

DECEMBER 1981  
73p

# COMPUTER & VIDEO GAMES

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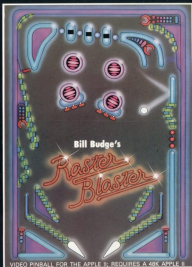
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# COMPUTER & VIDEO GAMES

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## NEXT MONTH

**W**IKI summer the summer of the software business in our January issue. An "E" Certificate is topped on our review pages on Elaph's Johny tracks down and gets to grips with a copy of Solitaire... one of the new generation of persnicketic computer games. Should you be dressing your mouse in a pleated skirt?

**W**E take the wraps off the 1987 stocking-fillers this issue but what has Christmas '87 in store? We preview the British Top 5 Holiday Fair and the store of electronic woaders that kids will be clamouring for a year from now.

**O**UR Treasurer Rust wins top billing in the January games program listings. A fully-fledged car waders for you to buy in. You can't fortle a farocious creature of fantasy in Dragon Dragg'n' and Sinclair owners will find these 16 woaders the best of their mice.

**T**HE arcade game which is being tipped as the game to watch in '87. We look at the game which will be filling video screens around the country in *Acadia Action*. Plus your last chance to bid to be the Best Arcade Game Player in the World and the final three arcade creatures which could help you win a Taito space invaders table of your very own.

**A**ll this on top of our first look of the computerized Bridge game, our regular round-up of the latest games and first-class features. Make 1987 a year to remember by starting it off with a copy of Computer & Video Games.

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You'll find all the help and advice you need about the MZ-80K at your local Sharp Dealer or the list below.

If there is no dealer in your area, or you require any further information write to: Computer Division Sharp Electronics, UK Ltd, Sharp House, Troop Road, Newbury Heath, Newbury, MK16 9SL.

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# MAILBAG

MORE LETTERS  
on Page 7

## PROGRAM TO PUZZLE OVER

Dear Sir,

### FREE PUZZLE PROGRAM

- 10 PRINT "TAKE PENCIL AND PAPER"
- 20 PRINT "EXAMINE CARDS, CALL NUMBERED SIDES 'A' AND UN-NUMBERED SIDES 'B'."
- 30 PRINT "STARTING AT ZERO (TWELVE O'CLOCK) DEGREES - I SUCCESSIVELY NUMBER EACH 45 DEGREES 1 TO 6"
- 40 PRINT "MATCH AND LIST MATCHING SYMBOLS, FOR EXAMPLE 1A1 - 2B2 AND 4A4"
- 50 PRINT "CONSULT LIST AND MATCH CARDS"
- 60 PRINT "1A5 - 2B3, 3B4 - 4A8, 4A6-1A3, 5A1-1A7"
- 70 REM I THINK THIS PROGRAM DESERVES A PRIZE FOR AUDACITY, EVEN IF ITS ONLY A YEAR'S SUBSCRIPTION TO YOUR NEW AND EXCELLENT GROVEL, GROVEL MAGAZINE.

Peter Brown  
Wear Bridgeford  
Nottingham

## GAME FOR A NEW MODEL

Dear Sir,

Firstly, can I congratulate you on a, happily, very different magazine which I think is assured of being a long and lasting success. I have a Tandy TP9-80 Model I and look forward to keying in Tutor when I have the time. However I am thinking of upgrading to the new Model III machine but am waiting to see whether any games software becomes available for it.

Do you know if any software houses are going to specialise in

the Model III Tandy. I have quite a library of Model I discs and would like to build up a similar one for the new machine.

A. Fodgiker

Accew

Middleton

Editor's reply: The best answer here is that the Model III does have a conversion facility so that Model I discs can be changed to run on the upgraded machine. The technique is well documented in the Model III's THE DOS manual.



## A TALE OF TRIAL AND ERROR

To whom it may or may not concern (in other words, to the person who doesn't want to concern himself with it, and I don't blame you).

I wish unobtrusively to tell you that I have been the solution to November's puzzle. Unfortunately, we (my family) won't have any sort of programmable or semi-programmable computer or T.V. game until Christmas, when we get the Atari T.V. game, and then, I was not able to think up a suitable program to run on the nearest computer, Bee miles away in Portonovo.

So I tried trial and error, and then I tried maths, and with a little luck stumbled on the solution at roughly 7.30 (I had bought this magazine at 3.30).

What I wish to know is it

possible to get some sort of wooden spoon? If so, I would like very much for you to send me as much info as you can legally gain from Atari about their T.V. game. But wait for it... In return I will give an honest criticism of YOUR magazine! READY? ... (clears throat) HUH.

For a start, though I run the risk of being shut, I think your magazine centres too much on the actual games programs.

Secondly, I find only one page for the Bags, which, I think, are highly entertaining and should be given more room (by the way, the network is incredible).

Thirdly, the words "hardware" and "software" are thrown around like ping-pong balls (what are pseudo-random numbers?)

To finish, I think your Basic programming guide is a great help to my classes. I do computers for "O" level but unfortunately, our computers won't arrive until January.

Colin Agnew

Lurgan

Craigpovov

Co. Antrim

Editor's reply: To all the many people who wrote in with solutions to our giveaway puzzle, congratulations, you did much better than I did!

But without a computer program to go with them, I'm afraid the best that you solved the puzzle II have heard of solution times ranging from 30 seconds to two hours is not enough to win you a computer — we need a program listing as well.



# MAILBAG

## CITY BOMB BOMBS OUT

Dear Sir,

Having just purchased the first edition of your magazine, I was sorry to find so many faults in your City Bomb program. I have a ZX80 with new RAM and am very new to programming but after much puzzling, I finally got the program to run.

Apart from this I found the magazine very good.

J. Wilson

Widlow

Essex

Editor's reply: We were amazed to discover the mistakes that had crept into the City Bomb listing. We were made to do penance by rushing around answering the many queries about the listing after we appeared in the newspaper.

For the record: Part of line 169 went mysteriously missing. It should read:

```
169 IF NOT F = 118 AND F=0  
THEN GOTO 760
```

A bracket escaped from line 165. It should read:

```
165 LET X =INT (RAND*2) +10
```

## CAUGHT IN THE TRAP

Dear Sir,

I've just seen your new Computer & Video Games, and on the whole I think it is quite excellent.

Unfortunately you have fallen into the "trap" of those "lites" before you.

You have published nine programs for nine computers, but, who, in the home computer hobby circles, has access to nine computers? I'm sure that with a bit of research it would be possible to produce a page of computer dialects.

I'm not suggesting you do it with every computer, just those that have their own dialect.

In addition I suggest a similar thing before each program, giving the alternative POKEs for each machine etc.

As hardly anyone has access to nine computers, this would make nine programs accessible to almost everyone, and I'm sure it would get you "read and abusers" over the other "lites, who just say: "the POKEs have to be changed" — but to what?!, and would almost certainly ensure your survival in a competitive field.

I look forward to your Adventure series, especially writing your own.

B. A. Moore

Boxton

Leam

Editor's reply: That is a perfect solution Mr. Moore but I think we would soon run into problems if we tried to produce a table with each of the many computers' special Basic commands. However, we have already adopted your idea in our *Down to Basic* pages, where we are teaching the language with reference to each machine's statements and how to transfer a command from one to another.

## A CHANCE TO REVIEW

Dear Sir,

Thankyou for a marvellous magazine which I thoroughly enjoyed. I would like to contribute to the "mag" myself and wondered if I could offer my services as a reviewer of games on the ZX81 and possibly the Avon 486 (after Christmas).

I have acted as a reviewer for many of the lesser known games magazines and would welcome the chance to tackle some of the

If you have a comment or idea for Computer & Video Games we would like to hear from you.

Please drop us a line at: Computer & Video Games, EMAP, Durant House, 4, Market Hill, London EC1R 5JD. While we will respect requests for anonymity, names and addresses must be supplied.

many computer cassettes now out on the market.

I also have a Philips G7000 games centre which I could utilise on your behalf in reviewing their cassettes.

Either way can I wish you all the best for the future of a welcome addition to the magazine world.

F. Cheeser  
Ridgewayworth  
Motts

Editor's reply: We have received several letters already from people who would like to help us out with our reviewing of games and TV centre cartridges. We do use outside reviewers and would welcome some additions to our list of helpers, so if you are interested please write and let us know which machines you have access to and we will try to send you some tapes and see what sort of a job you manage. If possible please enclose details of whether you can use disc drives and give us a work and home phone number to allow us to contact you easily. If we get swamped with reviewers for a certain machine then I'm afraid you will be unlucky but until then, we would love to hear from you.



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# NONCOMPETITIONCOMP

## ARE YOU KEEPING THE ALIENS AT BAY?

Do space invaders fight each other to avoid duty on machines which you're playing?

If so, then why let your reputation rest on these cold distant planets inhabited by the green machines, let your own world into the secret.

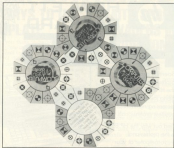
In conjunction with Teiko Electronics we are searching for the fastest, deadliest arcade player this side of Alpha Centauri. No matter which game you excel at, you are eligible to enter and it's very easy to do so.

Just turn to the reader reply card, which you will find inside our back cover and fill it in. There are some questions to be answered on what you are looking for in arcade games, so that we can tell the manufacturers and help you to get the kind of games you want.

Next fill in the name of the machine which you have accumulated all that expensively won expertise and take the card down to your local pub, club or arcade. Put the best score you can on the machine and ask the pub or arcade owner to sign it and send it off to us.

Should you find yourself finishing with a score which is not up to your usual standard, simply try again.

If, after you have sent the card in, you manage an even higher score, don't worry, you'll find another card and another chance to enter in our January issue.



## HERE IT IS SOLVED AT LAST!

We will keep a running chart on the scores on the 10 most popular arcade games which will be published in our Arcade Games section to give the rest of you something to aim at.

And the three top scores on the three most popular machines who send us back their entry forms by 1 January will be invited along to take part in our Grand Arcade Game final.

So if you are the only human still keeping the multifarious hordes of space still locked inside their machines and off the streets of Britain, then let the world know who they owe their thanks to.

Here it is ... the free first issue puzzle as you might have despaired of seeing it solved!

Although judging by the amount of letters and phone calls we had, many of you have already managed to match the four cards as shown above.

Times for the puzzle ranged from an impossibly "lucky" 30 seconds to a couple of hours slugging through mathematical formulae. Many of you proudly claimed that you produced a solution without the use of a computer.

Our congratulations go out to all of you who managed to do what we in the office couldn't, but I'm afraid that there are still only three VIC-20 computers up for grabs and these will go to the best programs we receive to solve the puzzle.

But it's not too late for you to enter, the closing date is 13 December when all the entries will go forward to be tested against one-another by our judges.

Next issue we will be printing our program solution for those of you who could not work out how to start.

And if you were one of the many who complained that you do not yet have a computer and so were unable to enter, then turn to page 11 where you will find the all-too-easy-to-enter Great Template Competition.

## BRAINWARE ANSWERS

Mercury, Venus and Mars will be the first three planets in line with the sun in our Mind Ecotunes problem. And this astronomical wonder will take place in some 7,345,601,897,088 days (round to seven decimal places).

The solution to Neveva's Crossword is printed right. We will print the names of the winners next issue.

This month's Brainware problems are on page 28.

T	H	E	S	U	B	B	L	E	S	O	R	T
H	A	A	A	L	L	E	C					
E	P	I	C	S	T	E	P	S	C			
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# ITION COMPETITION COM

## TEN WINNING WAYS TO USE OUR TEMPLATE

You are now the proud owner of a Computer & Video Games free template and are probably wondering just what miracles can be performed with it.

The quick-witted among you will probably already have noticed that the edges on the template are ruler-sharp. Some

you think it ought to be a template at all or who among the rich and famous could make best use of this 8" x 11" piece of plastic and why?

The 10 most imaginative suggestions which we receive by 7 December, will win a Rega T-shirt and their names and ideas will be entered into the annals of Computer & Video Games' history.

ENTER THE GREAT TEMPLATE COMPETITION  
SEND YOUR PRODS TO US TODAY  
SEE THE COMPETITION PAGE IN THIS ISSUE FOR DETAILS.



of you might possibly have gleaned the information that when it is linked up along the bottom of a C&VG page, it reaches from one edge to the other.

The reasons for this may soon become clear... long ago, when this publication was a barely suppressed gleam in our publisher's eye, he pondered long and hard over the problems of keying in computer listings.

Realising the difficulties of keeping one's place in a long listing, he decided that what the public was crying out for was a tool — a carefully designed precision instrument to help with the keying-in process. He came up with the very template that was attached to your magazine's front cover.

So we want you to use the template to key in our program listings. You might have come up with some other more imaginative uses for it. This is the essence of the Great Template Competition: we would like to know just what you would like to use our template for, whether

The judge's decision is quite final and her mind is reasonably unswayed — it might be worth bearing this in mind.

## COMPETITION RULES

COMPUTER & VIDEO GAMES' many free competitions are open to anyone except C&VG employees and their relatives.

Entries to our Mind Races, News Crossword, News Year Creator, Great Template Competition, Game of the Year and Arcade of the World competitions, should be sent to: **COMPUTER & VIDEO GAMES**, Bureau House, 21 Market Hill, London EC1R 3LS. Judges' decisions are final and no correspondence can be entered into.

Send entries to Mind Races on a postcard and in all cases please include a name, address, and where possible, a phone number — so we can let you know should you have won.

## TAITO SPACE INVADERS IN YOUR HOME

A Taito space invaders machine is up for grabs for the winner of the Know your Creatures competition.

Taito Electronics, the name behind the space invaders craze, will make one reader's dream come true — putting an inexhaustible supply of alien terrors, safely locked away in a cocktail table, in his or her living room.

If you can tell which machines the three creatures below inhabit, then that space invaders table is looking closer already. All you have to do is write beside each picture what machine you think that particular creature features in. For example, if the first one looks like a Puckman, Pacman or Muzumun (whichever), then write any of these words beside it and we will know what you mean.

Then answer the question below, in not more than 25 words and cut out that part of the magazine, but do not post it yet. Put it with the three creatures we featured in our first issue and in our January magazine you will find the last three creatures to complete your set. When you have named all nine, send the three sections back to us.

This gives you time to hunt around your local arcade if there is a creature you are not sure of. The first correct answer out of the lot wins Taito's space invaders table.

And if you missed our first issue, then don't despair as we will be showing them again in that January issue.

## KNOW YOUR CREATURES/2



Name \_\_\_\_\_  
Address \_\_\_\_\_

Telephone: \_\_\_\_\_

I THINK SPACE INVADERS PROVED SO POPULAR BECAUSE:

For details of Computer & Video Games competition rules see page 8.

# NEW PRODUCTS NEW PRODUCTS NEW PRODUCTS N GAMES NEWS



## THE NEW CHESS CHOICE

Chess enthusiasts, who opt for a computerized opponent are facing an ever more difficult choice to make.

