closely surrounded by the opposing force. Wouldn't it be nice if we could make the program remove captured stones automatically?

At first sight this seems straightforward enough — the program must check that a single stone or a group — adjacent stones of the same colour — has no further liberties — adjacent vacant points. But as with many programming exercises, there are logic traps just waiting for the unwary!

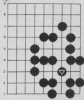
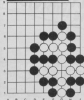
First, we must consider more than one group, each independently. In fact up to four groups can, in theory, be captured by a single move. This extreme case is shown in the first two diagrams.

A second tricky problem is how to get the program to identify all the stones of a group without missing any. Then it's even trickier to get the program to recognise when it can stop looking!

The best solutions are often the simplest. Only if the program proves slow in position need it be "polished". One simple method of detecting a group relies on copying that group on to an entirely fresh array — call it the "capture" array — the same size as the board array.

The code for detecting a group should be written as a subroutine. Then it can be used for each potentially captured group

BY ALAN SCARFF



adjacent to the last stone played.

The subroutine can detect when it should stop and return to the main routine by using a repetitive process of "sweeping" its capture array. At each sweep it will either find another adjacent stone to extend the group, or it will not, in which case it can stop!

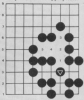
Having used the subroutine to detect a captured group, it can also be used to check if the last move has attempted to capture itself. Such a move is illegal. This can be indicated by generating a noise or whatever else you consider appropriate!

## DETECTIVE WORK...

The Detection Subroutine

**STEP 1:** Clear the capture array. Put the stone which is nominated by the main routine, on the array.

**STEP 2:** For the last stone placed on the capture array, examine its adjacent intersections on the board array in the order North, East, South and West. If any adjacent intersection is found to be vacant, exit from the subroutine with a "not-captured" result. If any adjacent intersection is found to hold the same colour stone, i.e. it extends the group, then put this stone on the capture array and start STEP 2 afresh. If, however, neither a vacant intersection nor an extension to the group is found, proceed to the next step.



**STEP 3:** Examine the adjacent intersection on the board array for each stone on the capture array. If a new stone of the same colour is found, put it on the capture array and go back to STEP 2. If after examining all the intersections, no new extension is found, return to the main routine with a "captured" result.

Figure 3 shows the order of detection of the stones in one of the captured groups. STEP 1 puts stone 1 on the capture array. STEP 2 places stones 2 and 3. STEP 3 sweeps the capture array to find and place stone 4. STEP 2 then places stone 5. Finally STEP 3 fails to find a fresh extension to the group and so returns with the list of captured stones.

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# Adventure

## DIAMONDS AND CLAWS

Now that we have covered the basics of Adventure programming — pardon the pun! — we are ready to have a look at some of the intricate parts.

When you first started writing your game, no doubt the word SCORE seemed very remote from your problems. Nevertheless, most Adventure games have a SCORE feature, the score usually being based on the number of treasures deposited in a special treasure storage location.

Let us code a score feature awarding any 10 points per treasure deposited in location 17.

First it will be necessary for the treasures to be recognized and not confused with "ordinary" objects. It obvious descriptions like DIAMOND or GOLD BAR are used, the player is probably in little doubt, but the computer won't be terribly impressed.

Therefore, all treasures in the object array should be grouped together in a block, say from 000 to 006+100. The command SCORE can then associate a routine like:

```
SC = 0; REM SC is score - zero to start count
FOR I = 0 TO 100-1
IF RD = LT THEN SC = SC + 10
NEXT
Q18 = "You have scored"; SC :
GOTO 1000
```

If the treasure descriptions are less obvious, like AMBER CLAW, then even the player may be in doubt as to its value.

A way round this is to identify each treasure with a special symbol such as an asterisk or a diamond alongside its description, for example \*AMBER CLAW\*.

Thus, treasures no longer have to be grouped together in the array, although doing this will still help to reduce the size of the object array. We can now have:

```
SC = 0
```

```
FOR I = 0 TO 100 : REM Object array has 100+1 elements
IF RD = LT AND LEFT$(RD,1) = "*" THEN SC = SC + 10
NEXT
```

Q18 = "You have scored"; SC : GOTO 1000  
No doubt you are wondering if you will now have to type "NDIAMOND\*" to reference a diamond that's a treasure. You don't, but I will explain the way round this near month.

A couple of points to beware of. The treasure stores will be frequently visited once discovered, and could well become a depository for all sorts of rubbish as well as treasures.

When this location is visited and the objects present are displayed, towards the end of the game the display variables may not have sufficient capacity to contain all the objects, as the amount of string space available for the concatenation of these objects may be insufficient.

This may result in truncation of the object/treasure list, or cause the program to "hang up" whilst the machine searches for free string space, possibly breaking with an Out of String Space error.

If the variables won't hold all the objects, establish more variables, then work on the string space problem — increase it by a hundred or so. This may now lead to an Out of Memory error, in which case revert to the working version of the string space, and restrict the number of objects that can be deposited at the location by limiting them to treasures only.

To do this you will need to modify the DROP routine to detect the asterisk, and if not found reply with a message like "SORRY, ONLY TREASURES MAY BE DROPPED HERE".

Meanwhile, to round off the SCORE routine, don't forget to bring the game to an end if all treasures are home, by following the NEXT line by:

```
IF SC = 100 THEN CLEAR SCREEN : PRINT "Congratulations, you have won" : END
```

Scott Adams' adventures are always full of mystery and excitement, and have set something of a standard on the Micro Adventure scene. So it's about time we had a look at another of his works.

Savage Island, part one, is one of the most diverse games that I have played. The object is not to collect treasures, but to obtain the password needed to commence part two. Who could resist buying the sequel after such a struggle?

All the outset, one finds oneself on a deserted beach on a tropical island. A stroll around reveals an impenetrable jungle, a plain, a shark-infested ocean and an extinct volcano.

It all seems like a very routine exploration job. Even after working out how to keep it busy the bear who inhabits the cave at the top of the volcano — a problem that you will spend hours sweating over — things seem to be going quite well... except for the lingering sense of



worse after having examined the clues laid back on the beach.

But it's easy to forget about that. Trying to survive hurricanes and investigating traps and bumps is the right.

Is the island all it seems? Where are these vital tools we became certain we needed some two months ago and still haven't found?

There is indeed something very sinister about, and it seems our old chortling friend from Pirate's Island is lurking around somewhere. So starting is the finale to this first part, that having been clever enough to get the password, I can't wait to find out what happens in part two.

Savage Island is published by Adventure International and versions are available for TRS-80, Video Game, Apple, Exidy Sorcerer, And Atari computers.

# ARCADE

## TIPS ON DONKEY KONG

### DON'T MONKEY AROUND WITH KING KONG!

King Kong certainly grabbed plenty of money at the box office and now he's doing it again in the arcade.

The mezzanine monkey is the star of Donkey Kong (also to be found under the name of Great Donkey) the arcade giant's current money-spinner.

There are four screens to this game which features an alternate rescue, by a cartoon character known as Jump Man, of a young lady in King's clutches.

For the beginner the game offers a rather confusing array of possible tactics.

The first screen shows King rolling barrels down a tilted array of girders, up which Jump Man must run to rescue his lady.

Points are scored for jumped over or hammer-squashed barrels, but these are not as significant as the time bonus given for reaching the top of the screen — to give that priority.

The hammer is a double edged weapon, crushing barrels in the hands of a wanderer but liable to disappear at the most inopportune moments and also preventing you from climbing.

Golden rules for this first wall known as "Stairway to the Stars".

## STREET TALK

Although the name of the game is Donkey Kong, human generosity dictates that the hairy gorilla throwing things down from the top of the screen, should be nicknamed "The Monkey".

Donkey Kong is a multi-playground for people who like coin-operated rickshaws. "Conveyor belts" is a pretty common term for the moving stairways which give the lady a lift to the top of the screen or shunt her unexpectedly sideways.

When the Jumpman goes on the rampage with the hammer, I have witnessed the phrase: "She 'em some steel!" And the big stairway is the third screen in



one, don't wait beneath the edge of a girder — you can't jump a falling barrel — and try to use the right hand side of the screen — King drops things straight down on the left. Don't forget that you can always half-way up a ladder if it is trouble.

The second screen seems more difficult but can be negotiated quickly for a big time bonus.

Little fires and things which can best be described as pins, form King's main threats in this screen of conveyor belts. For a fast time, run along the bottom of the screen to the right and go up to the first level.

Leap on the conveyor belt when there's a gap and you'll find yourself travelling along to the fire — fatal — but there is a ladder about you and that is the way to safety. If you miss, it is possible to move along the conveyor belt the wrong way by running jumps.

Up to the next level and some pie jumping needs to be done to get underneath the extending and retracting ladder. Man and it extends to the top — and Kong is not too wise — to make your back for some and a high bonus.

The third screen features lifts running up and down a central structure. Take the lift up to collect as many objects —

vegetables, chickens and the like — as you clear their dash and jump to the staircase. Watch the falling missiles until you are sure of their pattern. Make your dash beneath them as they move to their furthest point from you.

The final dash for here is a question of finding the safe spots, beneath the booming projectiles. These are just above the penultimate ladder and one centimetre away from the final ladder. (Strategic wait here will see you safely home.)

The fourth wall can have no set strategy as it is very random. Eight car-like plugs are the key features which must be collected. These have the added bonus of restoring the first movement. When all eight have been collected the screen has been conquered and they can be done in any order.

Use the hammer on this wall to squash the four legs on the middle level.

After this the game repeats but becomes faster and harder. Remember, the longer you take the faster the fire get and beginners should watch out for a good time bonus at the top right hand corner of the screen. 4-5,000 is reasonable, but some machines offer only 2,000 and prove very difficult.

## TIME TO TALK TURTLE

### TURTLEPIN

Target is an everyday tale of a turtle convined with a sprinkling of Russian roulette thrown in as well.

The hero figure is a turtle whose mission is to end on his back terrapins home to the turtle house.

There are eight mystery locations around the screen which make up a maze and the six baby terrapins are hidden away beneath them.

The catch is that two deadly Snapper turtles are also hiding out beneath these locations.

The Snapper's shell is avoided which is easy at first as they roam the screen at random. But when they turn blue later they pursue the player.

The player can drop an egg beam to stun a Snapper turtle but he only has three of these at the beginning of the game although three more are granted each time the player turtle crosses the centre star.

To earn a new screen the player must deliver all six terrapins to the turtle house.

Target is a new maze-chase game which definitely should be placed in the "cute" category. Fine graphics on a deep-blue pond background and the Snappers look notably vicious.

Points are scored for: delivering a terrapin, 70; snapperbacking a terrapin, 100; shoving a Snapper turtle, 50; and stomping a Snapper, 40 points. A bonus player turtle is awarded for over 1,000.



# ACTION

## DIG THESE CRAZY MONSTERS

When it seemed that maze games were in danger of turning up one of their own dead ends, a new innovation has emerged.

The do-it-yourself-maze game goes under the name of Dig-Oug and features a kind of super-alignment where all the action takes place.

The hero is a gardener, who comes complete with his own spade and a healthy appetite for "green".

The screen shows a ratway

### DIG-OUG

view of the land and the player controls the gardener as he digs out a maze of tunnels.

His aim is to collect vegetables from within the ground and destroy any monsters that try to threaten him.

The monsters are a warty-looking crew which seem to have come straight out of the darker recesses of the games

designer's imagination and live beneath the soil.

The only really described creature is one which resembles a dragon — page 51 in the book of common garden pests.

They can be despatched by the gardener by dropping rocks on them or blasting them with his gun.

Points are scored for any monsters which you have kills off and any tasty vegetables he collects in the game.



Video games have inevitably turned out to be a real shot in the arm for the pinball machines which once seemed in danger of losing out to the likes of space invaders.

The pinball designers, forced to become more innovative and imaginative to win back the players are now producing machines which put the accent firmly on the skill factors and give dedicated players a chance to build up high scores without relying heavily on the run of the ball.

One of the new breed of pinball games is Hyperball which could herald the start of a new category of arcade games.

It has the familiar pinball features of backboard, play area, targets and ball bearings — but there the similarity ends. For Hyperball is not about keeping balls in play.