London-based Westpac has a new medium priced chess game (it sells for £180) featuring layers with a yep for a "full-sized chess board in an attractive brown plastic casing".

The chess board has a sensory surface with lights in each square which show when the computer wants to move. The player has to move his piece into the new position. It means you don't have to enter each move via a keyboard — just like playing a human, except you can set the skill level of your opponent.

Altogether there are 32 different levels, ranging from the learn mode, where the computer will help you along by suggesting a suitable move to make, to good club player standard.

If you make illegal moves the computer will also let you know by flashing it's lights at you. Lights also flash when the player's king is in check, and when checkmate is achieved it will make another noise.

The game sells under the name Westpac CC1 and is available directly from the firm which is based in North London.

## A RANDOM ADVENTURE

### THE DUNGEONS OF DEATH

Not only a random dungeon but random monsters await the intrepid adventurer who starts the Dungeons of Death.

Ten tortuous levels have to be braved in a 45 minute time limit to win through this graphically displayed adventure.

The adventurer must first battle with the dungeon master for his arrows — magic and the more usual weapon variety — his characteristics are then gener-

ated. He is armed and armored and then sets off on the quest by leading the first level.

A lot of strangely named monsters with a toughness rating in percentage terms is generated and should be memorized if you are not going to end up fighting something deadly after running from a pretty harmless creature.

Treasures are there for the taking to reward the bold adventurer.

## A BETTER BET FOR PUNTERS

### HELTA SKELTA FLATS

Followers of the Earl will find the "Sport of Kings" lovingly reproduced in the horse-breeding and racing game of Helta Skelta Flats.

The aim of the game is to breed horses and then run these thoroughbreds in a race against real horses, placing bets on them to win money.

It is similar to that popular board game Totopooly and a fascinating concept for the Sinclair Z88, but in some ways it requires more work with pen and paper than with the keyboard.

The Z88 acts as a random selector for most of the time, with the information being kept on forms which come with the games package. Two-on players can take part.

Each contestant starts by naming their horse, and the computer allocates various characteristics, for example, good runner or weak legs. This allows the player to enter the information onto the

form card. Once this is done breeding can take place — for a fee. It should be possible for somebody who knows about these things to produce a winner.

Once interbreeding has taken place the race can begin. Odds are calculated by the computer depending on the form of each horse. Bets are also taken, with bets slips also provided in the package. The race is run and the winner collects from the other players.

Our reviewer felt more work needed to be done on the presentation and that some of the paperwork necessary could be incorporated in the available 80 of licensed literary Horse Racing enthusiasts will soon forgive these niggles though.

Helta Skelta Flats comes from London-based Helta Skelta Software and costs £15.

It runs on a Z88 with 192 KRAM pack.

The game is supplied by London-based Sharpsoft for the Sharp M2 80K and costs £1.75.

Among the other new games from Sharpsoft is a logical test for people who like a financial challenge. It is called Stockmarket "T" and involves assessing so many stocks and shares of the highest prices as possible.

Stockmarket "T" costs £3.95. VAT and postage are included in both games.

## A FEW POINTS TO MAKE

### RHINO

A scary tale awaits the computerized figure who walks innocently onto a field in Rhinoceros.

He is lured by an animal of the same name with a hairy temper and a rather intimidating horn. The creature in question tends to take an instant dislike to anyone invading his territory and has a few points to make on the subject.

Luckily there is a wooded area in the field and that is the poor unfortunate's only chance of escape. He must carefully entice the temper rhino into the trees and try to lose him there.

Even if he succeeds, the reward is not a pleasant one — with only a few seconds to spare he wanders into another field to find himself with two beads to lure to a forestry forest!

While coming on a tape with another animal game called Wiggins. This time there is a snail, but equally dangerous creature to contend with. The player has to guide a snake through the gaps in a set of parallel walls. But once that is mastered the game gets more difficult with the gaps getting more closely spaced.

These two games are for Acorn Atmos with 65K memory and require the floating point ROM. The cassette is priced at £3.00 from Liverpool-based Big Bits.

A second new cassette from the firm contains three games: Squares, in which you have to arrange letters in alphabetical order within a square; the musical memory game Simon; and Parachute which involves landing three parachutists on a platform. This also costs £3.00.





## GAMES NEWS

WHERE THE  
ENDS ARE  
REALLY DEAD

## MONSTER MAZE

Finding the way out of a maze is difficult enough without the hazard of man-eating monsters waiting to gobble you up if you cross their path.

Running on the Commodore VIC-20, *Monster Maze* is an unusual game without a time limit and could be a big seller. The maze unfolds in five square sections as you work through it, so you cannot see where you are headed — it could be a dead end.

At the beginning of each round a new maze is generated randomly so the player cannot get familiar with a particular one. He controls a man at one end of the maze using a joystick to follow the path moving up, down, right or left. As the player does not know the section he is walking into will be the correct path the game can be frustrating when you keep finding dead ends.

It sounds easy enough but not when a hairy monster is guarding the exit and moves towards you when you attempt to killing you. He is a crafty beast and moves only on the down line, so he sometimes waits diagonally and has the nasty habit of hiding in the walls of the labyrinth — lying in wait to take the intrepid explorer unawares.

With each new maze the number of monsters increases, creating more hazards to negotiate. What you can do to thwart them, is lure the creature away from the exit. You have to be clever to entice him towards you, making sure you can slip-strip him and quickly take your wily to the exit.

Once you have reached four three with three monsters lurking in the maze for the next stage you are given a break with only one monster to contend with. For each round completed you score points.

This is one of the latest games for the VIC specially imported from the *Starline* by Adels Computers' VIC Centre. With one other game on the cassette it sells for £14.95.

THE KNIGHT'S  
DAYDAMSEL AND THE  
BEAST

The age of chivalry and galantry returns in the maiden in distress game, *Damsel and the Beast*.

The player takes the part of our brave hero, sworn to save the bewitched but workless damsel who is locked in the bowels of the wicked beast's lair.

A rather tongue-in-cheek adventure, the game sets its hero a randomly generated 25

rooms to search through to complete his task. The damsel must be found by working through these rooms, some with clubs which can be used either to beat the beast, or smash down obstructing walls.

Only once the hero has slain the beast can he lead his thoughtful damsel to the exit.

To help light his path our knight is given a number of torches at the outset, which can be used to beat off the beast if he attacks. The tails of the clubs and torches is kept and displayed as each can only be used once.

Bug-Byte is the supplier of this adventure game and it is for use on a ZX81 with 128 RAM just. The price £5.95.

BOLDLY GOING  
ON THE ZX81

## STARTER

Captain Kirk and Dr. Spock are ready once again to tackle the battles of the farthest galaxies but this time through the spaceship of a *Sinclair ZX81*.

The 128 RAM pack gives ZX81 owners a *Starlink* game with more details and more facilities. It entails all the usual features of *Starlink* with the player in control of the *Starship Enterprise*, navigating it and Kirk's crew in a hazardous mission through space.

The Klingons are there in full force too, complete with super-fast firing lasers which the *Enterprise* has to avoid. She can defend herself with the special photon lasers she is equipped with. *Starlink* costs £9.95 from Bug-Byte of Liverpool.

WORKERS  
STRIKE IN  
ALIEN ACTION

## APPLE PANIC

The space labourer is given a tough test of his work ethic in the alien-busting game of *Apple Panic*.

Any attempt to down tools from the worker of the future, results in death by derelicting. The labourer is given a shovel and a network of ladders connecting various levels on the screen.

His task is to climb the ladders and dig holes which the Apple stems will unwittingly fall down and hang from suspended by their levers. The workman then puts aside all thoughts of tea-break and rushes up to fill in the hole and send the creature plummeting to its death before it can climb to safety.

Five levels inhabit the first "well" and these can be killed by a fall of just one level.

The second successful structures include a variety which can only be destroyed by digging two holes, one under the other, and sending him crashing down two levels.

If you succeed in bringing down this second creature, a third — meaning a three levels fall to kill it — appears.

There are three lives to start off with, but bonus lives can be gained by the industrious. This time and motion starliner's delight is available from Richmond based SOE software — among others — for £9.95.





# NEW PRODUCTS NEW PRODUCTS NEW PRODUCTS GAMES NEWS

## MOORE STARS ON YOUR T.V.

### CONSTELLATION

A computerized road to celebrity stargazing, Patrick Moore, can guide you through the night sky and its starry wonderland.

Constellation is the astronomy aid which will turn your television screen into the night sky—with the help of an Acorn Atom. The view you get on the screen is of the night sky as seen through the rotating lenses of a telescope. Using this computerized guide it is possible to look at stars from any point in the northern hemisphere at any chosen time and date.

All the stars that appear on the screen can be shown by magnitude, constellation or number (supplied in a list with the cassette). Make use of the zoom facility to get a good close-up of selected stars.

This program was written for a Neosim originally and has only just been converted for use on the Atom. Program Power of Leads is behind this version which will test astrology fanatic's IQ.

Another recent addition to Program Power's Atom list is Maxwell. The player's part in this game is to control a ball which bounces up and down the paths of a maze.

A variety of hazards crop up in your way which must be avoided by bouncing the ball out of their path. Maxwell retails for £14.95.



## REBEL AGAINST AN EMPIRE

### PROJECT NEBULA

The galaxy has been taken over by a force of ruthless, wicked aliens bent on suppressing the inhabitants.

A lone rebel leader with a spaceship is the only means of defiance and the only hope of leading the galaxy of the terrestrial invaders. The player takes control of the rebel and plans his strategy against the alien empire.

Project Nebula is the mission undertaken by the player to free the galaxy. In the Tandy TRS-80 colour computer game, there are

four levels of AI, so the player can work his way through from inexperienced to advanced.

Special features of this new game include checking the fuel levels and refuelling and having to fly a disabled ship, damaged in an exchange of fire. Control is via a joystick.

From the Trends Corporation Project Nebula costs £24.95, fairly expensive as games go but the new Tandy has colour graphics and the software is most up to date.

## GOLD RAID ON THE LABYRINTH

### MINOTAUR

Take a giant step with two hands full of gold and it might take you right into the jaws of a greedy minotaur.

He passes the labyrinth of a deep cavern guarding the valuable bars of gold which lie wrapped up inside a treasure chest. As soon as he senses an exit passage in his lab, he is on the alert and uses his automatic homing device to track down the intruder.

The only thing that will stop him moving towards the intruder are walls blocking his path but he

will turn it using a random direction to surprise the intruder.

The adventurer who dares wander into the minotaur's territory is armed with a specially developed minotaur detector which warns him when the creature is five squares away. The higher the tone given out by the detector the nearer the creature is, warning the intrepid explorer to take evasive action.

Like any human the explorer can only carry two bars at once so he has to keep making trips back and forth until all five are

securely locked up in the wall safe.

Minotaur runs on an Acorn Atom requires 6K with 6K graphics. It is the latest peak out from Acorn's software arm of Accosoft.

Two other games are on the cassette, a version of the popular arcade game Pacman called Snapper, and a sadistic but compelling game, Babes. The player must catch babes who are leaping for their lives from the top of a burning building. If the minotaur misses three babes, it marks the end of the game. It costs £10 plus P.A.T.

## PLUMBING THE 3-D DEPTHS

### SUBMARINE

### COMMANDER

For sheer atmosphere it is hard to beat a good submarine warfare game and the new one coming out for the Atari home computer has the graphics capabilities to really bring it to life.

Called Submarine Commander, it incorporates 3-D graphics. Realism is brought out with all the dials and gauges found in a real submarine, including air pressure, oxygen, speed and depth readings.

And that atmospheric beeping sonar, tracks your own vessel's path with a shadow indicator as well as revealing the presence of other enemy submarines in the area.

You can take the vessel into battle station mode and see temperatures at a chosen range and depth.

To add variety and realism to the submarine's simulation, the programmer who wrote the game for Atari has given the player three different views to see sonar.

Firstly, there's the picture of the scene below and around the sub, so you can see hazardous objects and possibly creatures which might be lurking in your path. Then, there's the view of the submarine's position in relation to the land, and finally what is in sight when you look through that vital periscope.

This will be out at the end of November from Atari's U.K. distributors, Ingress Electronics. The cost is £25 and a full review will follow in a future issue.



# the vic centre

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FEATURES This board allows VIC to store back to input at 1024 characters in 16 bit and outputs the data in 8081 MICROVIA™ COLOUR GRAPHICS.

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# adda

# CHESS



AFTER the hoax perpetrated in the mid 18th century by Von Kempelen's Chess-playing "automaton", the world had to wait until the end of the 19th Century for the genuine article.

The Spanish, Leonardo Torres y Quevedo (1824-1908) was an early pioneer of dataprocessing and a prolific inventor. He built an electro-mechanical device to play the basic endgame of King and Rook against King.

The machine, which appeared in the 1890s, always played White (the stronger side) and



invariably forced checkmate, although frequently not in the smallest number of moves necessary.

Torres' principle motive for building the machine, was to disprove the argument that automation could never be used for tasks which required the "intervention of the mental faculties".

## By Max Bramar

In 1971, Donald Michie, Professor of Machine Intelligence at the University of Edinburgh, published a reconstruction of Torres' algorithm in modern "decision table" form.

Michie states that in the worst case, it can take 82 moves for White to win (compared with a "theoretical" maximum of 16 needed from any starting position). White's play is painfully slow and tedious, as the reader will soon discover by choosing one or two starting positions and following through a "Torres strategy" for White in each one.

Producing an efficient algorithm remotely comparable to that of Torres in terms of compactness took almost 90 years further to achieve. The machine is now housed in the museum of the Polytechnic in Madrid.

Delegates at a conference on Advances in Computer Chess at Imperial College, London, in April were fascinated by a description by Ken Thompson (of Bell Laboratories) of his special-purpose chess machine named Belle.

Belle is an almost frightening example of the power of micro-chip technology. It can generate a candidate move for consideration in just over one two-millionth of a second and examines 100,000 positions per second. It uses a pre-stored opening "book" with 200,000 positions, compared with an estimated 200,000 positions in each volume of the Encyclopedia of Chess Openings. The entire book

is scanned in one and a half seconds!

The speed with which this machine was developed is also incredible. The best "light" design was in February 1980, when the components (approximately 1,700 chips) were ordered. It played its first move in July, won a celebrated simultaneous game with Nisger in Hamburg in August, was the third World Computer Chess Championship in Lina last autumn with a score of 4½ and has won several human tournaments since then.

Belle now has an official E.L.O. rating of 2140 and could well go much higher.

To dispel any feelings of over-confidence about the "state-of-the-art" of computer chess in the 1980s, here are the first few moves of two games from last year's first world microcomputer championship in London.

Black on both occasions was the aptly-named program, **Alfredos**:  
 1. P-G4, P-K3; 2. N-K3, P-G4;  
 3. N-K3, B-K2; 4. B-K4-O377  
 1. P-G4, P-K3; 2. N-K3, P-G4;  
 3. N-K3, B-K2; 4. P-K4, P-P;  
 5. N-P; 6. G4; 6. N-K3, N-K377  
 I shall return to the subject of computer chess next month.