Instead the player is given two triggers which take the piece of the normal flippers and let him fire the ball bearings directly into playfield. It is a rapid fire theme that has already made Hyperball very popular in the U.S.

The playfield is dominated by an energy centre which is controlled by draining energy balls. The aim of the player is to hit targets and prevent the lightning bolts from striking home.

The balls come out of anything up to 250 a minute and good players will make full use of this speed to protect the energy centre. Bonus points are offered for players who can hit targets which spill out words requested by the machine. One example is "energy" which must be split out in sequence by dropping balls through correct holes in the deck.

It is a fast action game which rewards skill—but it is difficult.



## THE MEAN MACHINES ARE HERE!

The ever-popular science fiction theme, the robots have taken over the skyline, has now been recreated story-book fashion in the arcade.

Robots, the story goes, fed up with mankind's inept attempts at ruling Earth, decide to take matters into their own steepy little and, with a fair degree of death and destruction, set out to do just that in the new game Robozone.

As always in these tales, one man stands between the robots and total human oblivion — in Robozone, that man is you.

Armed with a robot-buster, you are charged with the protection of your family. The robotic hordes come in all shapes and sizes. The early ones tend to be small and easily despatched, the later models are bigger and more dangerous.

Certain varieties cannot be killed but only strapped for a time, others have the ability to turn your family into mutants.

The machine tells you the

### ROBOZONE

story and how to play. The story expands to illustrate each new screen and describe the events.

The game is a cross between Berserk and Defender and you are represented on the screen by a human figure which is controlled by an eight-way joystick.

Each screen is progressively

more difficult and by the third screen you have to deal with mutated family members.

Like Defender, the game comes from the Williams stable. It is due to be launched here at the end of May and is confidently expected to be a successor to the popular Defender.



It's halftime in the semi-final against Czechoslovakia and you're 2-0 down.

As the team troop back into the changing rooms you wonder whether you should change your tactics. The 4-2-4 system you elected to play seems to be giving the Czechs a lot of possession in midfield and your sweeper has been caught out twice by their tendency to hit early crosses to their centre forward Rehede — who scored both the goals.

You seemed to have the easier task too, for in the first semi-final West Germany and Brazil — two of the teams you had fancied for the title — had battled to a 3-2 draw, with Brazil ramping through 5-2 in extra time.

Luckily you had the first-sight to get your scouts to compile a thorough dossier on Brazil and there ought to be no surprises when you meet them. Perhaps you'd have been better off sending a scout to watch the Czechs.

Well you'd better pull another player back into midfield and also try to close down the Czechs' space in the centre — Paréna has been controlling the mid-field.

And what about a substitution? Several of your players have been giving away possession.

It's not as though you haven't had chances. Marley was almost rounding two defenders before he shot wide, if that had gone in...



**RUNS ON A SHARP MZ-80K IN 26K**

**BY TERRY ALLEN**

# WORLD CUP

World Cup Manager sets out to give you all the frustrations of sitting on the bench when the national side you manage go a goal down 20 minutes from time in a crucial match.

And hopefully, with some careful attention to tactics and good substitutions in critical games, it should give you all the elation of guiding your country's team through to the cham-

pionship of the 1982 World Cup Finals.

The game runs on a Sharp MZ-80K in a massive 26K but is packed with REM statements and there is not a FEEL or a POKE in sight so transferring it to another machine should not cause too many problems.

It will let you manage any of the 24 countries involved in the 1982 World Cup but expect to have a more difficult time if you pick El Salvador than if you choose Brazil.

It invites you to enter your team and then publishes the draw for the competition with initially six groups of four. Set out the countries you think will be stalling blocks to your continuation in the competition and send off your scouts to watch them.

Remember you can get through by finishing second in your group so it may not be necessary to watch all three teams in your group. The first game comes up and a dossier on the opposition is printed out. Pay careful attention because you will have to find good tactical answers to the opposition's props.

There are other considerations too. Choose your formations carefully and if you need to boost your goal difference to qualify, try to manufacture an open game.

Turn to page 35

```

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Then it's out of your hands and the two teams are up against one another with a running commentary of events. Keep a close check on which of your players seem to lose possession and play badly; those are the ones you will want to substitute. A good substitution will improve your play — a bad one will give the opposition more chance.

Also watch for which team is gaining the most possession in midfield — you may need to change your formation or tactics here. Check on how the goals are scored — it could be important to tighten up your defence to certain situations or to find out which of your own attacking plays is paying dividends.

Half-time comes around and this is your chance to change your tactics if you have noticed things going wrong.

At the end of the day, win, lose or draw, you will have to sit back and watch the other results of the day being typed out and see if your predictions are coming true.

And so you go, hopefully towards a place in the final.

The game is run on exactly the same lines as the World Cup with the winners of Group 1 going into Group A and the runners-up into Group C; Group 2 winners into Group B and runners-up into Group D; Group 3 winners into Group A and runners-up into Group C; Group 4 winners into Group C and runners-up into Group A; Group 5 winners into Group D and runners-up into Group B; Group 6 winners into Group B and runners-up into Group D.

The first semi-final is between the winners of Group A and C and the other between the winners of Group B and D.

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0084 0085 "1980 WORLD CUP FINAL"
0085 0086 "1980 WORLD CUP FINAL"
0086 0087 "1980 WORLD CUP FINAL"
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0096 0097 "1980 WORLD CUP FINAL"
0097 0098 "1980 WORLD CUP FINAL"
0098 0099 "1980 WORLD CUP FINAL"
0099 0100 "1980 WORLD CUP FINAL"

```







## ZX-81

**Q&S DEFENDER.**

UP - DOWN - THRUST - FIRE  
First and only 3rd screen display software to drive Q&S BOARD HD. Moving Planetary surface. Up to 64 fast moving characters on screen at once. On screen scoring. Ten missiles at once. Increasing attack patterns. Requires 6K ROM, and 4K extra of SLAM. **£4.90.**

**Q&S SOUND HD.**

A programmable sound effects board using the AT-2-80 10.2 TONES, 1 MIOSEC. KEYRELEASE GRAPH. + TWO BIT 1.0 PITCH. Heavy programmable 8-bit DACS, the AT chip does most of the work leaving you a new pattern tree for other things. Signal OUT via 3.0 mm-jack socket. Tapes OUT via a 3.5 pin IC Socket. **£49.00.**

**Q&S CHAS HD.**

A programmable-character generator giving - 128 REP. ALPHABETICALLY PROGRAMMABLE CHARACTERS. ON/OFF SWITCH. 1K ON BOARD RAM. 8x40bit memory and display of your own characters to screen or printer. Demo-operate of Test machine code operates routines and lower case alphabet (included. See below for ZX PRINTER setting) **£49.00.**

☐ = LOWER CASE

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**Q&S INVADERS.**

LEFT - RIGHT - FIRE  
1.5 x 7 INVADERS. High score, 5 levels of play. 242 scenarios. Bonus game. Drives Sound hd. W/CHAS HD. Requires 7K RAM, 6K ROM + Slow. **£8.50.**

**Q&S 3D-RAM HD.**

A 11-rot graphics board giving - 256 x 100 PIXELS. ZX ON HD. RAM. SOFTWARE SELECT. DELETE MIXED TEXT AND GRAPHICS. ZX ON BOARD ROM. Resident test machine code graphics software (in ROM) provides the following 30-FRS Commands - MOVE a, y, PLOT x, y, DRAW a, y, BOX a, y, UP, DOWN, LEFT, RIGHT, PRINT AB, SCROLL, BLACK, WHITE CLEAR COPY. See above for ZX PRINTER format using COPY. **£44.00.**

## Special offers &amp; news

(1) Q&S Mother hd. + connector + CHAS hd. = The special Graphics version of **ARCUS COMPUTING'S ZX CHAS II, £48.00.**

The strongest chess program with 7 levels of play.

(2) Q&S MOTHER HD + CONNECTOR + other SOUND or CHAS hd. **£49.00.**

We will beat the following offers . . . Come and see us . . .

**THE COMPUTER FAIR, Barle Court, 23rd to 26th April**  
**3rd ZX MICROFAIR, Central Hall, Westminster.**  
**26th April & 1st May**

POSTAL AND MONEY ORDERS TO:

**QUICKSILVA Q&S, UPPER BROWNHILL RD., MATRUSS, SOYON, HANTS, ENGLAND.**

Please state Type of machine, Wash RAM, Memory size, when ordering.

## ZX-80

**Q&S ASTEROIDS**

LEFT - RIGHT - THRUST - FIRE  
Software to drive Q&S BOARD HD. Multiple enemies firing in 8 directions. On screen scoring. Increasing number of asteroids. Full auto-tyranny to all areas of the screen. Two asteroid sizes. Bonus ship at 10000 points. Requires 6K ROM, 4K min of RAM + SLOW function. **£8.50.**

**Q&S 3D-RAM HD.**

An extremely reliable static RAM HD, which combines with the computer's memory to give 4K total. Plug-direct in to the rear port on your ZX Computer. **£18.00.**

**Q&S MOTHER BOARD HD. & Q&S CONNECTOR.**

A reliable expansion system allowing a total of any RAM pack plus two other plug-in boards to be in use at once. On board 5V regulator drives all external boards. Fitted with two 20 way double sided edge connectors. Connector on 2 x 20 way edge-ports soldered back to board. Expansion can operate in two ways - (1) COMPUTER -- CHAS HD -- (2) COMPUTER -- CONNECTOR -- MIXED HD -- ANY RAM PACK (2 bits to 81 in another hd.) Mother Board **£18.00** Connector **£4.00.**



```

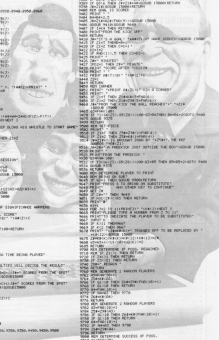
0075 PRINT "WHAT ABOUT THESE COMMENTS?"
0080 GOTO 1
0081 GOTO 1 IF @ NUMBER 0700
0082 PRINT "1710"
0083 GOTO 1710
0084 PRINT "1"
0085 GOTO 1
0086 GOTO 1
0087 PRINT "1"
0088 GOTO 1
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0076 GOTO 1
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0200 GOTO 1

```



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Kit costs £39.95 + 10% P.V.C. and £10.00  
assembly charges and £5.00 P.T.  
Specialist kit dealer, full assembly and fully tested by  
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- A FOOTBALL MANAGER VIDEO GAME

This is not a mere simulation. This is an exciting and highly addictive game in which you play the part of a football manager. Starting with the problems of a club, you have to build up a team, buy and sell players, manage the team, and win the league. The game is so addictive that you will want to play it in a game room or at home, and you will want to play it for hours. There are no end to the things you can do in this game. It is the best computer game you've ever played.

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48.30K	48.30K	48.30K	48.30K

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 Disk Drives  
 Speech Synthesizer  
 Joysticks etc etc

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 Thomas Street, Weston, Gloucestershire, GL9 3ET



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0000 IF 0101 THEN RETURN
0001 GOTO 0100
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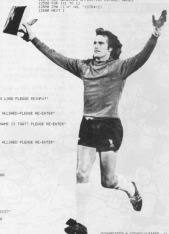
```

**Longer ratings are best!** That's the message you keep drumming into us on the telephone and by letter. Well, they don't come much longer than World Cup Manager and we hope you take the trouble to log it in. But for any Shary owners who feel it will be too risky or time consuming to type it, a cassette of the game is available from Sharpsoft. It costs £5.95 and can be bought from Sharpsoft, 66/68 Paul Street, London EC2.