Here is one of its recent games, an excellent win against a senior U.S. master, Mike Valvo.

**White M. Valvo Black Belle**  
 1.P-Q4; P-K3; 4.B-N2; B-N2;  
 5.P-N3; O-O; 6.B-N2; N-K3;  
 7.Q-O; P-N3; 8.P-K3; B-N2;  
 9.Q-K2; P-E3; 10. P-Q3; P-Q4;  
 11.Q-N2; P-Q3; 12.P-K4; P-K4;  
 13.N-B4; B-E3; 14.P-K34; P-P;  
 15.P-P; N-B4; 16.Q-N4; B-P;  
 17.K-KP; N-B4; 18.Resigns

White loses the Rook and is then the exchange and a Pawn down in a hopeless position.

White's 12th move is dubious but Black's combination is surprising, and clearly foreseen on his 12th move for 13... B-K3 is inescapable. After 13... N-B4, White cannot avoid losing material.

The black king				
It is the game over for white				
It is still in the game, but on the only cell the position between the black king and the red king				
more than one square	one square, with the rook before	one square, with the rook before	one square, with the rook before	one square, with the rook before
The red rook can move horizontally	The red rook can move vertically	The king can move	The red king can move horizontally	The red king can move vertically
1	2	3	4	5

Torres' algorithm, which divided the board into three zones of 1, 2 and 3 cells.

# Acorn Atom 747



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# Sinclair ZX81

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## BREAKOUT

This cassette contains two versions of the classic arcade game, both written in machine code and both using the 12, 20K. These are our best priced program with BASIC FOR 20K1 £9.95

# SOFTWARE

# GO

GO affords many levels of programming challenge, from the very simple to the ultimate challenge — an intelligent program. It is possible to develop your Go program one step at a time, each step giving a useful program.

The first step is to use your V.D.U. screen as a board. The simple elements of the grid and circles for stones are relatively easy to represent.

Secondly, build in game recording and playback. No Go player should be without such a program! It can do for Go what video recording did for sport. You can relive your triumphs and catastrophes. You can analyse in slow motion the critical points, peruse the sweep of events by fast replay, even obtain an entirely different perspective by reversing the playback.

And all at the push of a button!

Next you should build in the rules of Go. Two novice players can then play without fear of inadvertent illegal moves. Captured stones should disappear automatically and illegal moves should be firmly rejected (with appropriate sound effects).

Now you can include an evaluation routine to count territory not only when play has finished (enabling the program to announce the winner) but also during the game. The difficult part is getting the program to decide sensibly where the individual areas are, before they are completely formed.

The above four steps bring your Go program to the brink of taking on an active role as a player. Adding the distractions of adding more facilities for archiving, displaying and evaluating the game of Go, the next step is to include a crude move generator. One method is to use a random number generating routine to provide candidate moves. If the move turns out to be legal and does not decrease the computer's score (as determined by the ter-

By Allan Scarff

GO is the most popular board game in the world. If you haven't heard of it, that's because most Go is played in China, Japan and Korea. But Go is coming west fast.

In the UK, Go has found popularity with computer professionals, but it is the advent of the personal computer which offers the greatest opportunity to develop computer Go. Perhaps there already exist hundreds of Go programs? If so, please write and tell me about yours!

Go is, in essence, a very simple game. The playing pieces, called "stones", are black for one player and white for his/her opponent. Play consists of the contestants placing, in turns, a single stone on the intersections of a 19 x 19 grid. Each player attempts to surround territory, first stretching it out, then fighting to hold it and capture his opponent's areas, until the boundaries are completed. The winner is the contestant with the most territory and captive stones combined.

Go originated in China over 4,000 years ago, perhaps as a primitive abstract, but more likely as a method of divination. The board can represent the universe, the black and white stones the two universal elements, negative and positive, or yin and yang. In Japan as well as China, Go became very popular amongst warriors. It proved ideal for devising military tactics. Indeed, in more recent times the Vikings included Go in their military training for officers (some would say to devastating effect).

Its simple rules allow Go to be

teritory evaluation routine), the program should accept the move. If not, it should generate another. Your program will now play Go . . . very, very badly! However, this in itself is valuable for a beginner — we all like to beat somebody! It's also interesting to see by how much you can win.

Improving the play of your Go program provides a fascinating study into the concepts of both Go and programming. Unlike Chess, nobody has ever been able to write a Go program that plays really well. What takes

played in a single fashion almost like the children's game, "boxes". Part of its charm is that in these circumstances the outcome is by no means predictable. But the game can be played at many levels of skill. At the higher levels, Go is revealed as the most subtle and profound board game of them all (including that modern opponent, Chess!).



The players have obtained six areas around the edges of the board.



An completed, the two players field with their areas. The player's captured stones (indicated by their white opponent's stones) indicate stones that are captured.

the machine an hour to calculate in Chess, would take a millennium in Go. There are just too many possibilities. Advances in programming Go will inevitably rely on new ideas, not on massive computing power. The micro is too suited to this task as the largest machine. Thus micro Go provides the ultimate programming challenge.

■ Allan Scarff's next article, which explains the rules of Go and the first steps to "Micro" Go, will appear in our March issue. Next month Allan Scarff looks at programming Bridge.





# Make the most of your Sinclair ZX Computer...

# Sinclair ZX software on cassette.

## £3.<sup>95</sup> per cassette.

The unprecedented popularity of the ZX Series of Sinclair Personal Computers has generated a large volume of programs written for users.

Sinclair has undertaken to publish the most elegant of these so far recorded cassettes. Each program is carefully tested for content and quality, and then grouped with other programs to form a single subject cassette.

Each cassette costs £3.95 (including VAT and postage) and comes complete with full instructions.

Although primarily designed for the Sinclair Z801, many of the cassettes are suitable for running on a Sinclair Z800 - if fitted with a replacement 8K BASIC ROM.

Some of the more elaborate programs can be run only on a Sinclair ZX Personal Computer equipped by a 16K-byte add-on RAM pack.

This RAM pack and the replacement ROM are described below. And the descriptions of each cassette makes it clear what hardware is required.

### 8K BASIC ROM

The 8K BASIC ROM used in the Z801 is available to Z801 owners as a drop-in replacement chip. With the exception of enhanced graphics, all of the advanced features of the Z801 are now available on a Z800 - including the ability to run much of the Sinclair ZX software.

The ROM chip comes with a new forward-looking layout, which can be overlaid on the existing keyboard to minimise, and a new operating manual.

### 16K-BYTE RAM pack

The 16K-byte RAM pack provides 16 times more memory in one complete module. Compatible with the Z801 and/or Z801a, it is forward-looking program storage on a cartridge.

The RAM pack simply plugs into the existing expansion port on the rear of a Sinclair ZX Personal Computer.



### Cassette 1 - Games

For Z801 (and Z800 with 8K BASIC ROM)

**ORBIT** - your space craft's mission is to get you a very valuable cargo that's in orbit around a star.

**SALPICO** - you're marooned by 40 of the enemy. How quickly can you spot and shoot them when they appear?

**SPITFIRE** - your warship is cruising through space when you meet a sinister alien. How long can you dodge the deadly danger?

**LIFE - ILL Country's** Centre of Life has achieved tremendous popularity in the computing world. Study the life, death and evolution patterns of ants.

**WOLFRICK** - your naval destroyer is on a collision course. The death charges are aimed, but must be fired with precision.

**GOLF** - what's your handicap? It's a tricky course but you control the strength of your shots.

### Cassette 2 - Junior

Education: 7-11-year-olds

For Z801 with 16K RAM pack  
**CRASH** - simple addition - with the added attraction of a car crash if you get it wrong.

**MULTIPLY** - long multiplication with five levels of difficulty. If the answer's wrong, the solution is explained.

**TRAIN** - rail to location tests against the computer. The winner's train reaches the station first.

**FRACTONS** - fractions explained at three levels of difficulty. A ten-question test completes the program.

**ATONIN** - addition and subtraction with three levels of difficulty. Answers wrong are followed by an explanation.

**DEVELOIN** - with five levels of difficulty. Minutes are explained graphically, and a scoring score is displayed.

**SPILLINGS** - up to 900 words over five levels of difficulty. You can even change the words used!

### Cassette 3 - Business and Household

For Z801 (and Z800 with 8K BASIC ROM) and 16K RAM pack

**TELEPHONE** - set up your own computerised telephone directory and address book. Changes, additions and deletions of up to 50 entries are easy.

**NOTES PAID** - a powerful, easy-to-run system for storing and

retrieving overdue information. Use it as a diary, a catalogue, a reminder system, or a diary.

**BANK ACCOUNT** - a sophisticated financial recording system with comprehensive documentation. Use it at home to keep track of where the money goes, and at work for expenses, departmental budgets, etc.

### Cassette 4 - Games

For Z801 (and Z800 with 8K BASIC ROM)

**LUNAR LANDING** - being the lunar module down from orbit is a well-honed, yet control-intensive and orbital direction - but watch the fuel gauge! It's a wonderful game.

**RIGHTS MAN** - digitally synthesised flight music.

**TWENTYONE** - a dice version of Backgammon.

**COMBAT** - you're an invincible space machine. You have only 12 minutes but the aliens have unlimited weapons. Can you take 12 of them with you?

**UNTHROD** - you're parked, your figure directs a pack of 100 cars. Can you double-check them before they topple you?

**CONVERTAKES** - the computer thinks of a 4-digit number which you have to guess loop by loop.

The logical approach is best.

**ALVOTAM** - an answer to a distance call, you're surprised down the search area to 101 cubic kilometers of dense space. Use your find the answer before the 100-wattout system fails at 10 hours.

### Cassette 5 - Junior

Education: 9-11-year-olds

For Z801 (and Z800 with 8K BASIC ROM)

**MATHS** - tests arithmetic with three levels of difficulty, and gives you a score out of 80.

**BALANCE** - tests understanding of forces/balances theory with a series of graphic examples.

**VOLUME5** - 'yes or no' answers from the computer to a series of easy volume calculations.

**REVERBOL** - what's the average length of your class? The average shoe size of your family? The average pocket money of your friends? The computer plots a bar chart, and distinguishes between MEAN, MAX, MIN.

**EXACT** - convert from decimal (base 10) to other bases of your choice in the range 2 to 9.

**TEMP** - Volume, temperature - and their combinations.

### How to order

Send us the order form below, and either enclose a cheque or give us the number of your Access, Bank Giro or National account. Please allow 28 days for delivery. 14-day money-back option.

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	3	Cassette 3 - Business and Household	£3.95	
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# Sinclair ZX81 Personal Computer

## the heart of a system that grows with you.

1980 saw a genuine breakthrough – the Sinclair ZX80, world's first complete personal computer for under £100. Not surprisingly, over 50,000 were sold.

In March 1981, the Sinclair lead increased dramatically. For just £99.95 the Sinclair ZX81 offers even more advanced facilities at an even lower price. Initially, even we were surprised by the demand – over 50,000 in the first 3 months!

Today, the Sinclair ZX81 is the heart of a computer system. You can add 16 times more memory with the ZX RAM pack. The ZX Printer offers an unbeatable combination of performance and price. And the ZX Software library is growing every day.

**Lower price: higher capability**  
With the ZX81, it's still very simple to teach yourself computing, but the ZX81 packs even greater working capability than the ZX80.

It uses the same micro-processor, but incorporates a new, more powerful 8K BASIC ROM – the 'trained intelligence' of the computer. This chip works in decimals, handles logs and trig, allows you to plot graphs, and builds up animated displays.

And the ZX81 incorporates other operation refinements – the facility to load and save named programs on cassettes, for example, and to drive the new ZX Printer.



New BASIC manual

Every ZX81 comes with comprehensive specially written manual – a complete guide to BASIC programming, from microchips to complex programs.

## Kit: £49.<sup>95</sup>

**Higher specification, lower price – how's it done?**

Quite simply, by design. The ZX80 reduced the chips in a working computer from 40 or so, to 25. The ZX81 reduces the 25 to 4!

The second lies in a totally new master chip. Designed by Sinclair and custom-built in Britain, this unique chip replaces 16 chips from the ZX80!

**New, improved specification**

● Z80A micro-processor – new faster version of the famous Z80 chip, widely recognised as the best ever made.

● Unique 'one-touch' key word entry: the ZX81 eliminates a great deal of tiresome typing. Key words (RUN, LIST, PRINT, etc.) have their own single-key entry.

● Unique syntax check and report codes identify programming errors immediately.

● Full range of mathematical and scientific functions accurate to eight decimal places.

● Graph-drawing and animated-display facilities.

● Multi-dimensional string and numerical arrays.

● Up to 26 FOR/NEXT loops.

● Randomise function – useful for games as well as serious applications.

● Cassette LOAD and SAVE with named programs.

● 1K-byte RAM (expandable to 16K bytes with Sinclair RAM pack).

● Able to drive the new Sinclair printer.

● Advanced 4-chip design: micro-processor, ROM, RAM, plus master chip – unique, custom-built chip replacing 16 ZX80 chips.



## Built: £69.<sup>95</sup>

**Kit or built – it's up to you!**

You'll be surprised how easy the ZX81 kit is to build: just four chips to assemble (plus, of course the other discrete components) – a few hours' work with a fine-tipped soldering iron. And you may already have a suitable mains adaptor – 800 mA at 9V DC nominal unregulated (supplied with built version).

Kit and built versions come complete with all leads to connect to your TV (colour or black and white) and cassette recorder.



# puter-



## 16K-byte RAM pack for massive add-on memory.

Designed as a complete module to fit your Sinclair ZX80 or ZX81, the RAM pack simply plugs into the existing expansion port at the rear of the computer to multiply your data/program storage by 16!

Use it for long and complex programs or as a personal database. Yet it costs as little as half the price of competitive additional memory.

With the RAM pack, you can also run some of the more sophisticated ZX Software – the Business & Household management systems for example.

## Available now - the ZX Printer for only £49.95

Designed exclusively for use with the ZX81 (and ZX80 with 8K BASIC ROM), the printer offers full alphanumeric and highly sophisticated graphics.

A special feature is COPY, which prints out exactly what is on the whole TV screen without the need for further instructions.

**How to order your ZX81 BY PHONE** – Access, Barclaycard or Trustcard holders can call 01-200 0200 for personal attention 24 hours a day, every day.  
**BY FREPOST** – use the no-stamp-needed coupon below. You can pay

At last you can have a hard copy of your program listings – particularly useful when writing or editing programs.

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# TV GAMES CENTRES TV GAMES CENTRES TV GAMES CENTRES TV GAMES CENTRES TV GAMES CENTRES

# VIDEO SCREEN

## SHOOT-OUT, CHESS AND DRAUGHTS

Perfect your marksmanship in a shoot-out to the death in the desert's sands of the wild west.