```

0201 GOTO 0100
0202 GOTO 0100
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0299 GOTO 0100
0300 GOTO 0100

```



# TROLLS GOLD

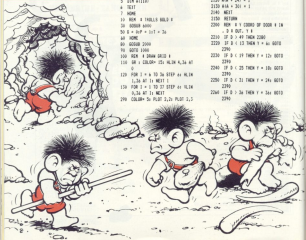
A KING'S ransom in gold could be yours if you are willing to leave the ransom of a deep dark cave. But reaching the gold is only half the battle — there is a particularly nasty Troll guarding the gold. He will attempt to stop you taking his golden treasure out of the cavernous labyrinth — that's if he hasn't got to you as you find your way into his lair. There are 36 rooms within the cave where the Troll can lurk as where the gold may be found. Can you beat the Troll in this battle of wit?

**RUNS ON AN APPLE IN 3X**

**BY GEORGE BLANK**

5 DOB 4110  
4 TERT  
7 HOME  
10 MEN 4 TROLLS GOLD 1  
20 GORR 4400  
50 0 = 107 = 107 = 24  
60 HOME  
80 GORR 2000  
90 GOTE 1000  
100 MEN 4 DRAIN GOLD 1  
110 00 = 2300 = 120 4,10,14 4,14 47  
0  
120 FOR 2 = 6 TO 24 STEP 44 4,14  
1,14 47 1; NEXT 1  
130 FOR 2 = 1 TO 27 STEP 44 4,14  
4,14 47 1; NEXT  
190 COLON 24 PLOT 2,1; PLOT 2,2

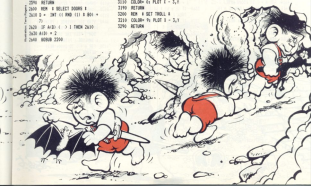
1 PLOT 2,3; PLOT 2,4; PLOT 4  
1,4; PLOT 4,2; PLOT 2,2  
120 COLON 12; 4,10,14 12,14 47 20;  
PLOT 27,24  
410 GORR 2000  
420 GORR 2200  
490 RETURN  
5000 MEN 4 MASTER ROUTINE 1  
1010 IF SCAN 2,2; 1 > 5 THEN  
GORR 100  
1020 GORR 1700  
1100 GORR 2200  
1200 GORR 2200  
1710 GORR 2000  
1790 GOTE 1000  
2000 MEN 4 GORR 1  
2010 FOR 4 = 1 TO 120  
2020 440 = 0  
2030 NEXT  
2040 FOR 4 = 7 TO 24  
2050 440 = 1  
2060 NEXT  
2070 FOR 4 = 21 TO 24  
2080 440 = 1  
2090 440 = 0  
2100 440 = 121 = 1  
2110 440 = 100 = 1  
2120 440 = 240 = 1  
2130 440 = 241 = 1  
2140 NEXT  
2150 RETURN  
2200 MEN 4 Y (2000) OF GORR 1 10  
10 = 0 = OUT; 1 1  
2210 IF 0 > 49 THEN 2260  
2220 IF 0 < 12 THEN 1 = 40; GOTE  
2240  
2250 IF 0 < 27 THEN 1 = 120; GOTE  
2270  
2280 IF 0 < 20 THEN 1 = 100; GOTE  
2290  
2290 IF 0 < 21 THEN 1 = 240; GOTE  
2310  
2300 IF 0 < 24 THEN 1 = 240; GOTE  
2320



```

2370 I = 34: GO TO 2390
2380 IF D < 17 THEN I = 9: GO TO 2390
2390
2390 IF D < 63 THEN I = 13: GO TO 2390
2390
2390 IF D < 67 THEN I = 17: GO TO 2390
2390
2390 IF D < 75 THEN I = 23: GO TO 2390
2390
2390 IF D < 81 THEN I = 29: GO TO 2390
2390
2390 I = 33
2390 RETURN
2400 REM # 1: DOORS OF ROOM # 10
    . 3 + SWL, 2 +
2410 I = 0
2420 IF I > 49 THEN 2520
2430 I = I + 6
2440 IF I > 54 THEN 2420
2450 I = SWL (I + 2)
2460 IF I = 1 THEN I = 4
2470 IF I = 2 THEN I = 10
2480 IF I = 3 THEN I = 14
2490 IF I = 4 THEN I = 22
2500 IF I = 5 THEN I = 28
2510 IF I = 6 THEN I = 34
2520 GO TO 2390
2530 I = 0 + 44
2540 I = I - 4
2550 IF I > 54 THEN 2540
2560 I = SWL (I + 2)
2570 IF I = 2 THEN I = 7
2580 IF I = 3 THEN I = 10
2590 IF I = 4 THEN I = 19
2600 IF I = 5 THEN I = 25
2610 IF I = 6 THEN I = 31
2620 RETURN
2630 REM # SELECT DOORS #
2630 B = SWL (1 + SWL (11 + SWL (
    7)
2620 IF SWL (I + 1) THEN 2630
2630 SWL = 2
2640 GO TO 2390
2650 GO TO 2440
2660 RETURN
2670 REM # WHICH DOORS ARE OPEN
    ? #
2710 FOR B = 90 TO 110
2720 GO TO 2440
2730 SWL = 0
2740 COLOR= 4: PLOT (I, Y
2750 IF D > 40 THEN PLOT (I, Y +
    1)
2760 NEXT B
2770 HOME
2780 RETURN
2800 REM # CLOSE DOORS #
2810 FOR A = 90 TO 110
2820 B = SWL
2830 SWL = 0
2840 SWL = 0
2850 GO TO 2390
2860 GO TO 2440
2870 COLOR= 12
2880 IF D > 40 THEN 2890
2890 COLOR= 15: HLIN I - 1, I + 1
    AT Y
2910 GO TO 2440
2920 VLN I, Y - 1 AT 1
2930 NEXT A
2940 RETURN
3000 REM # LOCATE TROLL #
3010 B = T + 6
3020 GO TO 2390
3030 GO TO 2440
3040 I = I + 1
3050 I = I - 1
3060 RETURN
3100 REM # RESET TROLL #
3110 COLOR= 4: PLOT I - 1, Y
3120 RETURN
3200 REM # SET TROLL #
3210 COLOR= 7: PLOT B - 1, Y
3220 RETURN
3300 REM # CONTROL TROLL #
3310 GO TO 2440
3320 GO TO 2440
3330 C = T - F
3340 IF C < 0 THEN 3370
3350 GO TO 2440
3360 C = ABS (C)
3370 IF C < 2 THEN 3400
3380 GO TO 2390
3390 REM # MOVE TROLL UP #
3400 IF T < 7 THEN 3390
3420 IF SWL = 2 THEN T = T - 4
3430 IF T = F THEN 3400
3440 REM # MOVE TROLL OUT #
3450 IF T = 8 THEN 3490
3460 IF SWL = 100 + 2 THEN T = T +
    - 1
3470 IF T = F THEN 4000
3480 IF SWL = 3 THEN T = T - 4
3490 GO TO 2440
3500 REM # MOVE TROLL IN #
3510 IF SWL = 51 + 2 THEN T = T +
    + 1: GO TO 3730
3520 REM # MOVE TROLL DOWN #
3730 IF T > 20 THEN 3600
3740 IF T = F THEN 4000
3750 IF SWL = 61 + 2 THEN T = T +
    + 4
3800 REM # END TROLL TURN #
3810 IF T = F THEN 4000
3820 GO TO 2440
3830 GO TO 2440
3840 RETURN
4000 REM # ENTER BY TROLL #
4001 FOR I = 1 TO 10: PRINT SWL
    (I): NEXT I: GO TO 2440

```



```

4002 BODU 2000
4003 FOR I = 1 TO 1000: NEXT
4005 TEXT : HOME : YEND 10
4010 TEXT : YHAG 10: INVRSE : FLASH
: PRINT "SOME PEOPLE NEVER L
: BARN!!"
4020 NORMAL : PRINT
4040 PRINT "THE DOOR AT THE ENO
: AND TO THE CAVE SAID:"
4050 INVRSE : PRINT "O PLEASE
: DON'T FEED THE TROLL" 8% NORMAL
4060 PRINT
4070 PRINT "THE TROLL JUST ATE Y
: OU FOR DINNER!"
4080 PRINT
4090 PRINT " O O O Y O U L O
: O O ! O O O "
4100 PRINT
4120 INPUT "WOULD YOU LIKE TO TR
: Y AGAIN?":A
4130 IF LEFT$(A,1) = "N" THEN
: NORMAL : END
4125 BOTO 00
4200 REN 0 BARE REN 0
4210 TEXT : HOME
4220 YEND 10
4230 PRINT "O O O O Y O U O
: O O O O O O "
4240 PRINT
4250 PRINT " YOU ARE VERY RICH!!
: OOOOOOOO "
4260 PRINT
4270 FOR A = 1 TO 1000: NEXT
4280 PRINT CASH 10: PRINT "BY
: THE WAY...."
4290 PRINT
4300 FOR A = 1 TO 1000: NEXT
4310 PRINT "CAN YOU LOAN ME A FE
: W THOUSAND?"
4320 FOR A = 1 TO 1000: NEXT
4330 PRINT
4340 BOTO 000
4350 REN 0 PLAYER LOCATION 0
5010 Z = P + 6
5020 BODU 2000
5030 BODU 2000
5040 Z = Z + 1
5050 Y = Y - 1
5070 RETURN
5080 REN 0 RESET PLAYER 0
5110 COLOR= 0: PLAT 1 - 3,Y
5040 IF 0 = 1 THEN COLOR= 0: HLIN
: 1 - 3,1 - 3 AT Y + 3: HLIN 1
: - 4,1 - 3 AT Y + 1
5170 RETURN
5200 REN 0 SET PLAYER 0
5210 COLOR= 10: PLAT 1 - 3,Y
5040 IF 0 = 1 THEN COLOR= 10: HLIN
: 1 - 3,1 - 3 AT Y + 3: PLAT 1
: - 4,1 + 1
5270 RETURN
5300 REN 0 CONTROL PHASE 0
5310 IF 0A0 < 20 0 0A0P + 0 :
: 20 0 0A0P + 50 < 20 0 0A0P +
: 30 < 20: THEN 5470
5310 INPUT "UP, DOWN, RIGHT OR
: (N), LEFT OR (O), OR (W)
: ?":S000 : 0=0N = LEFT$(S0,
: 1): 0' 0A = "O" THEN 0 = -
: 0
5315 IF 0A = "O" THEN 0 = 0
5320 IF 0A = "N" OR 0A = "O" THEN
: 0 = 0
5325 IF 0A = "L" OR 0A = "O" THEN
: 0 = - 1
5330 Z = 0: HOME
5340 IF 0 < 00 AND (P = 1) AND
: 10 = 1) THEN 5500
5350 IF 0 < 00 = 40 0 0A0P = 20 THEN
: 0 = 0
5360 IF 0 < 40 0 0A0P + 0 = 20:
: THEN 0 = 0
5370 IF 0 < 10 0 0A0P + 50 = 2
: 1 THEN 0 = 0
5380 IF 0 < 0 = - 10 0 0A0P + 50 =
: 21 THEN 0 = 0
5390 IF 0 = 0 THEN 5470
5400 BODU 5000
5410 BODU 5100
5420 P = P + 1
5430 IF P = 30 THEN 5500
5440 BODU 5000
5450 BODU 5100
5460 IF 1 = P THEN 4000
5470 BOTO 2000
5480 RETURN
5490 REN 1 TEND GOLD 0
5510 BODU 5000
5520 0 = 1
5530 BODU 5100
5540 BODU 5700
5550 BOTO 2000
5560 REN 0 RESET GOLD 0
5570 COLOR= 0: HLIN 0 - 5,0 - 3 AT
: Y + 3: HLIN 0 - 4,1 - 3 AT Y
: + 1
5575 RETURN
6000 TEXT
6010 PRINT
6020 PRINT CASH 10
6030 PRINT "TROLLSLOOT"
6040 PRINT
6050 PRINT "IF YOU ARE FORTUNATE
: ENOUGH TO"
6060 PRINT "DESCEND TO THE LINDS
: T AND INMOST"
6070 PRINT "REACHER OF A CAVE OR
: HABITAT"
6080 PRINT "BY A WETTY TROLL, I
: GET TO"
6090 PRINT "STAL HIS GOLD..."
6100 PRINT
6110 INPUT "WDS RETURN":A0
6120 HOME
6130 PRINT : PRINT CASH 10
6140 YHAG 10: INVRSE : PRINT "O
: O ?": FLASH : PRINT "PLEASE
: DON'T FEED THE TROLL!"% NORMAL
: INVRSE : PRINT " 000 "
6150 FOR A = 1 TO 1000: NEXT
6160 RETURN
6170 END

```



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```

0  HS=0: POKEX6876,0: POKEX6879,172
1  GOSUB5000
2  B=2: POKEX6879,210: GOSUB7000
5  PRINT" "
10 PRINT" C? T=7 H=H+3 V=0 S=0
20 FORI=5TO23
30 PRINTTAB(I)* " " "
40 NEXTI
50 X=INT(RND(1)*#11)
55 Y=INT(RND(1)*#23)
60 IFX<3THEN T=T-1
70 IFY<3THEN T=T+1
71 IFC<3000THEN GOSUB 9000:GOTO50
72 IFS<2500THEN GOSUB6000:GOTO50
73 IFA<5THENPRINTTAB(I)* " " " "
74 IFB<5THENPRINTTAB(I)* " " " "
75 IFD<11THEN T=T-1
76 IFE<11THEN T=T+1
78 IFA? THENPRINTTAB(I)* " " " " "
80 VV=7000+(22*200)
81 VV=30400+(22*200)
82 IFC<11THENPOKEVW,H,81:POKEVW,H,5:POKEVW+22,H,93:POKEVW+22,H,2
83 IFCY<11THENPOKEVW,H,81:POKEVW,H,5:POKEVW+Y+22,93:POKEVW+22+Y,2
85 PRINTTAB(I)* " " " "
90 GET#A
100 IFA#="M"THENH=H-1
110 IFA#="M"THENH=H+1
120 IFFEEK(H+7000)=101THENG00
130 IFFEEK(H+7000)=102THENG00
132 IFFEEK(H+7000)=103*125THENG00
135 IFFEEK(7000+H)=54*128THENG0=S+5:FORI=1TO4:POKE36875,221+I:NEXTI:POKE36875,0
137 IFFEEK(7000+H)=51*128 THENG0=S+0:FORI=1TO4:POKE36875,128+I:NEXTI:POKE36875,0
140 POKEH+7000,42
145 FORI=1TO2:POKE36874,200+I:NEXTI
150 S=S+3
160 GOTO50
300 POKEX6874,0
305 FORI=200TO127STEP-1
310 POKE7000+H,170
320 POKE7000+H,163
330 POKE7000+H,205
340 POKE7000+H,206
350 POKE7000+H,42
355 POKEX6877,1
360 NEXT
365 POKEX6877,0
367 POKEX6876,127
368 B=-1:GOSUB7000
369 POKEX6879,25
370 PRINT" TON SPEED SORT _____"
380 PRINT" YOU SCORED _____"
390 PRINTS: "POINTS"
395 IFS=0 THENV=0:HS=S:GOTO1000
397 GOTO1000
400 PRINT"#####W/H TO PLAY AGAIN
410 FORI=1TO500:GET#A:IFDA="M"ORDB="M"THENNEXTI
420 IFA="Y"THENB=1:POKE36879,210:GOSUB7000:PRINT" B?":GOTO10
425 IFA="H"THENPRINT"#####BVC...SVC..." :END
430 NEXTI
440 PDRV=17050
450 PRINT" C?
460 PRINT" W/H TO PLAY AGAIN "
470 NEXTV
480 PRINT" TTTTTT"
490 GOTO400
1000 REM
1010 PRINT" ##: HS=0
1020 PRINT" YOU HAVE GOT THE HIGH"
1030 PRINT" SCORE FOR TODAY"
1040 PRINT" PLEASE INPUT YOUR NAME"