That's the theme of one of the new games for the Acorn's MPU080 home video games centre. Either play against the computer or take to a friend or foe in this captivating game called Desert Gun.

The tension and excitement of those lawless days of gunfights are all there for £19.95. You take

the part of one of the cowboys on the screen, who is in a gunfight and must save his skin by being quick off the draw.

Two other additions for the Acorn's range include chess and draughts which follow the format of traditional computerised games and add to the same price as Desert Gun. Chess and draughts are available direct from Ace or through the firm's distributors in the UK.



There's no time to hang around in the sport of Drag Racing and if you like your thrills short and sharp, you should enjoy the new Intellivision version.

When the game is mastered, a race can take as little as six to seven seconds — and from then on it's just a question of how many 1/16s of a second you can shave off your best time.

Mastering this cartridge is a real test of reactions and understanding. Two cars wait on a screen, moving away as the starter counts down from 10. As he reaches "one" it's both fingers on the accelerator button and a swift change into first gear, second, third and fourth, follow

## NO TIME TO HANG AROUND

swiftly with perfect changes taking place that split second before the red race line moves into blue-out mode.

It can make frustrating learning as both fingers push too early or too long in the search for a good time. The sound effects are convincing but the graphics are all too ordinary and capture none of the thrills and colour of the real thing.

The cartridge is produced for the Atari by US firm Accolision and distributed over here by Computer Games for £19.95.

Also new out from Accolision is Laser Blast, the game which

## WHAT A GRAPHIC KNOCK-OUT

### BOXING

Landing a R.O. Move in the boxing ring is an exhilaration feat of us will ever know but it is possible to relive some of the cut and thrust of the sport in the new Intellivision cartridge.

Boxing is now added to the long list of Intellivision sports cartridges which show off the machine's graphic qualities to best effect.

It's "secondly out" as you control one of the boxers fighting for survival in a tournament match. A clock on the platform stage in the right-hand section of the screen ticks off the seconds of each round and the entire picture is dealt with in the usual perspective.

As with most of the Intellivision games arms and legs tend in the right places so the figures appear to be really moving and not as if they are suffering from a severe case of arthritis of the joints.

Points are scored for every blow each of the players strike



and penalties given for below-the-belt punches. The winner is the player with the most points at the end of a bout or a win from a knock-out.

Boxing is available from the Intellivision Major League Sports Network range through UK distributors Ace Advanced Consumer Electronics of Wembley. Its retail price is marked at £19.95.

Space Armada is of the space invader version for the Intellivision. It has some graphically interesting aliens and costs £19.95. Otherwise the technicians in the time-honoured tradition.

## DRAG RACING AND LASER BLAST

reverses the usual alien descending from the heavens role.

Satisfyingly brilliant laser flashes illuminate the night sky as you guide your fleet of flying saucers over the planet's defenses.

The defenses come in threes. They sit along the ground beneath your ships and home in swiftly with their deadly fire.

Starts from your best saucer are just as lethal as you see above the ground forces — unfortunately, so just the height

to give them the best chance of hitting you. When all three laser stations have been destroyed, the next three roll on to the screen. You have just three chances to call or but have the additional advantage of being able to pilot your wrecked ship on to the defenders. Further reinforcements are available with each score of 10,000 and after some initial low scores, a dedicated player can reach the score for the loss of each life — and so keep going ad infinitum.

Four skill levels and an asking price of £19.95 but perhaps too easy to master.





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# Adventure

SCOTT Adams is the name behind a whole library of Adventure and his games have introduced many enthusiasts to micro adventuring. My own introduction was his Adventureland on a friend's machine. It is set in a swampy forest near a sunny meadow and progresses underground to a maze of pits.

Various things lying about the place seem rather innocuous, but as the game develops a feeling grows that most objects have a purpose, and that some very devious thinking will be needed to find uses for, among other things, an empty wine bladder and potsherd of oily slime! The large dragon, peacefully sleeping in the meadow, begs a good hard kick to wake him up — is he really so impervious to attack as he seems? And the "No Swimming" sign by the lake is positively urging you to take a dip — but with what consequences? The object of the game is to collect and store 15 treasures. To say more would be to give away too much.

So I'll merely say "Bunyan" and vibrate on to another Scott Adams game — Pirate Adventure. A strong theme runs through this game which is litted with bottles of rum, treasure chests, anchors and a parrot, which is not only excessively greedy but very logorrheic.

The story begins in the player's London flat, from where, after some chilling discussions, it moves to Pirate Island. There it soon becomes apparent that you are being urged to do something without being told quite what.

Pirate is set as deep as Adventureland and the machine's memory is not so fully packed. But this is more than offset by a delightful sense of humour running through the game, diminished by a cruel and dramatic boss.

Both these games are available on the I&K TRS-80 and Video Genie; the I&K Ruddy Sorcerer; I&K Apple 2 and Apple 2 Plus.

The Adventure series by Scott Adams, currently comprises 30

A swift glance down most software catalogues will reveal a veritable hoard of Adventure games.

They compete with Space Invader and Asteroid type games to the top-of-the-micro-pops. Which you prefer depends on whether you like to test your reactions and control, or are the mystery-loving puzzle-solver type (there are by no means mutually exclusive).

If you are new to Adventure and wondering which to try first, or if you are just wondering which to buy next, I will be helping to guide you through the Adventure jungle each issue. A brief rundown of what to expect from each Adventure, will help you select tapes and discs to suit your taste a little less randomly.

games. All games are written in machine code and have a "save game" feature enabling the current state of the game to be recorded and reloaded later.

Each month I shall be bringing you tips on how to write an Adventure program in Basic, in order to do this you will require a machine with at least 6K RAM and capable of holding many string variables, arrays (single dimension will do, it will also need string manipulation statements like MIDS, LEFT\$, RIGHT\$, LEN, plus the ability to concatenate.

Having devised your plot and drawn a map the next step is to number the locations from zero, and draw up a table. For simplicity I have shown a five location map in Figure 1 and the corresponding table in Figure 2. All exits in the example are compass bearings, hence the exit columns entry for location 0 shows "E" (East South) leading to destinations in the corresponding positions in the destination column entry, of locations 1 and 2 respectively. If more than 10 locations were to be used, double figures would be needed in the destination column.

Type the contents of the table, omitting the number column, row by row into data statements. Part of your program will now look like this:

```

DIM L$#, E$#, D$#
    
```

```

FOR I=1 TO 4: READ
L$#, E$#, D$#: NEXT
DATA COTTAGE, IS, IS, LAKE,
WS, OL, FOREST...
and your logical network is
formed!
    
```

Putting aside sophisticated word decoding routines for the moment, we can test this network out with the following simple routine:

```

150 (clear screen) LN=1: REM
CURRENT LOCATION IS I
160 PRINT "I AM IN A ";L$(LN)
170 INPUT "WHERE TO NOW":
RR (clear screen) REM AND
WER N, S, E or W
180 RR=LEFT$(RR,1)
190 FOR I=1 TO LOWERLN:
200 IF MIDE(RR=VAL(MIDE
(D$(LN,I,1)):GOTO 160
210 NEXT
220 PRINT "I CAN'T GO THERE":
GOTO 180
    
```

To place objects in these locations is now quite easy. Make an object table as in Figure 3 using array P to hold the current location of each object. Read this in from data statements as with the locations. Now add these lines to those above, and Hey Presto!

```

165 OSS="I CAN SEE ";FOR I=0
TO 3
185 IF P(I)=LN THEN OSS=
OSS+OBJ
187 NEXT:PRINT OSS
    
```

We can't manipulate the objects yet — that will come after we've had a look at word decoding next month.

No.	Location (N or S)	Exit (E, S, W, N)	Destination (N or S)
0	Cottage	SE	1
1	Island	SW	2
2	Forest	NE	3
3	Mountain	WS	0
4	Lake	N	1

Fig. 2. Location table derived from map in Fig. 1. The number column is merely the location used to access the information on a given line. Note: all variables are dimensioned.

No.	Object (N or S)	Place (N or S)
1	Knife	0
2	Box	1
3	Iron	1

Fig. 3. Object table derived from Fig. 1. Again the number column is the array subscript. Note that since array P will only hold the number of the current location of an object it may be defined as integer numbers.

# ARCADE

## TIPS

When the blow-up asteroid sent out three arrow-head missiles on that first revenge mission, many players decided that *Asteroids de Luxe* was too hot for them.

A pity, because good use of the laser firing and moving advantages of the second generation *Asteroids* game, could still ensure a long play. And the new features make for a more entertaining play, than that offered by its popular predecessor. Here we tell the uninitiated what to expect from *Asteroids de Luxe* and offer a few hints on survival.

The first difference from the original game is that there are more meteors on the first screen, seven instead of four. But you will soon find that the faster firing button — it is possible to fire almost continuously — makes for more dramatic destruction.

The fire-power makes it easy to stand your ground while meteors are heading straight for you, so you should reduce them to smithereens before they become a real danger.

There is also the question of the shields. These are an improvement on the hyperspace panic button of the original, because there is no random lock element involved. However, timing is all important. New players tend to press the shields too early and waste this for them



## ASTEROIDS DE LUXE

inextinguishable means of defence. The S.F.D. is a very different proposition in *de Luxe*. The small one is usually on patrol early and is far more deadly, hitting stationary targets with ease and also picking you off if you move in a straight line. So waver!

No point in leaving that last rock and waiting in a corner to build up a high score in this version either. The small S.F.D. responds by moving up that last rock with its first shot and your

ship normally follows soon after. When the "geometric" asteroids begin appearing it is best to leave them until you have room to manoeuvre when these are hit. Three burning missiles are loaded upon you and fire and rocket packs are the best way to reduce the threat of these spinning horrors.

As in the earlier *Asteroids* version, the best players learn how to use the thrust and keep on the move.

## ROYAL SNATCH AND GRAB

It's back in time, for once, in the King and Balloon aerial defence game.

Instead of the usual space invaders and laser beams, this game features balloons which descend from the heavens and drop bombs.

The balloons are the villains of the piece, attacking in squadrons of 40 which will stretch your more primitive resources to their limits.

You play the part of a faithful milkman employed to defend the royalty of the castle from the aerial kidnappers.

Should the invaders snatch your monarch, he prattles quite vocal, crying for aid from his rescuer and a well aimed shot

which clears the capturing balloon will enable him to parachute to safety murmuring his thanks.

When a squadron of balloons is downed by the crossover a faster-moving one appears to attempt the next snatch-and-grab raid.

And should that royal Spang disappear over the horizon, dangling captive from his basket, it's a case of "The King is Dead! Long live the King", as another is sent out to tempt the balloons back.

Up to three kings can be lost before the game is over.

A fun variation on the usual theme which is not too demanding graphically but still challenging.

## STREET TALK

A brief rundown of machine slang, phrases and comments which players use while blowing up asteroids.

- **Bigger balls** — a phrase to describe the constantly on the move player.
- **Drop of destruction** — keeping up a constant stream of fire in an attempt to wear down the meteors.
- **A bouncer** — a player who makes good use of his shields.
- **Bad scouder** — a meteorite which will unleash missiles when blown up.

As far as we can tell there are no noticeable programming bugs in *Asteroids de Luxe*.

● Next issue we look at the popular but notoriously difficult arcade game of Defender.

## GOLF: NOT JUST FOR THE CLUBS

Japan goes in for courses with such gusto that our Britain with *Robin's Cube* seems half-hearted by comparison.

So *Pro Golf*, which combined the cream of golf and video games, from of Japan's biggest was bound to be a hit over in the States.

But our own arcade industry is pessimistic about the graphically superb game finding a following over here. The game is certainly a far cry from the usual space-fighter fare to be found in pubs and arcades but it could warm its way into western hearts.

A nine hole golf course is to be played. Chosen your club, address the ball and hit, before the golfer takes his fifth automatic swing, or you will lose your ball.

A limited number of balls are allowed per hole and if that is passed a gather will also be lost. Trees, ponds, bunkers and out-of-bounds areas add to the difficulty. Each hole has its own par score and holes in one are possible.

A game which deserves to see a wider audience than just the "tee box" of the golf clubs.



# ACTION

## KING KONG GOES CRAZY IN A CABINET

The low-office screens. King Kong, now likely to become a success in a box — or at least an arcade cabinet — is the game Donkey Kong.

Kong has captured an electronic starlet and is holding her hostage at the top of the screen. He hurls down barrels at the other heroine rescue figure as he ratchets up a series of falling levels. The rescuer must leap over the incoming barrels and so make his way to Kong's hideout. A hammer with which to knock the barrels clear of the level can be reached by a well-timed leap sideways.

Once at the top, King realising he is beaten, picks up our heroine and carries her off to a new screen, here the rescuer must leap between passing fire to attain the game-changer's hide-out.

On achieving this, the screen changes again to a conveyor belt affair and so the chase continues, with King hurling obstacles in the path of our plucky hero and the girl is finally saved... then it all starts again only with more obstacles.

Can Jumpman save the writhed heroine? Find out down your local arcade.



## AN AMPHIBIOUS ARCADIAN

The arcade games industry seems to have discovered a new hero figure to tempt us onto its machines.

It is questionable whether hard-bitten arcade and pub veterans, who are used to seeing themselves as laser bases or rocket ships, will be able to identify with this new character — a frog — but he seems to be catching up in several games now.

Frogger is one of the popular new generation of arcade games which are getting away from space themes.

It does give an idea of how tough a life frogs may lead. Our intrepid amphibian is first set the problem of crossing a busy highway without getting run over.

Manoeuvring the creature by a joystick, either vertically or horizontally, it must avoid a steady stream of vehicles to reach the river bank. From the aim is to cross without falling in, via a series of logs and the treacherous diving turtles, who are not averse to giving a harrying frog an early bath.

Other horrors lurking here include deadly snakes, crows and crocodiles.

Points are scored for each safe jump (10), arriving safely home (50) and beating the timer (10 points per beat saved). Bonuses can be accrued by scooting home a lady frog (200), gobbling an insect (200) and safely getting all five frogs home (1,000).

## ALIENS ABOVE THE SKYLINE

Plating your craft above a New York-like skyline gives you first taste of the Space Odyssey challenge — but the action does not stop there.

Space Odyssey is reminiscent of the Defender game but with a much less daunting array of buttons to become familiar with.

Just two buttons and a lever give you all the manoeuvrability you will need on the long voyage ahead of you.

Missiles are launched from the

ground to prompt you forwards and a host of alien spacecraft speeds towards you. Firing to pick off those you can, while flying vertically to avoid the rest of the enemy craft and the tall buildings, you pick your way through the waves of attackers.

A regular feature of the early waves is the laser-firing Mothership Galactic, a large craft which appears initially to be indestructible but a little perseverance will prove otherwise. Later the action switches to a mountainous moonscape.

So the game progresses until you are speeding between large black boxes which will draw you into their voids should you fly too close and leave you spinning and vulnerable to enemy fire. Then it is back to the opening sequence again.

The game is easy to learn, the action is always changing and the graphics and backdrops are among the best you will see. If you liked the idea of Defender but found it too difficult to master, Alca Electronics is distributing the game for you.

## GALAXIANS MARK II

The second generation of Galaxians is on its way to our arcade sites.

This new breed, which bears the Midway logo, do not all positively in the skies waiting to be shot at but swarm in from the sides of the screen to form their convoy and then dive groundwards to put your laser station out of action.

Apart from this peculiar behaviour, the new creatures resemble and attack in the same fashion to the already popular Galaxians. And the action will be just as frantic as before.

One other important change to the name, this new breed answer to the name of Seligs.



Chomp runs on a Sharp MI-80K  
By Karl Parker and Terry Brown

# CHOMP

Amesex and Old Lady's elderly  
possessor probably played Chomp  
while waiting for their motor to  
kick into their best supper.

The supper prepared on the Sharp  
screen in this game is going to be  
somebody's last too. The screen is  
set out like a large piece of cake but  
the pieces in the top-right hand corner  
could have been made by Luciano  
Pagan.

The fact that it is labelled  
"Delicious" is a bit of a giveaway.

But the cake has to be finished so  
someone is going to end up eating  
the piece which will give them more  
than happiness. The player who is  
to start is Chomp on a piece of cake  
and try to digressions their oppo-  
sition to eat to leave them to eat their  
last poisoned section.

This game makes good use of the  
Sharp's graphical facility and  
includes a strong end to the game  
where that total Chomping has taken  
place.

Not for the squeaky!





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BY FRED PENCE

# GOAL

At the far end of the board, the Goal is beckoning as you and the computer plan your respective routes to victory.

The computer is out to make things difficult for you but achieving life's goals should never be easy.

Moving a single counter alternately you must aim to outwit your opponent and be first to move into that elusive Goal area and win the game.

You can choose who takes the first move in this game of strategy and thinking ahead. If you wish the computer to go first, enter thought, or key-in a number between one and six if you are taking the first move.

Once the counter is set in motion, it can only be moved left, right or down but it cannot be returned to a box it has already entered.

Goal uses a mode of the Apple graphics in a well thought out game with plenty of scope for tactical maneuvering.

```

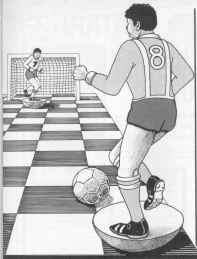
0  REM *****
1  REM #1
2  REM #2  GOAL
3  REM #3  #1
4  REM #4  FRED PENCE
5  REM #5
6  REM #6  NOV, 1979
7  REM #8
8  REM *****
9  GOTO 1000
10 HOME : 80
11 REM #14,15
12 FOR #1 = 0 TO 44 FOR #2 = 0 TO
   7:PRINT #2: GOTO NEXT #2: NEXT
   #1
13 #1 = 1: C = 1
14 HOME : 80 : COLOR= 1: FOR #1 =
   1 TO 30 STEP 44: #1,10 AT
   #1: NEXT #1: #1,10,17 AT #1: #1,10
   11,10 AT #1
15 FOR #1 = 0 TO 30 STEP 44: #1,10
   1,10 AT #1: NEXT #1: #1,10 1,10
   AT #1
16 REM PRINTING "GOAL"
17 COLUMN= 12
180 #1,10 0,10 AT 33: #1,10 0,10 AT

```

```

33: #1,10 0,10 AT 33: #1,10 33
,37 AT 50: #1,10 33,37 AT 30
120 #1,10 14,17 AT 30: #1,10 14,17
AT 37: #1,10 33,37 AT 10: #1,10
33,37 AT 19
120 #1,10 23,27 AT 33: #1,10 23,27
AT 20: #1,10 23,27 AT 23: #1,10
23,27 AT 27
130 #1,10 28,35 AT 37: #1,10 33,37
AT 30
140 IF #6 = 2 THEN PRINT "0.
  1. YOUR #0 " : GOTO 140
150 GOTO 200
160 PRINT "1. A NUMBER FROM 1 TO
  6?": INPUT #1
170 IF #1 = 1 OR #1 = 4 THEN PRINT
  "PRINT "0" - YOUR #0 " : GOTO
  140
180 IF #1 = 107 OR THEN GOTO
  190 PRINT "PRINT "44" ENTERED " :
  GOTO 140
190 PRINT "ENTER AN INTEGER FROM
  1 TO 6 IF YOU WANT TO GO TO
  207."
210 PRINT " IF YOU WANT #0 TO 0
  0 FIRST ENTER 0?": INPUT #1

```



```

220 IF INT 660 = N THEN 260
230 PRINT : PRINT
240 PRINT "  B A T T E R  R  N
  I N T E R  R "
250 PRINT : PRINT : GOTO
  500 OR AND 61 " TO INPUT N
260 IF N > 4 OR N < 0 THEN PRINT
  : PRINT : PRINT : PRINT : GOTO
  340
270 IF N = 0 THEN C = INT 14.8
  AND (2) + 14*NR,C) = - 1:
  GOTO 440
280 C = 6*NR,C) = - 1:
290 GOTO 490
300 REM COMPUTER'S GO
310 IF N = 5 THEN IS = IS + 1: GOTO
  740
320 IF C = INT (C / 2) + 2) =
  0 THEN 390
330 REM MOVE RIGHT
340 IF A(R,C + 1) = 0 THEN C = C

```

```

  + 1:NR,C) = - 1: GOTO 440
350 IF R = 4 THEN J = INT (2.4
  + 1) AND (2) OR IF J > 3 THEN R
  = R + 1:NR,C) = - 1: GOTO
  440
360 IF A(R,C - 1) = 0 AND C > 1 THEN
  C = C - 1:NR,C) = - 1: GOTO
  440
370 R = R + 1:NR,C) = - 1: GOTO
  440
380 REM MOVE LEFT
390 IF A(R,C - 1) = 0 THEN C = C
  - 1:NR,C) = - 1: GOTO 440
400 IF R < 4 THEN J = INT (2.8
  + 1) AND (2) OR IF J > 3 THEN R =
  R + 1:NR,C) = - 1: GOTO 44
  0
410 IF A(R,C + 1) = 0 AND C < 4 THEN
  C = C + 1:NR,C) = - 1: GOTO
  440
420 R = R + 1:NR,C) = - 1

```

```

430 REM COMPUTER'S GO PLOTTED
440 PRINT : PRINT : PRINT : PRINT
  "  T H E  C O M P U T E
  R  I  S  P  L A Y E R  I  S  P L O T T E D
  T H E  R  I  G H T
450 FOR T = 1 TO 1000: NEXT T
460 REMB 87% COLOR= 13: PLOT 4
  4 C = 1,4 4 R = 3: FOR T =
  1 TO 200: NEXT T: GOTO 510
470 FOR T = 1 TO 100: NEXT T: GOTO
  510
480 REM PLAYER'S GO PLOTTED
490 REMB 87% COLOR= 13: PLOT 4
  4 C = 1,4 4 R = 3: FOR T =
  1 TO 200: NEXT T: GOTO 510
500 REM PLAYER'S GO
510 PRINT : PRINT : PRINT : PRINT
  "  I T ' S  Y O U R  80%
520 PRINT : PRINT "INPUT AN 'L',
  AN 'R' OR A 'D' "
530 INPUT N
540 IF N = "L" AND C > 1 AND A(
  R,C - 1) = 0 THEN C = C - 1:
  A(R,C) = - 1: GOTO 490
550 IF N = "L" AND C = 1 THEN 4
  40
560 IF N = "L" AND A(R,C - 1) =
  - 1 THEN 440
570 IF N = "R" AND C < 4 AND A(
  R,C + 1) = 0 THEN C = C + 1:
  A(R,C) = - 1: GOTO 490
580 IF N = "R" AND C = 4 GOTO 4
  40
590 IF N = "R" AND A(R,C + 1) =
  - 1 THEN 440
600 IF N = "D" AND R < 5 THEN R
  = R + 1:NR,C) = - 1: GOTO
  490
610 IF N = "D" AND R = 5 THEN R
  = R - 1: GOTO 490
620 IF N = "D" THEN PRINT : PRINT
  : PRINT "  Y O U  C A N ' T  G O  B A C
  K  U P " : GOTO 520
630 PRINT : PRINT : PRINT : PRINT
  : PRINT "  Y O U  M U S T  E I T H E R  U S
  E  ' L '  O R  ' R '  O R  ' D ' " : GOTO
  520
640 PRINT : PRINT : PRINT : PRINT
  "  Y O U  C A N ' T  M O V E  T H A T  W A Y
  .  I T ' S  80% " : PRINT "THE 80%
  80."
650 GOTO 520
660 PRINT : PRINT : PRINT : PRINT
  "  Y O U  C A N ' T  M O V E  T H E R E " :
  PRINT "  Y O U  M U S T  M O V E  T H E  C O U N T
  I N  W A S  J U S T  M O V E D  F R O M ."
670 GOTO 520
680 REM PLAYER WINS
690 COLOR= 13: FOR J = 1 TO 10: PLOT
  4 4 I = 1,2: NEXT I

```

continued on page 11

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Continued from page 28

```

700 PRINT "PRINT A PRINT PRINT TASH
    T1"YOU WIN. YOU MUST BE LUC
    KY!"
710 PRINT "PRINT THE SCORE: C
    OMPUTER - "Y20;" PLAYER - "
    Y9"
720 PRINT "SPACE BAR TO PLAY :
    'ESC' TO END"
730 GET D4: IF ASC D4 = 32 THEN
    80
740 IF ASC D4 = 27 THEN 800
750 GOTO 700
760 REMARK 870: PRINT A PRINT A PRINT
    A PRINT "THE SCORE: COMPUT
    E - "Y20;" PLAYER - "Y9"
770 PRINT "PRINT SPACE BAR TO
    PLAY : 'ESC' KEY TO END"
780 COLOR= 6: FOR I = 1 TO 20: HLIN
    5,37 AT 1: NEXT I: FOR I = 1
    TO 20: NEXT I
790 I = PEEK I - 16384: IF I =
    144 THEN POKI - 16384, 0: GOTO
    80
800 IF I = 120 THEN POKI - 144
    64, 0: GOTO 800
810 COLOR= 6: HLIN 22,37 AT 6: PLOT
    5,30: PLOT 5,37: PLOT 7,32: PLOT
    7,37
    ...
820 HLIN 22,34 AT 12: HLIN 24,34
    AT 14: HLIN 26,32 AT 24: PLOT
    17,37: PLOT 24,37: PLOT 15,3
    4: PLOT 15,32: HLIN 22,34 AT
    22: HLIN 22,34 AT 22: PLOT 1
    9,34: PLOT 19,32: PLOT 18,37
    : PLOT 21,37
    ...
830 HLIN 22,37 AT 24: PLOT 22,37
    : PLOT 22,37: PLOT 27,32: PLOT
    27,37
    ...
840 HLIN 22,37 AT 29: HLIN 22,37
    AT 32: PLOT 24,32: PLOT 24,
    34: PLOT 24,34: PLOT 21,32: PLOT
    21,32: PLOT 22,34
    ...
850 PRINT ""
860 FOR I = 1 TO 100: NEXT I: GOTO
    790
870 COLOR= 6: NORMAL: FOR I = 1
    TO 40: FOR K = 1 TO 5: PLOT
    6, I * 7 - 1, 6, I * 8 - 2: NEXT K
    : RETURN
880 TEXT "HOME" : VTAB 14: PRINT
    TAB 10;"WELL I ENJOYED IT
    "
890 PRINT "PRINT TASH 201;"WOP
    ...
900 HLIN 22,34 AT 12: HLIN 24,34
    AT 14: HLIN 26,32 AT 24: PLOT
    17,37: PLOT 24,37: PLOT 15,3
    4: PLOT 15,32: HLIN 22,34 AT
    22: HLIN 22,34 AT 22: PLOT 1
    9,34: PLOT 19,32: PLOT 18,37
    : PLOT 21,37
    ...
910 HLIN 22,37 AT 24: PLOT 22,37
    : PLOT 22,37: PLOT 27,32: PLOT
    27,37
    ...
940 HLIN 22,37 AT 29: HLIN 22,37
    AT 32: PLOT 24,32: PLOT 24,
    34: PLOT 24,34: PLOT 21,32: PLOT
    21,32: PLOT 22,34
    ...
950 PRINT ""
960 FOR I = 1 TO 100: NEXT I: GOTO
    790
970 COLOR= 6: NORMAL: FOR I = 1
    TO 40: FOR K = 1 TO 5: PLOT
    6, I * 7 - 1, 6, I * 8 - 2: NEXT K
    : RETURN
980 TEXT "HOME" : VTAB 14: PRINT
    TAB 10;"WELL I ENJOYED IT
    "
990 PRINT "PRINT TASH 201;"WOP
    ...
1000 HOME = 0: COLOR= 12
1010 HLIN 8,12 AT 8: HLIN 8,12 AT
    12
1020 HLIN 8,12 AT 16: HLIN 8,12 AT
    22: HLIN 16,22 AT 10
1030 HLIN 24,20 AT 8: HLIN 24,20
    AT 16: HLIN 24,20 AT 12: HLIN
    8,12 AT 24
1040 HLIN 5,10 AT 12: HLIN 5,10 AT
    22: HLIN 8,10 AT 19: HLIN 17
    ,21 AT 5: HLIN 19,21 AT 18
1050 HLIN 5,10 AT 17: HLIN 5,10 AT
    21: HLIN 8,10 AT 19: HLIN 17
    ,21 AT 5: HLIN 17,21 AT 18
1060 HLIN 17,21 AT 12: HLIN 17,2
    1 AT 19: HLIN 12,19 AT 17: HLIN
    12,19 AT 19
1070 HLIN 17,20 AT 22: HLIN 17,2
    1 AT 29: HLIN 22,27 AT 18: PLOT
    22,12: PLOT 24,12: PLOT 24,1
    9: PLOT 25,19
    ...
1080 HLIN 24,34 AT 12: HLIN 24,3
    2 AT 19: HLIN 24,34 AT 22: HLIN
    27,20 AT 20
1090 HLIN 14,17 AT 25: HLIN 14,1
    9 AT 29: HLIN 22,29 AT 12: HLIN
    24,29 AT 17
1100 HLIN 22,27 AT 25: HLIN 22,2
    2 AT 29: HLIN 22,29 AT 22
1110 HLIN 5,10 AT 22: HLIN 5,10 AT
    27: HLIN 8,10 AT 24: HLIN 22
    ,27 AT 25: HLIN 10,27 AT 18
1120 HLIN 14,19 AT 22: HLIN 14,1
    9 AT 29: HLIN 22,27 AT 12: HLIN
    22,27 AT 19
1130 HLIN 22,27 AT 22: HLIN 22,2
    2 AT 29: HLIN 22,27 AT 27: HLIN
    22,27 AT 27
1140 HLIN 24,20 AT 27: HLIN 22,1
    7 AT 28
1150 VTAB 24: PRINT TAB 20;"P
    ERCE PROGRAM"
1160 FOR K = 1 TO 5000: NEXT K
1170 TEXT "HOME" : VTAB 2: PRINT
    " YOU AND THE COMPUTER WILL
    ALTERNATE!"
1180 PRINT "PRINT " MOVE A COU
    NTER UNTIL THE NUMBER MOVES"
1190 PRINT "PRINT " GETS THE B
    AL AREA:" PRINT
1200 PRINT
1210 PRINT "PRINT " YOU ARE
    CHOOSING WHO YOU WANT TO MOVE
    FIRST:"
1220 PRINT
1230 PRINT " : FOR COMPUTER TO
    MOVE FIRST"
1240 PRINT
1250 PRINT " A NUMBER FROM 1 T
    O 4 TO PICK A BOX"
1260 PRINT " IN THE UPPER ROW
    FOR YOUR BOX"
1270 PRINT "PRINT "THEREAFTER I
    DO MOVE LEFT, RIGHT OR DOWN"
1280 PRINT "BUT YOU CANNOT RETURN
    TO A PREVIOUS BOX."
1290 PRINT "PRINT " ADAPTED
    FROM A GAME IN "MATHEMATICS
    IN RECREATION" "SPACE BAR"
    TO CONTINUE"
1300 GET D4: IF ASC D4 = 32 THEN
    20
1310 GOTO 1200
1320 END
    
```