```

# S·P·E·E·D·B·O·A·T



**FINDING** the source of the Mackenzie River by speedboat can be a real challenge in the logging season.

A lot of lumbering is going on and the thoughtless treehelters are sending their timber down river with little regard to life and limb.

The Mackenzie River follows the usual watery logic, being slow and sluggish at first but speeding up as you approach its source and after a score of 2,000 has been reached it narrows, becoming faster and more difficult for would-be discoverers to negotiate. Another 1,000 points and it is still more difficult.

A good boatman will spot the most favorable currents and steer for them. There are shores on bonus points on the river.

The game is simple but it will suit the diehards and those who can look ahead. It is for one person to steer the boat up-river, trying to miss the logs and hit the bonus shores as they flash upon the screen. To steer the boat use the two cursor keys for left and right.

The program runs as fast as it flows because the river is printed onto the screen in a fast working statement and as the boat is poked onto the very top of the screen, each print statement pushes it totally off the screen, so only one print statement is needed.

A graphically exciting and neatly playable game, difficult enough to become addictive.

## BY STEVEN HOLLIDAY

The variables used are:

MS is high score.

T is tab distance for river.

M is the car position.

WV is the position ready to add to T to create the trees.

S is the players score

I is general for next logs

X is random number to create the logs' numbers and tab value

T is position of trees

WX is column position from trees.

AS is boat movement.

DS is Y/M to play again variable.

AES is the name of the person with the high score.

TS general get statement variable.

V is volume controller.

SS is sound generator.

## RUNS ON A VIC-20 IN 3M

50-100 is main body of program.

7000-8000 is music routine.

8000-9000 the instructions.

9000-9500 is the routine with river.

9500- is this river.

8000-7000 is data for music.

1000-2000 is high score routine.

180-1900 prints score and asks if another go is required.

85000 makes the trees grow.

130-157 checks next position of crash.

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```

1050 INTRUDER
1060 PRINTRE:" HAS THE HIGH SCORE"
1070 PRINT"WITH".RS;"POINTS"
1080 GOTO4000
3025 S=S+3
3030 POK336875:0
3040 FORI=00 TO100 POK346801.1:NEXTI:PRINT"
3050 PRINT"SS" SPEED:BOAT
3060 PRINT"SSSS"
3070 REM SPEED:BOAT,CY2:IN3<
3080 REM BY S.L.HALL:1987
3090 REM 28/1/1992:CFR:MS:CG
3100 PRINT"SSSSSSSS"KEY TO:CONTINUE"
3110 FORI=100 TO00 STEP-1:POK34603.1:NEXTI
3120 OLTS:IF1="":THE:0000
3130 FORI=00 TO100 POK34603.1:NEXTI
3140 PRINT"SS"
3150 PRINT"THE INSTRUCTIONS"
3160 PRINT"
3170 PRINT"ORIN RIGHT=BOAT RIGHT"
3180 PRINT"7 DOWN DOWN=BOAT LEFT"
3190 PRINT" NUMBERS=POINTS:EXIT"
3200 PRINT" B O-O-O-B L-U-C-K"
3210 PRINT"6 SCARE:1:1
3220 PRINT"LOT OF LUBBERING IS"
3230 PRINT"THINKING PLACE:50"
3240 PRINT"WATCH OUT FOR THE LOGS"
3250 PRINT"IF YOU GO TOO FAR THE"
3260 PRINT"RIVER BECOMES A STRONG"
3270 PRINT"WHY KEY TO PLAY"
3280 FORI=100 TO00 STEP-1:POK34603.1:NEXTI
3290 OLTS:IF1="":THE:0100
3300 FORI=12 TO100 POK34600.1:NEXTI:PRINT"IF POK35075:0
3310 FORI=100 TO12 STEP-1:POK35000.1:NEXTI:POK35075:210:RETURN
3320 DATA225,300,225,300,225,300
3330 DATA220,120,220,200,200,200
3340 DATA220,100,200,200,200,120
3350 DATA225,120,240,200,200,200
3360 DATA231,300,225,200,225,200
3370 DATA232,120,231,240,220,120
3380 DATA225,400
3390 DATA -1
3400 DATA 100,000,0,00,100,000,0,00,100,200,100,000,0,00
3410 DATA200,000,201,200,0,000,201,000,100,200,0,00
3420 DATA005,000,0,00,100,200,0,00,100,000,-1
7000 S=36875
7001 IF0=0:THE:STORE
7010 Y=36875
7020 REM
7030 FORI=15
7040 REHP
7050 IFI=-1:THE:=-1:RETURN
7060 READD
7070 POK352:P
7080 FORH=1 TO0 :NEXTH
7090 POK353:0
7100 FORH=1 TO20 :NEXTH
7110 GOTO7040
9000 IF14<THEHT=T-1
9010 IF15<THEHT=T+1
9020 PRINTTAB(T);" B"
9030 RETURN
9040 IF18<THEHT=T-1
9050 IF19<THEHT=T+1
9060 PRINTTAB(T);" B"
9070 RETURN

```

■ = 000+0

■ = 0+0+12

# SAVE THE PRIN

**B**AD Baron Hegalyte has imprisoned the beautiful Princess Mirrie on the top floor of his nine-story castle. She is guarded by his minions who have orders to slay any intruder to death.

Armed with your magic crossbow, you, the brave knight Gorhar Lothar Boon, must find the keys to release her and then guide her to safety for a fairytale ending.

You will find one key hidden on each of the lower nine floors of the castle. On each floor there are four hiding places. One of these contains a key, two are empty, and the last one could be empty or contain a sleeping enemy — who will not like being woken up.

Obstructions to your quest are scattered around the castle, but you can blast your way to safety or kill an enemy with one of your nine magic crossbows.

During your search for the keys an enemy might pop up suddenly when you have just mounted the stairs to the next floor. And the Bad Baron tends to move the keys around when you are not looking.

You use the keys I, J, L, and M to make your moves and press CTRL and one of these keys to fire in a certain direction.

The program was written in Acorn Risc, BASIC, and this should help in translating for other machines. For example, the program's screen consists of 16 rows of 32 columns, and the second row starts at 8020, so change lines 15, 121, and 125 to suit your own machine. The program should then run.

The characters used to represent stairs, hiding places and other features are defined at the beginning and you can change them easily.

For those with Microsoft-style BASIC, use `DEF FN= "D"`. Line 80 provides an INKEY\$ FUNCTION, so for other BASIC's change line 100 to `INKEY$`.

After defining variables, line 15 `RND(5)` is the end of program text, so you can expand your introduction as much as memory space will allow. Lines 40 and 50 reset variables at the beginning of the game.

Line 40 starts with a function which assigns a random value for an address within the screen's limits. Line 50 sets a flag array and can be replaced by `FOR I= "1123456789"`.

New floors start at line 60 with a sleep and one second wait, followed by a row of information written to the top line of the screen. Line 65 `POKE`'s obstructions are the staircase locations.

Lines 75 and 80 place the keys on the screen. Line 82 puts a key in one of them and gives a 1 in 4 chance of an enemy sleeping in one of the other hides. The array EE allows this extra one.

Line 85 and 87 invert the floor numbers where you have found keys, and also put your player onto the screen.

Lines 110-115 convert the up-down-left-right chords to a screen address increment. Line 120 checks to see if a move would go off the screen; line 145 reads the "fire" button as the enemy information is available to see direction of fire.

Before making a move the program looks at what is already there. If it is a hide a "W" character replaces an "H" character. If it is a key line 195 does a computed GOTO on an integer division on the floor number by nine. The program then branches to line 100 for all floors except nine, when it branches to line 3000.

By changing an enemy's character from "H" to "E" for hide characters you will have to step aside to avoid being tripped if you find an enemy.

The enemy move is made in line 300 to 305. To make the lowest sleep count on your way up the number of enemy is kept constant — line 310. But the enemy moves is only made if the character at the specified address is "E". The routine only moves them up and down the screen but it is possible to make them move sideways.

If the enemy does get you your remains are marked with a cross in line 340.

Program variables: A row position, B bolts, C change of address, D Count staff character, E enemy character, EE enemy address, F floor number, GG byte array, 079 if not got key, H hiding place character, HH3 hiding place address, I loop variable, K key pressed number, KWD table for assembly code, L key character on screen, M Mechanic (D=dead), N address of speaker, O obstruction character, P Princess rescued, Q quit/reset time, R random choice, S start of second row of screen, T time taken, U update character, V enemy killed, W3 who's in the hide, Y previous bot number of kills, Z last address of screen.







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# Helicopter Lander