# GOAL



```

1330 END
    ...
1340 FOR K = 1 TO 5000: NEXT K
1350 TEXT "HOME" : VTAB 2: PRINT
    " YOU AND THE COMPUTER WILL
    ALTERNATE!"
1360 PRINT "PRINT " MOVE A COU
    NTER UNTIL THE NUMBER MOVES"
1370 PRINT "PRINT " GETS THE B
    AL AREA:" PRINT
1380 PRINT
1390 PRINT "PRINT " YOU ARE
    CHOOSING WHO YOU WANT TO MOVE
    FIRST:"
1400 PRINT
1410 PRINT " : FOR COMPUTER TO
    MOVE FIRST"
1420 PRINT
1430 PRINT " A NUMBER FROM 1 T
    O 4 TO PICK A BOX"
1440 PRINT " IN THE UPPER ROW
    FOR YOUR BOX"
1450 PRINT "PRINT "THEREAFTER I
    DO MOVE LEFT, RIGHT OR DOWN"
1460 PRINT "BUT YOU CANNOT RETURN
    TO A PREVIOUS BOX."
1470 PRINT "PRINT " ADAPTED
    FROM A GAME IN "MATHEMATICS
    IN RECREATION" "SPACE BAR"
    TO CONTINUE"
1480 GET D4: IF ASC D4 = 32 THEN
    20
1490 GOTO 1200
1500 END
    
```

No municipal park, or seashore worthy of the rock bearing its name, should be without a putting green.

These nine to 18 patches of well measured turf which can divide friends and turn happy families into bitter rivals.

Remember that struggling white ball on the green, which belied its battered appearance and refused to surrender its white prize until the fifth stroke.

Or how about the fifth hole, whose cap protruded a solid half inch above the surrounding circle of dried and desiccated earth.

If someone were to write a thesis proving that that famous still upper lip was tempered on the putting greens of England... I wouldn't be at all surprised!

If you thought you had left these ninth green dandelion belauding traditions behind you, this program will bring them back all over again. In fact the only putting frustration not to be experienced on this computerized version, is the wait for the previous group to move on.

Mini Golf is an excellent representation of a nine-hole miniature putting green, which will accommodate up to 10 players.

You control the angle of your putter by pressing the keys marked "+" and "-", which have small arrows marked on their

## ALL THE FRUSTRATION OF THE PUTTING GREEN

upper left-hand corners.

The following strings should be typed using the Atari logo key to produce reverse video.

Line 10: "ATARI 9 HOLE," and "MINIATURE GOLF"  
 Line 45: "SCORE:"  
 Line 500: "FINAL SCORE:"  
 Line 554: "GOOD BYE."

The messages such as "HOLE 1" and "PAR 3" should be typed using reverse video for all nine holes.

```

1 HOLE 9 MINIATURE GOLF
2 HOLE 9 DESIGN, PROGRAM BY
3 HOLE 9 BY MITCH VOTH
4 HOLE 9 ARTS TRANSLATION BY
5 HOLE 9 RICH BOUCHARD
6 HOLE
8 OPEN H,1,2,3,4,5
9 HOLE 9 DESIGN, ARTS, TRANSLATION
10 GRAPHIC 9:PRINT 9:          ARTS
     9:HOLE:PRINT 9:          TRANSLATION
    GOLF
    
```

```

20 FOR H=1 TO 9:PAR=H:PRINT H
25 FOR H=1 TO 9:PAR=H:PRINT 4
30 PRINT H:PRINT 9:PRINT NUMBER OF PLAYERS
    9:PRINT 9:PRINT 9:PRINT THEN H=1
32 FOR H=1 TO 9:H:PRINT 9:PRINT "HOLE
    9:GRAPHIC 9:PRINT 9:PRINT THEN H=
    H+1,10
33 IF LEND=0 THEN H=1
34 IF LEND=1 THEN LEND=H:PRINT 9:
    GRAPHIC 9:PRINT 9:
35 INCREMENT H,PAR:INCREMENT H,1,9:PRINT
    9:
40 GRAPHIC 9:PRINT 9:PRINT "
    SCORE:PRINT 9:PRINT 9:PRINT 2
    HOLE:PRINT 9:PRINT 9:PRINT 4
42 PRINT PRINT "SEE YOU NEXT HOLE"
    
```

# MINI GO

BY MITCH VOITH AND RICH BOUCHARD

```

1 GRAPHIC 9:PRINT 9:
    INCREMENT H,1,9:PRINT
    9 HOLE 9:PRINT 9:PRINT 9:PRINT 9:
    2:PRINT 9:PRINT 9:PRINT 9:PRINT 9:
    PRINT 9:
    40 PRINT IF 2:PRINT THEN 70
    42 PRINT 9:PRINT 9:PRINT THEN 50
    44 COLOR 9:PRINT 9:PRINT 9:PRINT 9:
    PRINT 9:
    70 PRINT IF 3:PRINT THEN 70
    72 PRINT 9:PRINT 9:PRINT THEN 80
    74 COLOR 9:PRINT 9:PRINT 9:PRINT 9:
    76 COLOR 9:PRINT 9:PRINT 9:PRINT 9:
    78 COLOR 9:PRINT 9:PRINT 9:PRINT 9:
    80 COLOR 9:PRINT 9:PRINT 9:PRINT 9:
    82 COLOR 9:PRINT 9:PRINT 9:PRINT 9:
    84 COLOR 9:PRINT 9:PRINT 9:PRINT 9:
    86 PRINT 9:PRINT
    88 COLOR 9:PRINT 9:PRINT 9:
    90 COLOR 9:PRINT 9:PRINT 9:
    92 COLOR 9:PRINT 9:PRINT 9:
    94 COLOR 9:PRINT 9:PRINT 9:
    96 COLOR 9:PRINT 9:PRINT 9:
    98 COLOR 9:PRINT 9:PRINT 9:
    100 COLOR 9:PRINT 9:PRINT 9:
    
```





## THE LATEST AND, INDEED, THE GREATEST

OF THE KANSAS ARCADE SERIES

# ARCADE SCRAMBLE



Don't waste your time playing the simple state to the Big Five games — get straight into the heavy action with the brand-new multi-action, home grown 'Arcade' game.

Yes, it's the Kansas one of the Arcades, and the first time it's ever been achieved on a computer.

Not that easy though, for without warning suddenly there's a squadron of enemy fighters heading at you as you fall back on your destination. Then comes the attack Bang at you from the ground batteries to add to your difficulties, and there's the cluster of bombs to make things even more difficult.

But the real battles are the rockets, which the enemy blast at you, without warning, from the ground installations.

Even if you manage to out-foot, out-fight, out-manoeuvre that little lot, you still have the mountains to negotiate which is a problem with the fighters streaming through the only available space.

But with this really unbelievable game, you have no less than six different controls at your fingertips, being able to move your bomber forward, backward, up and down, whilst at the same time both firing your guns at the enemy and landing the installations.

The installations include rocket launch pads, ack-ack batteries, forts, munition dumps and fuel dumps. You do your darndest to destroy these as they unfold below, so building up your score.

There is so much happening it really is unbelievable with sound adding to the realism of this ultra-fast moving game.

£9.90

Programs are for the Tandy 105, 80 and Video Cards. All prices are VAT paid and postage free. Same day return first class post service. All software fully guaranteed and in stock as we are the actual publishers, not the retailers. Free catalogue upon request.

# Kansas

224-20007, KANSAS CITY SYSTEMS, UNIT 2, BUTTON SPRING WOOD, CHESTERFIELD S40 6AT.

Circle No. 13

## ZX80/81 HARDWARE/SOFTWARE

2K RAM PACK  
4K RAM PACK  
16K KIT

£15.95  
£22.95  
£32.95



ZX KEYBOARD  
16K SOFTWARE  
CASSETTES

£27.95  
from £3.95

### RAM 80/81

#### 2K & 4K RAM

Static Ram memory expansion for the 8081. They both work with onboard Ram i.e. 4k plus onboard = 8k. This is the cheapest small memory expansion available anywhere.

#### 16K RAM

Massive add-on memory for 8081.

#### 16K KIT-A-KIT VERSION

of a 16K Ram. Full instructions included. All memory expansions plug into the user port at the rear of the computer.

### 16K SOFTWARE

#### As seen at the ZX Microfest

**DEFLUX** This totally new and very addictive game, which was highly acclaimed at the Microfest, uses fast moving graphics to provide a challenge requiring not only quick reaction, but also clever thinking. One and two player versions on same cassette, £3.95.

**30000 LABYRINTH** You have all seen 30 Labyrinth games, but this goes one stage beyond, you must manoeuvre within a cubic maze and control with controls which may go left/right/up/down. Full size 3D graphical representation, £3.95.

**CRIMPED** This is the first implementation of the popular arcade game on any micro anywhere. Never mind your invaders you this is positively striking, the speed at which this game takes ZX invaders took like a game of simple snap, £4.95.

Please add £1.00 pp for all hardware.

Software pp free.

Scotts (ZX80/81) on order.

ALL OUR PRODUCTS ARE COVERED BY A MONEY  
BACK GUARANTEE

### KEY

A full size keyboard for the 8081. The keyboard has all the 8081 functions on the keys, and will greatly increase your programming speed. It is fitted with push type keys as in larger computers. The keyboard has been specially designed for the Sinclair computer and is supplied ready-built. It also has facilities for 4 extra buttons which could be used for on/off switch, reset, etc.

# dk'tronics

22 Sussex Road, Gorleston, Great Yarmouth, Norfolk.  
Telephone: Yarmouth (0493) 652462

Circle No. 14



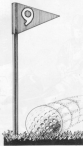
(Continued from page 62)

1) \*16 THRU 27) \*  
 750 IF 00=0 THEN 00=41,00=20,00=100  
 00=10,0000 100  
 750 IF 00=0 THEN 00=10,00=1000 100  
 000 700  
 750 IF 00=0 THEN NEXT P1=000 000  
 700 0000 1000  
 750 IF 00=0 OR 00=07 OR 00=03 AND 01=0  
 00 THEN 00=40,0000 200,000 700  
 750 IF 00=11 OR 00=01 OR 00=06 THEN 00  
 =40,0000 200,000 700  
 750 IF 00=00 AND 00=11 THEN 00=10,00=0  
 20,00=40,00000 200,000 700  
 750 00=10,00=02,00=40,00000 200,000  
 700  
 000 0000 40,COLOR 2,000 0=01 TO 0=04  
 01,0,0,0000 00,0,0000 0=00 0=01 TO  
 0=04,01,00=0000 20=0,0,0,0000 0  
 000 000 41,0,0,0000 41,0,0,000 01,0  
 0,0000 00,0  
 000 000 0=0 TO 0=04,01,0,0,0000 01,  
 0,0000 1,000 0=01 TO 0=04,01,0,0,0000  
 1,000 7000  
 000 00=00,0000,00=00=01,00=00,00=00  
 00=00,00=00 100  
 000 IF 00=0 THEN 00=10,00=0000 100,  
 000 000  
 000 IF 00=1 THEN NEXT P1=000 100  
 000 0000 1000  
 000 IF 00=0 OR 00=1 OR 00=07 OR 00=03  
 AND 01=01 OR 01=100 AND 01=00 OR  
 01=01) THEN 00=40,0000 200,000 000  
 000 IF 00=00 OR 00=06 OR 00=03 OR 00=0  
 7 OR 00=01 AND 00=04 THEN 00=40,0000  
 000 200,000 000  
 000 00=10,00=02,00=40,00=00,0000 200,00  
 0 700  
 000 0000 40,COLOR 2,000 0=01 TO 0=04  
 00=0,01=0,0,0,0000 20,0,0=0,000 20=0,0  
 =0,0,0,0000 01=0,0,0,0000 0  
 000 000 0=0 TO 0=04,01,0,0,0000 04,  
 0,0000 0=00 0=01 TO 0=04,01,0,0,0000  
 000 20=0,0,0,0,0000 0  
 000 000 0=0 TO 0=04,01,0,0,0000 00,00=0  
 00,00=00 00,00=00 00,00=00  
 0 00,07  
 000 000 20,0,0,0000 20,0,  
 000 0000 \* HOLD 0 0 P00 0=0=0,000  
 0=01 TO 0=04,01,0,0,0000 20,07=00=0,0,07=00  
 1,000 7000  
 010 00=00,0000,00=00=00,00=00,00=00  
 00=00,00=00 100  
 000 IF 00=1 THEN 00=10,00=0000 100,  
 000 700  
 750 IF 00=1 THEN NEXT P1=000 1000  
 100 0000 1000

# MINI GOLF

950 IF 00=11 OR 00=03 OR 00=07 AND 00  
 100 THEN 00=40,0000 200,000 700  
 950 IF 00=17 OR 00=1 OR 00=03 THEN 00=  
 40,0000 200,000 700  
 950 IF 00=03 AND 00=17 THEN 00=10,00=0  
 20,00=40,00=0000 200,000 700  
 950 00=10,00=02,00=40,00=00,0000 200,000  
 700  
 1000 0000 40,COLOR 2,000 0=01 TO 0=04  
 01,0,0,0000 00,0,0000 0=00 0=01 TO  
 0=04,01,0,0,0,0000 20=0,0,0,0000 0  
 1000 000 21,07=0,0,0,0000 21,07=0,0,0,0  
 1000 000 21,07=0,0,0,0000 21,07=0,0,0,0  
 1000 000 21=0,10=0,0000 21=0,10=0,0000  
 21,10=0  
 1000 000 0=0,01,0,0,0000 01,0,0,0,0000  
 01,0,0,0000 00,00=00 20,00=00 20,00=00  
 00=00 40,01,0,0,0,0000 40,01,0,0,0,0000  
 40,01,0000 000 0  
 1000 0000 \* HOLD 0 0 P00 0=0=0,000  
 0 0=01 TO 0=04,01,0,0,0000 20,07=00=0,0,07=00  
 1,000 7000  
 1010 00=00,0000,00=00=00,00=00,00=00  
 00=00,00=00 100  
 1020 IF 00=0 THEN 00=10,00=00,00=00,00  
 0000 100  
 1020 IF 00=1 THEN NEXT P1=000 1000  
 1000 0000 1000  
 1050 IF 00=07 OR 00=1 THEN 00=40,0000  
 0 200,000 1000  
 1050 IF 00=03 OR 00=06 THEN 00=40,0000  
 0 200,000 1000  
 1050 IF 00=03 OR 00=06 THEN 00=07 OR 00=0  
 0 00=04 THEN 0004  
 1050 IF 00=00 OR 00=03 OR 00=03 OR 00=  
 00 OR 00=00 OR 00=04 THEN 00=40,0000  
 200,000 1000  
 1050 IF 00=00 AND 00=10 OR 00=00 AND 0  
 00=11 OR 00=06 AND 00=04 THEN 00=40  
 0,00=00,00=00,00=0000 200,000 1000  
 1050 00=10,00=02,00=40,00=00,0000 200  
 1000 000 1000  
 1080 0000 40,COLOR 2,000 0=01 TO 0=04  
 01,0,0,0000 00,0,0000 0=00 0=01 TO  
 0=04,01,0,0,0,0000 20=0,0,0,0000 0  
 1080 000 20,0,0,0000 20,0,  
 0000 00,0,0,0000 00,0,0,0000 0  
 1080 000 0=0 TO 0=04,01,0,0,0000 04,  
 0,0000 0=00 0=01 TO 0=04,01,0,0,0000  
 000 20=0,0,0,0,0000 0  
 1080 000 0=0 TO 0=04,01,0,0,0000 00,00=0  
 00,00=00 00,00=00 00,00=00  
 0 00,07  
 1080 000 20,0,0,0000 20,0,  
 1080 0000 \* HOLD 0 0 P00 0=0=0,000  
 0=01 TO 0=04,01,0,0,0000 20,07=00=0,0,07=00  
 1,000 7000  
 1110 00=00,0000,00=00=00,00=00,00=00  
 00=00,00=00 100  
 1110 00=10,00=00,00=00,00=00,00=00,00=00  
 00=00,00=00 100  
 1120 00=00,00=00,00=00,00=00,00=00,00=00  
 00=00,00=00 100

1120 IF 00=0 THEN 00=10,00=0000 100,  
 000 1000  
 1120 IF 00=1 THEN NEXT P1=000 1000  
 1100 0000 1000  
 1150 IF 00=07 OR 00=1 OR 00=03 THEN 00  
 =40,0000 200,000 1000  
 1150 IF 00=07 OR 00=03 OR 00=03 OR 0  
 0=01 AND 00=04 THEN 00=40,0000 200,  
 000 1000  
 1150 IF 00=07 AND 00=10 OR 00=03 AND 0  
 0=11) THEN 00=40,00=00,00=00,00=00  
 000 200,000 1000  
 1150 00=10,00=02,00=40,00=00,0000 200  
 1100 000 1000  
 1180 0000 40,COLOR 2,000 0=01 TO 0=04  
 01,0,0,0000 00,0,0000 0=00 0=01 TO  
 0=04,01,0,0,0,0000 20=0,0,0,0000 0  
 1180 000 20,0,0,0000 20,0,  
 1180 000 0=0 TO 0=04,01,0,0,0000 04,  
 0,0000 0=00 0=01 TO 0=04,01,0,0,0000  
 000 20=0,0,0,0,0000 0  
 1180 000 0=0 TO 0=04,01,0,0,0000 00,00=0  
 00,00=00 00,00=00 00,00=00  
 0 00,07  
 1180 000 20,0,0,0000 20,0,  
 1180 0000 \* HOLD 0 0 P00 0=0=0,000  
 0=01 TO 0=04,01,0,0,0000 20,07=00=0,0,07=00  
 1,000 7000  
 1210 00=00,0000,00=00=00,00=00,00=00  
 00=00,00=00 100  
 1210 00=10,00=00,00=00,00=00,00=00,00=00  
 00=00,00=00 100  
 1220 00=00,00=00,00=00,00=00,00=00,00=00  
 00=00,00=00 100  
 1250 IF 00=0 THEN 00=10,00=00,00=00,00  
 0000 100  
 1250 IF 00=1 THEN NEXT P1=000 1000  
 1200 0000 1000  
 1280 0000 40,COLOR 2,000 0=01 TO 0=04  
 01,0,0,0000 00,0,0000 0=00 0=01 TO  
 0=04,01,0,0,0,0000 20=0,0,0,0000 0  
 1280 000 20,0,0,0000 20,0,  
 1280 000 0=0 TO 0=04,01,0,0,0000 04,  
 0,0000 0=00 0=01 TO 0=04,01,0,0,0000  
 000 20=0,0,0,0,0000 0  
 1280 000 0=0 TO 0=04,01,0,0,0000 00,00=0  
 00,00=00 00,00=00 00,00=00  
 0 00,07  
 1280 000 20,0,0,0000 20,0,  
 1280 0000 \* HOLD 0 0 P00 0=0=0,000  
 0=01 TO 0=04,01,0,0,0000 20,07=00=0,0,07=00  
 1,000 7000  
 1310 00=00,0000,00=00=00,00=00,00=00  
 00=00,00=00 100  
 1310 00=10,00=00,00=00,00=00,00=00,00=00  
 00=00,00=00 100



VIC-20

BY IVOR STONES

RUNS IN 3.5K

ON A VIC-20

# POT

Not just anybody can get served in the Computer & Video Games City Saloon.

Newcomers are challenged to prove that they are good enough to drink with the other games players. The only way to prove what a game player's gotta prove, is by demonstrating your nerve and reactions in a few rounds of Pot Shot.

The bar tender will fill your glass and slide it along the bar top to you. It will go over the edge and fall to the floor. You must fire at just the right moment to hit the

glass as it falls.

When you score six hits in one round, the game becomes harder and you have to hit just the handle for all subsequent rounds.

Don't worry about the bar bill, as many drinks as you want will be provided by your landlord, Pot!

Pot Shot is one of those deceptively simple but compulsive games. The graphics show just what can be obtained using the VIC-20's built-in character set.

Aspiring games writers

would do well to note how well Pot Shot puts 20 of the golden game rules into practice.

1) It is visually novel.

2) As a reaction game it is hard but not so hard that numerous scores cannot be obtained.

3) As the player improves the game automatically gets harder.

4) The rules are easy to understand and are printed in an interesting way.

5) The game does not require constant resetting by the player or an interrupt

line.

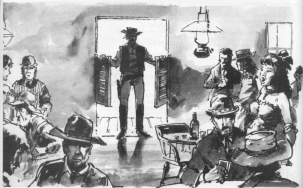
6) If no keys are pressed the "retreat mode" allows game operation.

7) Appropriate sound effects add to the overall impact.

8) Complicated character strings have been put in as data statements and odd symbols have been kept to a minimum to aid entry by readers.

9) Key program sections indented by REMarks.

10) The game makes the most of the computer's facilities and memory.



# SHOT

```

0 REM VIC POT SHOT
1 REM © J A STONES, JR, MICRO LTD
2 REM F, S, BOX24, SMITHTON, WINCHESTER, RG273AH
3 AA=73 BB=140 CC=183
4 RESTORE SC80
5 FORE36879,25:REM SCREEN COLOUR
6 SO=36876/V=36870:REM SOUND & VOL.
7 REM DATA FOR AA
8 AA="":FOR I=1 TO 27:READA:AA=AA+CHR(0):NEXT
9 DATAA0,158,46,17,157,157,146,172,18,32,17,157,288,17,157,146,28,223,18,223
10 DATA17,157,157,169,146,169,144
11 REM DATA FOR BB
12 BB="":FOR I=1 TO 25:READB:BB=BB+CHR(0):NEXT
13 DATA44,175,30,17,157,162,162,162,164,164,164,145,137,146,172,17,17
14 DATA57,157,157,288,288,18,32,223,146,17,157,157,157,163,223,18,32,146
15 REM DATA FOR CC
16 CC="":FOR I=1 TO 12:READC:CC=CC+CHR(0):NEXT
17 DATA1,167,17,157,167,164,165,157,145,157,167,284
18 REM DATA FOR DD
19 DD="":FOR I=1 TO 25:READD:DD=DD+CHR(0):NEXT
20 DATA157,167,281,32
21 A=7000 B=22 C=40 D=1940 E=12 F=0
22 PRINT "C"
23 PRINT "  SHOT CITY SALOON"
24 FORK=0 TO 1000:K=0
25 D0=" "
26 Z0=" "
27 PRINT "***** TAB(19)AA"
28 PRINTTAB(127)BB
29 IF C=0 THEN PRINT "***** FOR I=1 TO 6:PRINT " ";:NEXT:PRINT "PRINT" ";
30 IF C=0 THEN FOR I=1 TO 6:PRINT " & ";:NEXT:PRINT
31 IF C=0 THEN PRINT " "
32 PRINTLEFT$(Z0,11)"  "
33 PRINT "
34 PRINT "
35 PRINT "
36 PRINT "
37 PRINT "
38 PRINT "
39 PRINT "
40 PRINT "
41 PRINTLEFT$(C0,13)TAB(13)OF J=1
42 IF C=1 THEN GOSUB 100
43 REM FILL GLASS
44 FOR EV=0:FOR I=1 TO 32:40:FOR ES=0:1:FOR EO=0:1
45 IF I/2=INT(I/2) THEN PRINTLEFT$(C0,18)TAB(18)RIDE$(D0,3,1):J=7+1
46 NEXT:FOR EO=0:FOR EV=0:FOR ES=0:1,0
47 FOR K=30:0:REM CLEAR KEYBOARD BUFFER
48 PRINTTAB(13) " "
49 REM MOVE GLASS +
50 FOR I=1 TO 32:STEP -1:PRINT "*****"TAB(1)C0 GOSUB(41) IF I=1 THEN GOSUB(123)
51 NEXT
52 REM MOVE GLASS DOWN
53 FOR I=1 TO 13:PRINTLEFT$(Z0,1+9)C0 " " GOSUB(141) NEXT:PRINTLEFT$(C0,22)" "
54 PRINTZ0 " "
55 FORK=2+0,32

```

# An education in computers starts with you!

There is another side to microcomputing, just as interesting as games, especially if you are a responsible parent or a teacher with responsibility for teaching, computing or using computers as teaching aids. Computers in Education is an important and expanding field the implications and potential is only just beginning to be realised. If you have children, or are a teacher you have a responsibility to keep yourself informed of developments in this area. Educational Computing is written for you.

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If you are a responsible parent you will want to know what your children are being taught in schools about the new technology. Many parents are diligent members of their local PTA. From January we shall carry a regular feature looking at the many ways PTAs have helped schools raise money for computers, peripherals and software.

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From the January issue onwards Educational Computing will publish the official programme of MEPC Officers elections in Education (except) at the latest details of these elections will be available. So make sure you take out your subscription now.

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## Educational Computing

the magazine looking to the future.

VIC-20

# POTSHOT

Continued from page 47

```

104 REM SPACE CLASS
105 F=0
106 POKEV,15,POKE36877,200
107 FOR J=1 TO 6: PRINT(CHR$(J,1)) : POKEV,16+J,FORJ=1 TO 200: NEXT: NEXT
111 POKE36877,0
113 PRINT" "
115 PRINT"          " : FOR J=1 TO 200: NEXT: PRINT"          "
117 GOTO131
119 F=0: H=1: HEXTOR=0
121 GOTO173
122 REM SUB TO MOVE ARM
123 PRINT"*****" : TR=19>" "
125 PRINTTR<10>" "
127 PRINTTR<10>" "
129 PRINTTR<19>" " : RETURN
131 PRINT"*****" : TR<19>" "
133 PRINTTR<19>" "
135 PRINTTR<10>" "
137 PRINTTR<19>" " : RETURN
139 RETURN
141 IFF=0: THEH=147
143 REM TEST FOR SPACE BAR
145 GET#0: IFF=0 : THENFOR J=1 TO 200: NEXT: RETURN
147 F=F+1: IFF=1: THENF=0: RETURN
149 IFF<2-THENPOKE36877,0 : POKEV,0, GOTO153
151 POKE36877,190 : POKEV,10
153 REM CHECK IF HIT
155 P=POKE<E-2>F : IFF=1: THENRETURN
157 IFF=ANDP=88ORP=CC: THENGOSUB161 : R=1 : RETURN
159 POKE<2>F,119 : POKE<2>F+20728,0 : POKE<1>F,32 : POKE8800,32
161 RETURN
163 REM HIT
165 SC=SC+1 : FOR J=1 TO 200 : POKEV,30+J,32: NEXT
167 FOR J=1 TO 200 : POKEV,40+J,32: NEXT
169 FOR J=1 TO 5
171 POKEV,15 : FOR J=200 TO 230 : POKEV,2 : NEXT : FOR J=230 TO 260 : STEP 1 : POKEV,2 : NEXT : POKE
50,0
173 HEXT1
175 RETURN
177 REM PRINT SCORE
179 PRINT"YOU GOT " : SC : " OUT OF 6 "
181 IFS=0: THENPRINT"SHARP SHOOTER" : PRINT"DO I TAKE IT YOU SON? WANT A DRINK?"
183 FOR J=1 TO 60000: NEXT: H=1 : IFS=0: THENH=0
185 IFS=0: GOSUB=0: THENH=0: H=0
187 GOTO5
189 REM INSTRUCTIONS
191 READ#0 : IFS=0 : THENRETURN
193 FOR I=1 TO 400: H=0
195 PRINT"*****" : H=CHR$(CHR$(1,1))
197 PRINT"*****" : H=CHR$(CHR$(20)) : FOR DELAY=1 TO 100 : NEXT
199 HEXT1 : GOTO193
201 DATA"VIC POT SHOT" : " THE BAR TENDER WILL POUR YOU A DRINK..." AND "
203 DATA"IT ALONG THE BAR TOP... YOU MUST SHOOT THE GLASS ....BEFORE IT HI
TS
205 DATA"THE FLOOR ...USING THE SPACE BAR TO FIRE.....FOLLOWING 6 HITS "
207 DATA"IN A ROW, THE GLASS WILL ONLY BREAK IF THE BULLET STRIKES THE WHOLE..
"
209 DATA"...YOUR FIRST DRINK IS COMIN' UP
211 DATA"
READY.