```

10 REM ** HELICOPTER LANDER **
20 LET S=0
30 LET R=INT(RND*(100000))
40 LET H=10
50 LET AN=1
60 LET BA=1
70 LET HD=1
80 PRINT "GO LEFT=>L"
100 PRINT "LEFT=>R, HD=>D, LEFT=>A, HD=>D"
110 PRINT "LEFT=>R, HD=>D, LEFT=>A, D: "0000"
120 PRINT "LEFT=>R, D: "0000"
130 GOSUB 300
140 LET S=INT(RND*(100000))
150 ON 1 GOSUB 400-500
160 IF PEEK(S)=40 AND S=0 THEN H=H-1
170 IF PEEK(S)=40 AND S=20 THEN H=H+1
180 IF PEEK(S)=20 THEN HD=HD-1
190 IF HD=10 THEN S=0
200 IF R=0 OR R=1 OR R=2 OR R=3 THEN S=0
210 GOSUB 300
220 GOTO 300
230 END
240 IF R=3 THEN H=H-1
250 RETURN
260 IF R=0 THEN H=H+1
270 RETURN
280 GOSUB 300
290 PRINT "SUCCESS"
300 PRINT "DROUGHT"
310 GOTO 450
320 PRINT "D"
330 PRINT "LEFT=>R, HD=>D, LEFT=>A, HD=>D"
340 PRINT "LEFT=>R, HD=>D, LEFT=>A, D: "0000"
350 PRINT "LEFT=>R, D: "0000"
360 GOSUB 300
370 RETURN
380 REM
390 FOR H=1 TO 5:LET HD=1:GOSUB 300:PRINT R
400 PRINT "DROUGHT"
410 PRINT "LEFT=>R, HD=>D, LEFT=>A, HD=>D"
420 PRINT "LEFT=>R, HD=>D, LEFT=>A, D: "0000"
430 PRINT "LEFT=>R, D: "0000"
440 GOSUB 300
450 PRINT "AGAIN?"
460 CLEAR:IF AN="Y" THEN GOTO 460
470 IF AN="Y" THEN GOTO 460
480 IF AN="N" THEN END
490 GOTO 460
500 PRINT "LEFT=>R, D: "0000"
510 RETURN
READY.

```

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# B o i n g



Illustration: Tony Taggart

1 ROM BOARD BY RON WEBSTER  
 2 Atari TRANSLATION BY JAMES GAGAN  
 3 See BRUNNEN 1-4 TO COVERED (ARCADE)  
 4-COMPLIMENT 1  
 10 BARFICE 2,POKE 90,5,POSITION 9,1  
 11  
 20 ? "Don't let Bouncing Barney down!"  
 21 ? "Barney likes bouncing, but he"  
 22 ? "has trouble staying on his"  
 23 ? "trampoline. Use the joystick"  
 24 ? "to keep it underneath him. If"  
 25 ? "he hits the left side of the"  
 26 ? "trampoline he bounces to the"  
 27 ? "right. If he hits the right"  
 28 ? "side of the trampoline, he"  
 29 ? "bounces to the left. This is"  
 30 ? "exactly Barney's bouncing way"  
 31 ? "and sure as the skill level"  
 32 ? "increases, and easier to handle"  
 33 ? "to keep him in the air. See"  
 34 ? "how long you can keep Barney"  
 35 ? "bouncing."? of "Next look 11 ?"  
 36 1 "Barney needs it!"  
 120 OPEN 81,4,0,"0"  
 121 1 " Skill level 10-10?"  
 125 SET 81,0,0,0-00  
 126 IF 010 80 010 THEN 125  
 140 0-10-2-10-00000000 2,POKE 752,1  
 141 000000 4,10,1,0000000 1,4,2  
 150 000000 0,4,2,0000000 1,0,11  
 155 COLOR 1,POKE 2-0 TO 2,PLUM 1,20,000  
 010 1,0,0000 1  
 160 00000 74,0,000 2-04 TO 70,000 1,1,  
 0,00000 1,2,0000 1  
 170 0-10-10-00-10-00-0-0-0000-1-0-00  
 172 0-10-10-00-0-0-0-1-0-0-2-10-0  
 175 POKE 456,0,POKE 457,0 ? 00,  
 180 FOR 0-0 TO 10 FOR 1-05 TO 20 STOP  
 170000 456,0,POKE 457,0? 0000111,  
 182 FOR 2-0 TO 10,0000 1,0,000 1,000 1  
 188 POKE 457,0,0? 0000011,000 0-1 TO

BARNEY likes bouncing. In fact he likes it so much he bounces everywhere. He bounces off walls. He bounces off ceilings. He even bounces on a trampoline. But so far he has failed to work out that bouncing off the floor is harmful to his health. You have to protect Bouncing Barney from his own folly by making sure the trampoline stays under his flying body as he bounces up and down. There are ten skill levels to the game — but be warned. Level one is so easy you might want to bounce directly to level nine. Don't do it! Level nine is for people who don't mind seeing their efforts result in messy consequences. Stick to the lower levels until you have developed your skill — for Barney's sake!

0,0000 1,POKE 457,0,0? 1,POKE 2-04  
 TO 20  
 200 COLOR 2,PLUM 2,0,0,000 2-1 TO 20,000  
 1,1,0000 2,PLUM 2,0,0,000 2-1 TO 20,000  
 1,0,000 2,0,000 2,PLUM 4,0  
 220 0,0,0,0,0,0  
 225 IF 010 800 0-10 000 0-10 THEN 0-1-1  
 230 IF 0-14 800 0-10 000 0-10 THEN 0-1-1  
 235 00000 0,1,00-000,0,1,0,0-0-2,IF 0-10  
 0000 0-0  
 240 POKE 456,0,POKE 457,0  
 241 IF 0-10,0 THEN 1 " Bouncing"0,000 2  
 20  
 242 1 00,  
 250 COLOR 2,PLUM 2,0,0,0,0,0-0-0-0-0  
 255 0-0-0-0  
 260 IF 0-10,0 THEN 0-10-0-0-00000 400  
 262 IF 0-10,0 THEN 0-10-0-0-00000 400  
 270 IF 0-10,0 THEN 0-10-0-0-00000-0-0-0-0-00000 400  
 0-1-00000 400  
 275 IF 0-10,0,0 THEN 200  
 280 0-10-0-0-1-0-0,0,0,0,0-0-0-0-0  
 285 IF 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0  
 000 100  
 290 ? 0 1 " 0 P L A T I ? ? ,COUNT" 0000  
 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0  
 295 COLOR 2,PLUM 2,0,0,0,0,0,0,0,0,0,0,0  
 0 TO 0 STOP -0,1,00000 4,2,05,12,0,0000 1  
 1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0  
 300 1 " Skill level was "0,0,0,0 1  
 30  
 310 IF 0-10,0 THEN 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0  
 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0  
 320 COLOR 2,PLUM 2,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0  
 33  
 340 SOUND 1,200,0,0,0,000 110-0 TO 10  
 NEXT TONE,SOUND 1,0,0,0,0,0,0,0  
 400 DATA 21,17,18,18,18,18,18,18,18,18,18,18,18

**BY RON WEBSTER**  
**RUNS ON AN ATARI IN 8K**

# PRACTICAL PROGRAMMING

## THE WAY TO BETTER PROGRAMS

Basic was designed to be easy to learn, so that people who are not professional programmers can write simple programs for themselves.

It is not easy to write long, complicated programs in any language, and is particularly difficult in Basic for several reasons, the main reason being the lack of suitable control structures.

In order to write a Basic program that works properly it is necessary to begin by designing the program carefully, and producing a detailed specification before beginning to write the code.

Top-down structuring is a method of program design where we begin with a general description of the program. Step by step, we add more details of the procedures the program must perform until we have a description that is sufficiently detailed to allow us to specify the data structure and write the code.

We need to use only a few simple structures in the description:

1. A sequence of procedures that are executed one after the other.
2. IF condition THEN procedure. If condition is true perform procedure, otherwise continue with the next section of the program.
3. IF condition THEN procedure I ELSE procedure 2. If condition is true perform procedure I; if condition is false perform procedure 2; then continue with the next section of the program.
4. REPEAT procedure UNTIL condition. Perform procedure, then test condition; if false loop back to procedure; if true continue with the next section of the program. Note that the test comes at the end, so that

the body of the loop must be performed at least once.

5. WHILE condition DO procedure. Test condition; if true perform procedure then loop back to test condition again; if false continue with the next section of the program. Note that here the test is performed first, so that the body of the loop need not be performed at all.
6. CASE I: OF procedure 1, procedure 2, ... procedure n. If I is 1 perform procedure 1, if I is 2 perform procedure 2, etc.

The essential property of these structures is that they each have a single entry point at the beginning and a single exit point at the end. This makes it possible to write a program outline where the logical flow proceeds straight through from beginning to end.

It is not possible to write Basic code like this because GOTO statements make the logical flow of the program jump around all over the place.

## SIMPLE GAMES

To illustrate top-down structuring I will show how a simple game program can be developed. The game is one that has been published in various forms, sometimes in the simple form described here, but usually in a more sophisticated form with extra features.

The object of the game is to shoot down a plane which moves across the screen. The gun is fixed in the centre of the bottom line of the screen and is fired by pressing a single key.

We begin with a trivial description of the program:  
REPEAT play game.

UNTIL game over.

To elaborate this we take the procedure "play game" and note that it can be divided into two parts, updating the display and handling input from the keyboard, so the description becomes:

REPEAT update display  
handle input

UNTIL game over.



"Update display" involves moving the plane, moving the shell if one has been fired, and taking appropriate action if there is a hit. At first sight it may appear that we can express it to:

move plane  
IF shell fired THEN move shell  
IF hit THEN plane destroyed

But if we look more closely at the possible positions of the plane and shell we see that we may have the shell immediately to the right of the plane so the plane will run into the shell. Or we may have the shell one place to the right and one line below, in which case the hit will occur after both the plane and the shell have been moved. Our next expression of "update display" could be:

move plane  
IF hit THEN plane destroyed  
IF shell fired THEN move shell  
IF hit THEN plane destroyed

Before continuing with this part of the program we need to look at the "handle input" section.

The description of the program says nothing about when and how often the gun may be fired. Program descriptions are often inadequate but top-down design will reveal where the deficiencies are.

If the gun could be fired continuously there would be no point to the game, so we must introduce some restriction. Two possibilities are to provide a limited supply of ammunition, or to allow the gun to be fired once each time the plane starts on a new line.

If we provide a limited supply of ammunition and allow the

BY TED BALL

# PRACTICAL PROGRAMMING

gun to be fired at any time while there is ammunition remaining, there could be several shells in motion at one time. To keep the program simple I will use the second possibility.

The "handle input" procedure can now be expanded easily. We have to first check that the gun can be fired — which means that it has not been fired since the plane started on its present line — and if so check for a key and fire a shell if the key has been pressed. The expansion may be written in stages as:

```
IF gun enabled THEN handle input
```

```
IF gun enabled THEN check keyboard
```

```
IF key pressed THEN fire shell and finally:
```

```
IF gun enabled THEN check keyboard
```

```
IF key pressed THEN set initial shell position
```

```
write shell to screen
```

```
set "shell fired" flag
```

```
clear "gun enabled" flag
```

## THE LISTINGS

Collecting together the sections that have been developed so far gives listing 1. From this we can see that the procedures we need to expand now are "move plane", "move shell" and "plane destroyed".

When we expand "move plane" we must remember to check for the plane having reached the end of its run halfway down the screen or having reached the end of a line on the screen. Thus the first step in the expansion is:

```
write blank to current plane position
```

```
determine new plane position
```

```
write plane to new plane position
```

```
and for the next step we introduce the checks by expanding "determine new plane position"
```

```
to: move plane position one place to right
```

```
IF end of line THEN set up for new line
```

```
IF end of run THEN set up for new run
```

```
and expanding "set up for new line" and "set up for new run" we get:
```

```
move plane position one place to right
```

```
IF end of line THEN set plane position to start of next line
```

```
decrease score value
```

```
set "gun enabled" flag
```

```
IF end of run THEN add 1 to plane count
```

```
set plane position to start of screen
```

```
set score value to initial value
```

```
set "gun enabled" flag
```

"Move shell" is expanded in a similar way, but remembering to delete the shell when it reaches the top of the screen:

```
write blank to current shell position
```

```
move shell position up one line
```

```
IF off screen THEN clear "shell fired" flag
```

```
ELSE write shell to new position
```

"Plane destroyed" appears in two places and in the final program we will obviously want to implement it as a subroutine.

To indicate this we will replace "plane destroyed" in the body of the program description by "subroutine (plane destroyed)" and put the expansion in a separate section at the end.

The expansion of "subroutine (plane destroyed)" is straightforward:

```
clear "shell fired" flag
```

```
simulate explosion on screen
```

```
add score value to player's score
```

```
set up for new run
```

```
with "set up for new run" being expanded in exactly the same way as before.
```

This leaves the final text "game over" to be expanded. Since the game consists of shooting at a fixed number of planes "plane count more than number of planes".

Putting these latest expansions into the program description of listing 1 gives the final program description shown in listing 2.

This final description gives almost all the detail we need to write the program.

### Listing 1: Intermediate Program Description

```
REPEAT move plane
IF hit THEN plane destroyed
IF shell fired THEN move shell
IF hit THEN plane destroyed
IF gun enabled THEN check keyboard
IF key pressed THEN
set initial shell position
write shell to screen
set "shell fired" flag
clear "gun enabled" flag
UNTIL game over.
```

### Listing 2: Final Program Description

```
REPEAT write blank to current plane position
```

```
move plane position one place right
```

```
IF end of line THEN
set plane position to start of next line
```

```
decrease score value
set "gun enabled" flag
```

```
IF end of run THEN
add 1 to plane count
```

```
set plane position to start of screen
```

```
set score value to initial value
set "gun enabled" flag
```

```
write plane to new position
```

```
IF hit THEN subroutine (plane destroyed)
```

```
IF shell fired THEN write blank to current shell position
```

```
move shell position up one line
```

```
IF off screen THEN clear "shell fired" flag
```

```
ELSE write shell to new position
```

```
IF hit THEN subroutine (plane destroyed)
```

```
IF gun enabled THEN
check keyboard
```

```
IF key pressed THEN
set initial shell position
```

```
write shell to screen
set "shell fired" flag
```

```
clear "gun enabled" flag
UNTIL plane count more than number of planes
```

```
Subroutine (plane destroyed):
clear "shell fired" flag
```

```
simulate explosion on screen
```

```
add score value to player's score
```

```
add 1 to plane count
```

```
set plane position to start of screen
set score value to initial value
set "gun enabled" flag
```



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# Graphics



## THE IMPORTANCE OF CURVES...

If you want to produce interesting displays for your video games then it is essential to be able to draw curves.

Straight lines tend to be characteristic of non-mode situations and not of natural objects. Most high resolution graphics systems on micros have commands such as DRAW or PLOT for drawing straight lines, but do not have commands for drawing curves. For this reason, a curve has to be approximated by a series of linked line segments.

The shorter the segments are, the more a realistic approximation to the curve becomes. The limit to which this can be taken is determined by the resolution of the display screen. With any system having a screen resolution of, say, 256 by 192 or better, consecutive curves can be drawn by joining points in adjacent screen columns as long as their vertical separation is not too great. These thoughts naturally lead to the problem of scaling.

The basic idea with scaling is that when a particular curve is to

be drawn it must be scaled — magnified or diminished — in such a way that it fits on the screen, and is also displayed to best effect.

This is probably best illustrated by an example, so let us examine how to draw two cycles of a damped sine wave on the Amos's screen, which has a resolution of 256 by 192. With a damped sine wave, the size of the oscillations decreases as the waveless proceeds. The equation of the curve we shall plot is:

$$Y = 58 \sin(2X) \exp(-X)$$

Now two cycles are obtained by letting  $X$  vary from 0 to  $4\pi$ . To plot the curve across the screen with full resolution, we start with a dot in column 0, on the left of the screen, and repeatedly draw a line to a dot in the next column, doing this 256 times until we get to the right hand side.

To make  $X$  increase from 0 to  $4\pi$  in this pattern, it must be repeatedly increased by increments of  $4/256$ . Thus the kernel of the program becomes

```
FOR I = 0 TO 256
  X = I * 4 # PI / 256
  Y = 58 SIN(2X) * EXP(-X)
  DRAW X, Y
NEXT I
```

However, the vertical axis still needs to be scaled. The curve shows to best effect with its

Y-axis across the middle of the screen, so we place it along row 96. Assigning 96 dots vertically to the full amplitude of the sine wave gives the final, tiled-up, Amos program.

```
10 Y0 = 0 : Z = PI / 256
20 CLEAR 0
30 MOVE 0, 96
40 FOR I = 1 TO 256
50 X = I * 4 # PI / 256
60 Y = 58 SIN(2X) * EXP(-X)
70 DRAW X, Y
80 NEXT I
90 END
```

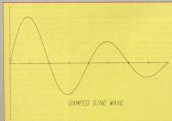
Experimenting with this program by changing the numbers in it will give a further feeling for how the scaling, positioning and damping are achieved.

To illustrate how simple matters such as scaling and positioning can be made, consider the drawing shown in the figure, which includes not only our curve, but also two axes and a label. It was drawn using a Hewlett-Packard HP7225A graph plotter attached to an HP 83 personal computer. The program that produced it is:

```
10 SCALE 0.4 # PI, -1.2
20 XMAX 0 # PI
30 XMAX 0.5
40 MOVE 0.5
50 S = 0 # PI * 2
70 FOR I = 1 TO 4 # PI STEP 0.5
80 DRAW X, 58 SIN(2X) * EXP(-X)
90 NEXT I
100 SCALE 0.5, 0.5
110 MOVE Y0 = 0.2
120 LABEL "DAMPED sine wave"
130 END
```

In this program the SCALE instruction in line 20 gives the lower and upper limits of the  $X$  values to be plotted and also of the  $Y$  values. All plotting can then be performed using the actual values to be plotted since the system can then automatically position them correctly.

Of course, the HP personal computer is a sophisticated and expensive system, but its capabilities illustrate what can be done, and also the direction which graphics facilities for micros are likely to take.



## THE GOSPEL TRUTH ...

Have you heard any clips of thunder recently? It could be that someone in your area has bought a copy of *The Bible*. Not the authorized version or even the New English but the version according to Automata — and it doing so has angered the angels!

*The Bible* is an investment built at some of the happenings in that epic story. The extracts are illustrated by games played on the DOS computer. There are ten games and all of them are within 15. of megalom.

### THE BIBLE

Don't just load the game through. Unplug the ear lead and listen to the story recorded on the tape. The nearest I can come to describing it is a version of Kurt the Nine O'Clock News on tape.

The characters on the soundtrack will tell you when and how to load the programs which supplement the text.

But what of the programs? As I said they are all 15 and of necessity, therefore, limited.

Most of them I have seen before in one form or another.

I did find one or two quite amusing. Salah's soft spot is no longer his forehead but somewhere lower down and almost as painful. You can also bring down the pages on the Pharisee's head and free the slaves. Save Jonah from the sea monster by directing the whale to him first. Stop the Ark from sinking or tempt Adam away from the evil DOS.

If you have just bought a DOS then this tape will provide some amusement. The same might apply if you have a wretched amount of footage. Otherwise I can find little of any value in it for those of you looking for original games software.

*The Bible* is available from Automata Cartography for £5.95.



## CUBE WILL HAVE YOU IN A SPIN

### QUADCUBE

There seems to be very little middle ground with *The Cube* — either you can't stop breathing it or you just don't want to know. Here's a game for the fanatics.

This program simulates a 4 x 4 x 4 cube — physically very difficult to make, but easy on a computer. The program can to a limited degree simulate a 3 x 3 x 3 cube. The object is — of course — to solve the cube in as few moves as possible.

In *Quadcube* the display is slightly distorted but recognizable. I liked the 'release' button on the key process — all input is handled by 'roll key' routines, and there is an immediate indication that your pressed key has been scanned.

Documentation supplied was of a high standard. There is also adequate internal documentation for when, as always happens, you

lose the instruction sheets.

The game has its restrictions. The graphics are unsatisfactory on a monochrome set and it will not run in extended BASIC.

This notation used is very simple and easy to use, but I was a little unhappy with 'spin' and 'unspin' which permit you to view the back. The effect of 'spin' and 'unspin' seems to be to present you with a mirror image — or to make the front three faces transparent. This makes the moves a little hard to visualize.

In this version of rotations are described as they appear on screen — clockwise is described as right.

I would have appreciated a small note on screen to indicate which face was R, which F, and which L. Memory space is tight but the program can be compacted to permit this, without losing any features.

You can scramble a virgin cube and watch the computer put it back, or the computer will scramble the cube.

The game runs on a Tasci Instruments format, in TI Basic and comes in cassette form for OS. It is available from Loren-based Workforce.

## DOING THE SHUTTLE SHUFFLE...

### SPACE RESCUE

Five orbital life support pods are stranded on hazardous alien terrain. In space the mother ship prepares for a rescue mission.

The mother ship has a rescue hatch and a storage area to accommodate all five pods. The ship's recovery shuttle — controlled by means of the PC's keypad — is sent to save the pods.

The shuttle is released by pressing 'I' to move it downwards. From this point in your score increases by one for every second you survive.

To remove a pod, the shuttle must be positioned immediately above it, then the 'A' key pressed. This manoeuvre can be very difficult on the higher skill levels since the shuttle moves rather fast and the control key becomes highly responsive.

Next the shuttle should be guided to a position just above the mother ship and the pod

dropped through the rescue hatch by pressing 'I'. If your aim is correct, the pod appears in the storage area. If you miss the hatch the pod lands back on the planet surface.

If you manage to complete your rescue mission and save all five pods, you are invited to clash with your missing mother ship for a bonus of 500 points.

Once you have successfully carried out a rescue you can progress to slightly higher skill levels building up your expertise until you have used up your four lives.

The more difficult the game gets the more interesting it becomes. Not only do you have to guide your ship accurately you also must fend off meteors which fly dangerously through the air.

No additional documentation was supplied with the game which would have been useful. The instructions only appear on the screen briefly, and, after leading to some experimentation was needed to learn the finer aspects of the game.

Supernova, the supplier of *Space Rescue*, has created another addictive game because like most good ones it cannot be easily mastered. You can try it out for £5 plus VAT.

## FINE ART OF SPACE FIGHTING

### GAMESTAPE 2

You can journey to the stars, unravel the mysteries of the planets or become an artist with *Gamestape 2*, which has about 185 programs for the ZX81. First on the tape is *Starfighter*.

The enemy are trying to destroy your civilization. You must stop them by flying your Starfighter and shooting them down with your lasers.

The screen displays the view from your cockpit with stars and a firing cursor in front of you. The cursor, your laser sights, are controlled by pressing keys one to nine, while the zero key fires the laser.

The layout can be confusing until you get used to it. I used a sticky label on the keyboard to remind me of the keys that give the diagonal moves, see *Do You*.

The enemy starships are shown as R, S and O on the screen. Each has a different colour value. If you can manage to hit twenty of them before your energy runs out you get a medal. I would have liked to have seen ten or three starships on the screen at once or see them fly back to form the game up a bit.

Second on the tape is *Pyramid* — the classic puzzle where a



pyramid has to be moved from A to B via E piece by piece.

The pyramid shown on the screen has nine layers and the pads labelled A, B, C and a prompt are also displayed. Movement is controlled by pressing the appropriately labelled keys, the computer will automatically move the top layer of the pile. The game takes a very long time to play, the suppliers reckon that 500 moves are the minimum.

Turning over the tape gives us *Artist*. The usual "draw a picture on your television screen!" type

program. However this one does have some major differences. After you have finished your drawing you can store it in one of 10 memories for retrieval later if you wish.

If you own a Sinclair printer the drawing can be copied on to it. The sticky label used in *Starfighter* can also be used here as the input commands are the same.

This tape must be rated as good value for money and is available from J.K. Broyer Software, of Bath, and costs £4.95.

## DUCKING AND WEAVING UP IN THE STARS

### COSMIC ZAP

*Cosmic Zap* is one of the new games for the Sharp MZ-800 from the London based firm — Sheepsfoot. Written in Basic for under 8K it is fairly slow for a real-time graphics game. However, the quality of finish is very high with some nice drawings such as showing the top five high scores and initials.

The aim of the game is to pilot your ship through space for 100 minutes using left, right and stop controls to dodge asteroids whilst trying to run assorted aliens with scores ranging from 10 to 100 points. After a while asteroids start appearing in your path and an alien you are about to run can suddenly turn into a deadly asteroid. If you last 10 minutes, which is some feat, a number ship appears and uses a tractor beam to draw you in for docking.

At £5.95 all the Sheepsfoot games are quite expensive and I do not feel that this game represents such good value for money as say *Asteroids* or *Trackmaster 2*. As far as I can tell there are no good tactics in this game of reflexes, although on the whole I found it quite good fun.

## FULL STEAM AHEAD ON THE MICRO RAILROAD

It is not often that a game that is entirely different to any other on the market makes an appearance, but I believe that *Microtrain* is one of these rare creatures.

Imagine that you are back in your childhood with hundreds of pounds worth of electric train set to play with then you get the best idea of *Microtrain*.

Depending on the memory available you can play with up to 200 trains with a combined number of coaches/wagons of up to 250. You are also offered up to 750 controls, and this is where the game gets interesting as the controls may be set in many different ways depending on the conditions on the track.

The controls that you have available are points, signals,

### MICROTRAIN

speed and direction of trains and the stopping of trains for set periods of time.

Obviously some of the realism is lost in the limited graphics available on the TRS-80 and Video Game, but if you accept this you have an unusual and

appealing game.

It is worth noting, the automatic controls are not easy to make, something that is not helped by the limited instructions supplied — maybe a demonstration mode would have helped. Once a suitable layout is

achieved, the screen after screen of track may be saved for future loading.

*Microtrain* is available from Premier Publications of Oremont. It runs on a Tandy TRS-80 model 1 or III and the Video Game costing £18.95 for the disk version and £14.95 for the tape.



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# Kit Korner

## THE POWER OF THE ATOM. . .

It is refreshing to see, in these times when the reliability of some newer machines has yet to be proven, an already well established product which can be expanded from a useful basic kit to a powerful multi-program microcomputer. I have been looking over a kit built Acorn Atom — and found it to be just that.

The Atom is a single board layout, measuring 14 by eight inches. The basic kit has an 8K BASIC and 2K of RAM but can be expanded to 64K RAM. The MPU is the trusty 6502 running at 1MHz, although there is a second crystal to run the Motorola video chip. Make sure which is which, as they are both the same size and shape. Only the numbers are different.

The full QWERTY keyboard is mounted on the other side of the board from the components as is the speaker. The power supply is entirely separate, however.

The Atom has an advantage over some of the smaller and more recent machines in that it has the facility for a 6522 Versatile Interface Adaptive (VIA) on the board.

The Atom also allows for other input/output. There is a parallel interface, which uses one half of the VIA, a standard GUTS interface for the recording or playing back of programs, a composite video and T.V. output. Not all of these are fitted as standard to the basic model, so find out which ones you are going to need before buying as it will be slightly cheaper.

As there are 32 potential IC sockets on the board it is worth mentioning that 14 pin sockets will go into H hole sets, as will 14 and 18 into 18 hole sets. If you do solder in the wrong size it is often impossible to retrieve it unless you have an IC desoldering tool for your soldering iron.

### BY KEITH MOTT

The only real way to extract them otherwise is to force the plastic moulding off and to remove the pins individually. You will have to replace the holder then, of course. The same applies to the larger sockets, although these are a little easier to differentiate between.

One major point that does worry me about the Atom is the way Acorn have arranged the keyboard, however smooth it is to operate. Acorn recommend a quite simple way of installing it in the instructions. They also state that insulating washers should be used with the steel



screws to prevent shorting out of the keyboard matrix. This is because all but one of the screws falls between two adjacent pins.

Although the model I was approving did not have any washers, with the length of connector wire on each of the keys it is possible for them to short out despite this precaution. They also suggest that you do not widen each of the connections too heavily as you may break the plated-through hole. It appears to me that it would be as easy to fracture the lead as it would the pad when the solder contracts as it cools. This would lead to an almost inevitable fault on all the keys would have to be removed before repairs could be effected. I am sure the solid contact type would be preferable.

The board has been constructed well on thicker-than-usual piece of fibreglass with

silk screen overlay to help place the components.

There are a few components, however, which have to have their legs bent quite considerably to get them positioned correctly. I am sure that some of the operators and especially the crystals could be damaged easily by this action by an over-eager assembler.

Everything else seems to go in quite neatly even though the voltage regulators do look a little hidden from view by their own heat-sink.

As is usual with the better designed kits the holes for the transistors are laid out for insulating pads although these are not included. Thankfully these transistors are of a larger body type than the ones which started off my campaign, and should tolerate a little more heat than these could.

As all the IC holders are supplied take care that you insert the right chips in the right sockets. Fortunately, all the chips are orientated with pin one towards the top or right of the board, which helps considerably. Another point about orientation is the electrolytic capacitors which are used to smooth the power supply. They are scattered around about the regulators and vary in their direction of polarity. Each is marked with its own polarity as is the board where it resides, so there should be no excuse for getting it wrong.

The Acorn Atom comes in a very sturdy case which is the size of many machines' keyboard cases. Even though not all the possible options are included in the basic kit the back panel is already cut out to accept them all. It would be a good idea to block up the larger holes to prevent dust and dirt from getting into the machine, so long as the regulators do not get too hot.

The power supply, as I said is separate from the machine, and plugs into the back of the box. It is heavy enough to power all of the options and more. External power is available from one of the back connectors if required.

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# DOWN TO BASIC

## STORING AWAY YOUR SCORES

Sometimes it is necessary to store a set of related data items while processing them in a program. For example, you might want to store a set of game scores and then sort them into order.

To do this you can store them in a list — or, as it is sometimes known, a one-dimensional array.

To create such a list, you must first of all inform the computer of the name and size of the list. This is done by using a DIMension statement which takes the form

```
(line no.) DIM (array-list)
```

For example,

```
10 DIM A(30)
```

would set up a list called A which could hold up to 30 data items. It is possible to declare several lists in one DIM statement.

```
20 DIM L1(5),L2(5),L3(10)
```

In general, the rules for forming names of lists will be the same as those for forming names of variables.

To refer to a particular item of a list, use subscripts enclosed in brackets after the name of the list. The subscript indicates the position of the item in the list.

```
A(8)
```

refers to the item in position 8 of the list called A.

A subscript may be a constant, variable or any other valid arithmetic expression. If the value of the subscript is non-integer, then it will be truncated to an integer value.

The value of the subscript should lie in the range

```
1 -> (size of list)
```

In some systems, the subscript may also take the value 0.

Elements of lists are sometimes referred to as "subscripted variables", and may be used in a manner similar to ordinary variables. The following are all



examples of statements containing subscripted variables:

```
10 INPUT A(2),L1(10)
20 LET S = A(1) + A(2)
30 PRINT S(4)
25 IF A(1) = A(2) THEN 10
30 FOR I = 1 - A(3) TO A(4) + 5
```

## LISTS, STRINGS AND CHARACTERS

It is also possible to have a list of character strings e.g. a list of names.

Such a list may be created in a manner similar to a list of numeric values except that the name of the list is followed by a "S".

```
10 DIM A(10),N(5)
```

would set up a list A, comprising of up to 10 numeric values, and a list N, comprising of up to five character strings.

The subscripts of a string array follow the same rules as those of an ordinary one-dimensional array (list), and the items of a string array may be used in a manner similar to string variables.

## GETTING THINGS IN ORDER ...

A very common operation in computing is sorting a list of items into order e.g. sort a list of heights into ascending order, sort a list of names into alphabetical order. I will now look at a program that could be used to sort a list of 30 numbers into ascending order.

I should point out that the method I shall use is only one of many sort methods. It is a fairly simple method but not the most efficient. The choice of a sort method depends on the number of items to be sorted and the attributes of these items. Many commercial applications involve sorting very large numbers of items in which case efficiency becomes very important. The method I shall describe should suffice for the most simple applications.

This method basically consists of working through the list comparing pairs of adjacent items —

BY MOIRA MORRIE

if necessary swap the items so that they are in the correct order with respect to each other.  
 read input data  
 repeat for each position in list  
 input item in list-position  
 end repeat  
 repeat for each cycle  
 let swap count = 0  
 repeat for each pair  
 if pair in order then goto end  
 repeat pair  
 swap pair  
 add 1 to swap count  
 end repeat pair  
 if swap count = 0 then goto print results  
 end repeat cycle  
 read print results  
 repeat for each position in list  
 print item in list-position  
 end repeat

This general program outline can be expanded into the following program. The best way to understand the program is to work through it using pencil and paper with some sample data.

## NOW GET DOWN TO WORK . . .

```

10 REM SORT 10 NOS IN
   ASCENDING ORDER
20 REM INPUT THE 10 NOS.
30 DIM A(10)
40 FOR I=1 TO 10
50 INPUT A(I)
60 NEXT I
70 REM SORT NOS.
80 FOR I=1 TO 9
   90 LET S=
100 FOR J=9 TO I STEP -1
110 IF A(J)<A(J+1)
120 REM SWAP A(J) AND
   A(J+1)
130 LET T=A(J)
140 LET A(J)=A(J+1)
150 LET A(J+1)=T
160 REM ADD 1 TO
   SWAP COUNT
170 LET S=S+1
180 NEXT J
190 IF S=0 THEN 230
200 NEXT I
210 REM PRINT RESULTS
  
```

```

220 FOR I=1 TO 10
230 PRINT A(I)
240 NEXT I
250 END
  
```

In the worst case, all cycles would have to be performed before the numbers were in order. However, in many cases the numbers will be sorted before the last cycle. For this reason, a count of the number of swaps in any cycle is included. If in any cycle there are no swaps, then the numbers are in order and there is no need to continue.

## COMMODORE BASIC

**VARIABLES:** Names of variables may be of any length and consist of any combination of letters and digits provided they start with a letter — however, only the first two characters are significant.

If a variable name is followed by %, it is an integer numeric variable and will take only integer values.

Integer variables cannot be used as control variables in a FOR loop. **STATEMENTS:** Can have more than one statement per line using a ":" as a separator.

Numeric values will be converted from one type to another type when necessary e.g. if a real value is assigned to an integer variable, then the real value will be truncated to an integer.

The form of the IF statement is either of  
 (line no.) IF (condition) THEN (statement(s))  
 (line no.) IF (condition) GOTO (line no.)

The ON statement can be used to transfer to one of a list of line nos. depending upon the value of a given expression.

(line no.) ON (expression) GOTO (list of line nos.)  
 (line no.) ON (expression) GOSUB (list of line nos.)

CLR clears all variables and memory space.

END terminates execution — can appear at any point in the program.

GET reads a character from a file or the keyboard buffer.

## NEXT MONTH

It is possible to have an array with more than one dimension. The commonest case being the two-dimensional array — a table of related data items. Next month, I will describe the use of these two-dimensional arrays and I will also include an example showing the use of string arrays.

The version of Basic summarized in the next issue will be the Atari.

**NEXT** if no variable, then it is matched with the most recent FOR statement.

**FOR** writes specified value of specified memory address.

**FOR** used to call an assembly language subroutine.

**WAIT** used to suspend program execution.

**FUNCTIONS:** ASC returns the ASCII code of the first character in the specified string.

**CHR** converts code number to character.

**FREE** returns the amount of free memory space.

**LEFT** returns the leftmost characters of a string.

**MID** returns a specified substring of a string.

**PEEK** value of byte in specified memory address in range 0 to 65535.

**POS** returns the cursor position.

**RIGHT** returns the rightmost characters of a string.

**SPC** used in a PRINT statement to supply spaces.

**STATUS** returns status corresponding to last I/O operation.

**STR** converts number to character string of digits.

**TAB** tabset.

**TIME** read internal clock.

**USR** calls the user's assembly language subroutine.

**VAL** treats the specified string as an arithmetic expression.

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## HARDCORE

A GAMES PLAYERS GUIDE TO THE VIC-20

EXPANDING  
MEMORY

The VIC-20 comes with 12K of usable memory and various ways will soon have to start thinking of expanding.

There is quite a choice about how you increase your VIC's memory. Commodore produces a memory expansion board which plugs on to the back of the machine and allows the user to add in extra memory cartridges.

The Commodore cartridges presently available offer an extra 2K, 8K and 16K of RAM — £20.95, £41.95, £49.95 respectively. The memory board connects to the VIC expansion port, and has six ports to allow the user to have all three memory cartridges, plus programming and cartridges plugged in at once, it costs £79.95.

Stack has a wide range of memory expansion kits using a page-lock technique. 32 costs £25, 64, 96 and 128; 144, 176 and 192, 244, £240 or £128.

Stack also offers a special memory board which allows the user to protect 96K of memory so that programs can be kept in while the machine is switched off. A battery keeps the programs in memory for up to a year and with 19K of memory it costs £78.

Stack Computer Services is at 260/262 Derby Road, Basildon, Liverpool 28, Merseyside.

Arten Micro has a VIC expansion system which allows up to seven cartridges to be added on to the machine. The memory expansion board costs £85 and the firm also produces three memory cartridges, 32 costs £20.95, 64, £49.95 and 128, £65.17 all plus VAT.

Arten Microelectronics can be found at Claydon Industrial Estate, Caermerfan, Gwynedd, North Wales.

Bedlines gives the user a chance to expand his VIC up to 32K and have a 48 column by 24 row layout compatible with the character standard. The expansion kit costs £25. Bedlines is at 124, Newport Street, Bolton, BL3 5AB.

CHARACTER  
DEFECTS

The main criticism of the VIC is the lack of character space it allows on the screen.

The screen layout is 23 lines deep and 22 characters long. As a result the text seems too clumsy to be pleasant to read and only short areas of a program can be listed on screen at any time. Each character is formed by an 8x8 bit matrix, so in high-resolution mode there is a possible 176 x 176 pixels to play with.

Up to 16 colours can be generated by the machine. Each character and the screen border can be one of eight different colours

The prospect of a low-cost colour computer supported by a company of Commodore's pedigree was the risk premium offered to the personal computer public last summer.

The premium was some time being fulfilled as a large backlog of orders built up while the bulk shipping of computers from the German factories was delayed. But the personal computer user is used to frustration of this sort and waited patiently. Now the VIC is appearing that patience with a quickly growing range of games and game peripherals and a sales figure of 15,000 a month.

For your £199.95 (after VAT), you will receive the VIC computer complete with a QWERTY keyboard, a lead to plug into a home T.V. and a power supply lead. It comes complete with 1.5K of usable memory.

The VIC's bright colours and graphics are well suited to gaming and a dozen firms are producing games software for the machine. The peripherals come from just a few firms but there is already a wide range. Names and addresses are laid out below — if an address is missing it will be included elsewhere.

Commodore is based at 875, Ave Avenue, Stought Trading Estate, Stought, Berks, SL3 4BB.

and the background, one of 16 possible colours.

Sound-wise the VIC is equipped with four voices, alto, tenor, soprano and white noise. It also offers a volume control which ranges from 0 to a very loud 15.

Coping arcade games is usually a good test of a computer's sound and graphics facilities and the VIC produces some very faithful copies. The range of graphics characters provided by the VIC can be supplemented by defining your own graphics made up of 8x8 pixels.

Commodore produces a super expander kit — a cartridge to help improve the graph-



Bedlines, T.V. presenter and larger than life character, David Bentley gets to grips with some of the VIC-20's larger than life characters on his T.V. screen.



# HARDCORE

## A GAMES PLAYERS GUIDE TO THE VIC-20

ing capabilities and it costs £24.95. It includes commands like: paint, colour, draw, erase and sound.

## SOFTWARE SUPPLY

Software for the VIC is growing in supply to meet demand.

At least 10 software firms are tugging to VIC-20 production, some of which began in the business by supporting the Pet so many of the programs find an easy fit for the VIC-20 conversions.

Mr Mory of Manchester is an example of this type of firm. It started with Pet programs but now has moved on to VIC games. Over 40 programs are listed in his catalogue including *Gold Rush* which is a similar idea to the recently salvaged puzzle, posed in the book *Aparquawise*. The object is to win a real nugget of gold by solving the game, the nugget going to the first person to do so. Another is a game entitled the *Great Baller Race*.

Mr Mory can be reached at PO Box 24 Bolton M27 3AL.

Big Toys is another major supplier having moved on from the Sinclair ZX81 and the Acorn Atom, on its lists at the moment are *Vixies*, which is a version of *Focus*, *Vogelman* (backgammon), and a version of *Arctical* called *Another Vic in the Hat*.

D Rames is in the process of building up its VIC-20 software library. Currently with *Res* and *Deflex* on the books and one cassette with ten programmes. They cost £4.95 each and £9.95 for the multi program pack. An IR 5-resolution Res will soon be available for £4.95.

Some 17 programs are on the catalogue from Autogenic including well-known games like *Aden* in which you have to trap foreign beasts and bury them in holes in the ground. That costs £7.99 for the pleasure. Also on the list is *Star Wars* the game based on the adventures of the screen hero Luke Skywalker. It costs £9.99.

Autogenic imports game software from the American firm Creative Software who supplies VIC programs. The firm can be reached through PO Box 34-35, Crown Street, Reading, Berkshire.

Liverpool based Supersoft is just beginning to branch into VIC software after having been one of the leading Pet software suppliers. First off the production line is an action game called *Rightmare Park* which should sell for £4.95. And a war-based game *Tank Battle* is shortly to be available but has not got a fixed price yet.

For further details write to Supersoft at 1st Floor, 10-14 Caning Road, Westcliff-on-Sea, Essex, SSM-5Eux.

Smaller firms providing a more limited range of software are as follows: Angle American Software, 138a Stratford Road, Spackholt, Birmingham, B11 1AG; Big Softie, 1, Kinnon Park, Sealford, BR7 0LH; Bridge Software, 36 Fernwood, Maple Bridge,

Stockport, Cheshire; G. Moon, 4, Acker Road, Woodhurch, Birkenhead, Merseyside; Gibson & Harvey Enterprises, 48 St Leonards Road, Sealford on Sea, East Sussex; M. Fash, 7 Greenways, Kewest Woodstead, Hertfordshire.

Thorn EM is also in the process of developing software for the VIC-20.

Commodore itself is supporting the VIC with a range of ROM cartridges and also has a very addictive cassette game called *8088*. It costs £9.95.

## JOY OF STICKS

Any game who has struggled with four directional keys while trying to keep half his mind focussed on the "fire" button knows why you the "joy" in front of "stick".

The VIC-20 currently has two joysticks available. The Commodore version costs £7.50 and includes a fire button.

Stack Computer Services includes joysticks in its large range of VIC peripherals. These retail at £7.5 each.

Commodore also offers a pair of joysticks for £11.24 (plus VAT).

Stack supplies a light pen for the machine which works in both normal and freeze modes, allowing interaction with the screen without using the keyboard, it costs £25.

Like the Pet the VIC-20 uses a specially made Commodore cassette recorder to load programs. It interfaces directly to the computer and includes a tape counter. The recorder uses standard cassettes and costs £24.95 (after VAT).

A single drive floppy disc unit for the VIC is available from Commodore. It has 174,848 bytes storage capacity and uses standard 5 1/4" single density floppy discs and costs £28 (after VAT).

The Vic printer's features include: 80 characters per line, a 30 character per second print speed, and double size graphics. It is a dot matrix printer and costs £20 (after VAT).

Stack produces a VIC-RS232 interface which will allow the computer to be connected to mainframe computers and act as a terminal or drive a daisywheel printer. It costs £85. A terminal version of a bi-directional RS232 interface costs £11.25 and is also available from Stack.

Commodore's RS232C terminal type interface provides the opportunity to connect to telecommunications controllers and other computers. It costs £24.95. Daisywheel printers can be interfaced to the computer via the Commodore 8022-486 cartridge for £24.50.

Among Stack's other offerings are: a VIC games port cable adapter which gives you two games ports for joystick and light pens, £11.75; a games port multiplexer needed for two joystick games, £2; and a VIC reader which includes freeze graphics facilities and remember and write number features and costs £25 with a manual.

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## A GAMES PLAYERS GUIDE TO THE VIC-20

## FOR AND AGAINST

The VIC-20 has various bad points for the user. Other than the obvious 32 column problem there is a distinct lack of expansion sockets, any expansion being forced outside the computer. This implies buying expensive motherboards that aren't really performing any expansion themselves.

There are a few software nuisance such as input prompts being listed to 32 characters and some scrolls when writing at the bottom of the screen.

The cassette storage system could be better. Load and verify errors are not logged until the end of a file and the data rate is no faster than normal audio techniques — the special system used by Commodore could be a lot better without increasing prices.

In its defence, the VIC has good basic, super graphics and is of good mechanical construction. The package seems excellent value for money being compatible with the Pet and having codes of add-in peripherals.

The after sale support is slight considering that add-ons, software and literature are not really around yet. I feel the machine to be caught up in the power and recall by Commodore and their approach and speed in this matter could not be faulted.

All in all, an excellent machine and well worth its purchase.

## PLUG-IN GAMES

One of the VIC-20's great gaming advantages over other computers is its plug-in cartridges.

Commodore is supporting the computer with a range of games programs recorded on cartridge which plug into the back of the machine and include enough extra memory for the expanded VIC to recreate popular arcade games.

These sell for (£120 plus VAT) and the range is expanding quickly. It includes a meticulously accurate copy of arcade space invaders (complete with 244 flying saucers) which will under the name VIC Avenger. And just released a Pac-Man game called Jelly Monsters which compares well with the arcade original.

Galaxian is to be found in the form as Star Battle and its own favourite is a Rally V variant called Rat Race. Also out are Alien, Road Race, Super Lander and Super Slot.

Out soon in cartridge are a series of five Start Adams Adventures, including: Adventure and Mission Impossible and an exciting and imaginative Pinball game.

Commodore has taken its time to bring these games out but it is going for a high quality rather than quantity and in the case

of Avenger, Rat Race Jelly Monsters and Star Battle has succeeded in this aim.

John Miles hopes to have a range of cartridges available for the VIC ready in this summer. Similar to the Commodore games cartridges and costing around £8 the Welsh firm has plans for a dozen games initially, including space invaders, Ricochet and Die Smiler.

## WRITTEN WORDS

The time to write books on the VIC has been short but there is already a collection on sale vouched out to meet demand.

Getting Acquainted With Your VIC-20 is by Tom Harwell, author of a book going by the same name for the C64. It costs £5.95 and is obtainable from Gurus Computers, 11 York Road, Molestead, Berkshire.

The VIC Revealed by Nick Hancock is said by some buyers not to live up to its name, causing their confusion. It is published by Nick Ramage Publications at PO Box, 13, Lyander Road, Yeovil, Somerset and costs £10.00.

Teaching in machine code for those users interested in the subject is a book called Assembly Language for VIC-20 by Dr P. Holmes, price £10.00. Copies can be obtained from the author by writing to: Colin Drive, London W11 5G. This 200 page book contains a ROM instruction set, programs, exercises and an assembler listing.

At the beginner's end of programming is Start With Basic on the Commodore VIC-20 which costs £9.95. Written by Don Marco and illustrated by Bill Tyle it is available from Tiny Publishing, 25, Beach Hill, Haywards Heath, Sussex.

Sigma Technical Press is planning to get in on the act and is in the process of compiling a book about the VIC-20 but precise details are not yet available.

Commodore publishes several books on the machine, including Learn Comp Programming with the Commodore Vic by L. Carter and E. Huxon which costs £12.95 the VIC-20 Programmer's Reference Guide is by A. Finkel, S. Harris, P. Hightower and M. Tomczyk. It costs £14.95.

Commodore also produces books with demonstration cassette to help users get the most out of the computer. Introduction to Basic (part 1) costs £4.95 and the Programmer's Aid Cartridge gives 28 with comment reports to help make the programmer's life easier. It includes advice on using the function keys and includes ASCII, HEXAD, DEPHUMPER and MATHS code manuals. It costs £9.95.

A Machine Code Monitor cartridge book helps the user get to grips with the assembly language. It has assembly disassemblers, hex dump, colours, line point and transfer among its features and costs £9.95.



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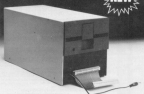
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# ingenious ...but lonely!

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WHEN YOU ARE STUCK YOU'VE CRASHED! START AGAIN!

Among the 2 bits of Data A (empty) A and the 2 in Column 2  
from the Bee in the middle, move 2 into the middle square.  
Then find Data Z from the Bee.  
Only one Data Z from the Bee.  
If you find the Bee, you can move it.  
Move the Bee into the middle square.  
Then find the Bee.