```



The firm, whose our world's two mightiest oceans rage against one another, long ago wrote its own stormy passages into sailing lore.

Its unpredictable sailing currents, towering swell and treacherous rocks and reefs, have littered the bleak coastline of the foot of South America with many wrecks.

But in the mid 18th Century the risk payoffs to be made by North American clippers made captains risk their vessels and sailors, their lives, once again in the race to be fastest 'Round the Horn.

George Blank has recreated the golden age of the clippers and their most hazardous route in this computerized test of seamanship — a race between three ships from New York to California.

The discovery of gold at Sutter's Mill in 1849 triggered a hurried migration to California that lasted for several years. While few prospectors struck it rich, many shippers did by shipping men and supplies to California.

The highest freight and passenger rates went to the fastest ships, and three of the fastest were the Surprise, the Flying Cloud and the Challenge.

The Surprise was owned by A. A. Low and Brother, and her captain was Philip Duncan. This clipper, displacing 1261 tons, sailed in December of 1849 on a record breaking run to San Francisco of 96 days, 15 hours.

The high demand for fast shipping, not only in the California trade but in the trans-Atlantic trade to Liverpool and the China tea and spice trade as well, led to the golden age of the clipper ship. Two of the greatest were launched within weeks of each other in 1851, and raced to California under great

publicity. They were the Flying Cloud and the Challenge.

The Flying Cloud, owned by Griswold, Miners and Company, was captained by Josiah Crosby. This ship of 1782 tons left on June 2, 1851 and set a new record for the California trade of 89 days and 21 hours. This record stood for several years, partly due to stormy weather that slowed the ship to record breaking speeds of over 200 miles a day several times. (The ship did suffer damage to her masts and rigging.)

The Challenge sailed a few weeks later and ran into very calm weather, leading to a disappointing but still impressive time of 108 days. Captained by Bob "Bully" Waterman, the Challenge was the largest ship of her day of 2008 tons and was owned by M. L. & G. Griswold.

This computer program tempers with history a little to allow the three ships to sail from New York on the same day on a race to San Francisco. You will captain one of the ships and attempt to find favorable winds and currents that will allow you to get to San Francisco first. It is by no means certain you will arrive in San Francisco. The passage around Cape Horn is dangerous, and many vessels were wrecked there. If you try to sail through the doldrums or on angle and have bad luck, you could spend months right there.

The computer will display a map of North and South America, with New England indicated by the letter N and San Francisco by the letter S. Your position will be indicated by an alphanumeric mark, and that of the other vessels by the first letter of their name, assuming that they are not in the same square.

To win, all you have to do is sail your ship into the square containing the S in the fewest days. As soon as

# 'ROUND THE HORN HO



## NOTICE TO MARINERS

- 1) Observe special caution in Long Island Sound, Eastern U.S. coast at 40 degrees north latitude. Seafloor current is treacherous, especially when combined with westerly winds.
- 2) The Cape Horn Passage is extremely dangerous. For safe passage, remain south of 55 degrees, 30 minutes until longitude 12 degrees west and south of 40 degrees latitude until longitude 84 degrees west. Dangerous polar ice is virtually certain south of 58 degrees north latitude.
- 3) The Caribbean Sea contains many unmarked reefs and is especially hazardous without local knowledge.
- 4) Vessels are advised to maintain good distance from the northeast coast of South America. Light winds and fair calms, combined with unfavorable currents, make long delays likely.
- 5) Vessels bound for California are advised to get course well west of the southern coast of Mexico. Light winds make delays likely.
- 6) Beware of all capes. Reefs often project out from them and make sudden shipwrecks likely. (Computer only checks for land due north, east, south, and west. If you approach a cape from the southeast, for example, you will see a ground before any land is displayed.)



```

170 W=1+3*W1+2*W2, L=2+4*W1+3*W2, S, L1=2+3*W1+4*W2
  Y, L2=2+4*W1+3*W2, S1, S2=4*W1+3*W2, L3=2+3*W1
175 FOR A=1 TO 10:GOTO 180,185,190,195,200,205,210,215,220,225
180 FOR A=1 TO 10:GOTO 190,200,210,220,230,240,250,260,270
185 W=1+3*W1, L=2+4*W1, S=4*W1, L1=2+3*W1
190 W=1+3*W1, L=1+2*W1, S=4*W1, L1=1
195 FOR A=1 TO 10:GOTO 200,210,220,230,240
200 GOTO 210
210 PRINT "CLIPPER - A RACE AROUND THE BURN TO CALIFORNIA IN 1933"
220
230 PRINT "PRINT THE NAME PLAYERS 11 TO 21"
240 A=1:DO WHILE A<=21: THEN GOTO 250: PRINT A: A=A+1
250 IF A=1 THEN GOTO 260
260 IF A=2 THEN GOTO 270
270 IF A=3 THEN GOTO 280
280 PRINT "YALOWAY, J. P." THEN PRINT "Y"
290 NEXT A
300
310 "CONTROL ROUTINE"
320 IF W1,2=0 AND W2,3=0 AND W3,4=0 THEN GOTO
330 GOTO 700
340 FOR G=1 TO 7
350 IF W1,2=0 THEN GOTO
360 GOTO 700:GOTO 710:GOTO 720
370 GOTO 700
380 GOTO 700
390 GOTO 700
400 GOTO 700
410 FOR CL=1 TO 14
420 IF W=1 THEN GOTO
430 GOTO 800
440 GOTO 800
450 GOTO 800
460 GOTO 800
470 GOTO 800
480 IF W1,2=0 THEN GOTO 810
490 GOTO 800
500 GOTO 800
510 GOTO 800
520 GOTO 800
530 GOTO 800
540 GOTO 800
550 NEXT CL
560 W=0
570 NEXT G
580 GOTO 1000
590
600 "NEW LOCATION"
610 W=0, L=1:FOR G=1 TO 11
620 "NEW TRACK"
630 IF W1,2=0 AND L1 THEN THEN W=0, L=1:GOTO 640, 650, 660, 670, 680, 690
  W=1:GOTO 610, 620, 630
640 "STANDARD TRACK"
650 IF W1,2=0 AND L1 THEN THEN W=1, L=1:GOTO 610, 620, 630, 640
  W=1:GOTO 610, 620, 630
660 IF W1,2=1 THEN W1,2=0
670 IF W1 THEN W1,2=0:GOTO 680, 690
680 IF W1,2=1 THEN W1,2=0:GOTO 690, 700
690 IF W1 THEN W1=0
700 IF W1 THEN W1,2=1:GOTO 710, 720
710 W=1, L=1:GOTO 730, 740, 750, 760, 770, 780, 790, 800
720 W=1, L=1:GOTO 730, 740, 750, 760, 770, 780, 790, 800
730 W=1, L=1:GOTO 730, 740, 750, 760, 770, 780, 790, 800
740 W=1, L=1:GOTO 730, 740, 750, 760, 770, 780, 790, 800
750 W=1, L=1:GOTO 730, 740, 750, 760, 770, 780, 790, 800
760 W=1, L=1:GOTO 730, 740, 750, 760, 770, 780, 790, 800
770 W=1, L=1:GOTO 730, 740, 750, 760, 770, 780, 790, 800
780 W=1, L=1:GOTO 730, 740, 750, 760, 770, 780, 790, 800
790 W=1, L=1:GOTO 730, 740, 750, 760, 770, 780, 790, 800
800 GOTO 800
810 W=1, L=1:GOTO 730, 740, 750, 760, 770, 780, 790, 800
820 IF W1,2=1 THEN GOTO 830
830 RETURN
840 GOTO 1000
850
860 PRINT "000 ..... 000 ..... 000"
870 PRINT
880 PRINT "S H I P M E C H S"
890 PRINT
900 PRINT "THE CLIPPER 'YACCI' WAS LAUNCHED IN SAN FRANCISCO 1933"
910 PRINT "AND ARRIVED IN CALIFORNIA 1933"
920 PRINT "THE 'YACCI' WAS LAUNCHED IN SAN FRANCISCO 1933"
930 PRINT "AND ARRIVED IN CALIFORNIA 1933"
940 PRINT "THE 'YACCI' WAS LAUNCHED IN SAN FRANCISCO 1933"
950 PRINT "AND ARRIVED IN CALIFORNIA 1933"
960 PRINT "THE 'YACCI' WAS LAUNCHED IN SAN FRANCISCO 1933"
970 PRINT "AND ARRIVED IN CALIFORNIA 1933"
980 PRINT "THE 'YACCI' WAS LAUNCHED IN SAN FRANCISCO 1933"
990 PRINT "AND ARRIVED IN CALIFORNIA 1933"

```

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1000 GOTO 1000
1010 W=1, L=1:GOTO 1020, 1030, 1040, 1050, 1060, 1070, 1080, 1090, 1100
1020 PRINT "LAST REPORTED POSITION: 'YACCI' 1933" THEN PRINT "00"
1030 GOTO 1040
1040 FOR A=1 TO 10:GOTO 1050, 1060, 1070, 1080, 1090, 1100
1050 W=1:GOTO 1060
1060 "END OF RACE"
1070 GOTO 1080, 1090, 1100, 1110, 1120, 1130, 1140, 1150, 1160, 1170
1100 FOR G=1 TO 7
1110 IF G=1, 1+1 THEN GOTO
1120 PRINT "THE CLIPPER 'YACCI' Sailed to SAN FRANCISCO 1933"
  C, W1, W2
1130
1140 PRINT "GOTO 1000"
1150 PRINT "THE 'YACCI' WAS LAUNCHED IN SAN FRANCISCO 1933"
1160 W=1:GOTO 1020, 1030, 1040, 1050, 1060, 1070, 1080, 1090, 1100
1170 GOTO 1000
1180 NEXT G
1190 NEXT A
1200 INPUT "PRESS ENTER FOR NEW RACE" *A
1210 GOTO 1000
1220 W=1:GOTO 1000
1230 PRINT "000"
1240 PRINT "000"
1250 PRINT "000"
1260 PRINT "000"
1270 GOTO 1000
1280 IF G1, 1+1:G1, 2 THEN G2
1290 IF G1, 2+1:G1, 3 THEN G2:G1, 1+1:FOR B=1 TO 10:GOTO 1300
  B=0+1 TO B=1:GOTO 1, 2:GOTO 1+1:GOTO B
1300 IF G1, 2+1 THEN G2:G1, 1+1:FOR B=1 TO 10:GOTO 1310
  B=0+1 TO B=1:GOTO 1, 2:GOTO 1+1:GOTO B
1310 GOTO 1000
1320 IF G1, 1+1:G1, 2 THEN G2
1330 IF G1, 2+1 THEN G2:G1, 1+1:GOTO 1, 1:FOR B=1 TO 10:GOTO 1340
  B=0+1:GOTO 1+1:GOTO B
1340 IF G1, 1+1 THEN G2:G1, 1+1:GOTO 1, 1:FOR B=1 TO 10:GOTO 1350
  B=0+1:GOTO 1+1:GOTO B
1350 GOTO 1000
1360 IF G1, 1+1:G1, 2 THEN G2
1370 IF G1, 2+1 THEN G2:G1, 1+1:GOTO 1, 1:FOR B=1 TO 10:GOTO 1380
  B=0+1:GOTO 1+1:GOTO B
1380 IF G1, 1+1 THEN G2:G1, 1+1:GOTO 1, 1:FOR B=1 TO 10:GOTO 1390
  B=0+1:GOTO 1+1:GOTO B
1390 GOTO 1000
1400 GOTO 1000
1410 PRINT "THE CLIPPER 'YACCI' WAS JUST ARRIVED IN SAN FRANCISCO 1933"
1420 PRINT "IS CALIFORNIA 1933" THEN PRINT "THE 'YACCI' WAS JUST ARRIVED IN SAN FRANCISCO 1933"
1430 PRINT "THE 'YACCI' WAS JUST ARRIVED IN SAN FRANCISCO 1933"
1440 PRINT "THE 'YACCI' WAS JUST ARRIVED IN SAN FRANCISCO 1933"
1450 PRINT "THE 'YACCI' WAS JUST ARRIVED IN SAN FRANCISCO 1933"
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1940 PRINT "THE 'YACCI' WAS JUST ARRIVED IN SAN FRANCISCO 1933"
1950 PRINT "THE 'YACCI' WAS JUST ARRIVED IN SAN FRANCISCO 1933"
1960 PRINT "THE 'YACCI' WAS JUST ARRIVED IN SAN FRANCISCO 1933"
1970 PRINT "THE 'YACCI' WAS JUST ARRIVED IN SAN FRANCISCO 1933"
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and sound. Program 09,  
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# SINCLAIR

Space invaders in 16 countless of hundreds to a conscientious laser base determined to survive.

Tim Bell's Cosmos allows come in four different varieties depending on the player's score. When you score above 1,000 points you find yourself up against a second generation alien.

Another mutation takes place at 2,000 points. The fourth variety are at liberty to drop on you at any time and being "semi-transparent" they carry a bonus of 50 points.

You are rewarded for an early strike on the descending creatures as they are worth 100 points to you at the top of the screen, but only five if you leave them to the last moment.

To destroy the creatures you move your laser base so that one of its two guns, mounted at either end, is directly below the centre of the alien. The "J" key moves the base left and the "K" key moves it right.

To fire press the "L" key. The guns fire invisible laser rays when key is pressed.

Only one life in this game though and the first alien to hit your base puts an end to your score. Tim has some ideas which will help games writers working with limited memory.

In lines 10-30 the "VAL" function is used to set up variables since it takes up less memory. Lines 50 to 80 determine which type of alien will come down the screen next. Note that the

middle character between the quote in line 80 is a reversed quote character.

Line 90 determines the initial height of the alien and line 100 tests whether the alien is above one of the two laser base's guns and whether the "fire" button is being pressed — if both conditions are fulfilled control jumps to line 120.

Lines 130 and 140 move the laser base. 150 and 160 move the alien and keep it on the screen. Line 180 tests whether the alien has hit your laser base and line 200 prints an explosion and your score.

The variables used are: A\$, alien type; H, horizontal position of alien; P, position of laser base; S, score; V, vertical position of alien.

## COSMAX program listing

```
5 RAND
10 LET E = VAL "J"
20 LET S = VAL "K"
30 LET P = VAL "L"
40 LET H = INT (RND*30)
50 LET AS = "-.V-"
60 IF S >= 100 THEN LET AS =
  "███"
70 IF S >= 200 THEN LET AS =
  "████"
80 IF RND >= 8 THEN LET AS =
  "███"
90 FOR V = INT(RND*15) TO 19
100 CLS
110 PRINT AT V, H-1: AS: AT
  30, P-E: "██████"
120 IF ABS(P-H) = 1 AND
  INKEY = "J" THEN GOTO 240
130 IF INKEY = "I" THEN LET
  P = P-(P>0)
140 IF INKEY = "K" THEN LET
  P = P+(P<0)
150 LET H = H+ INT(RND*3)-1
160 LET H = H+(H<0)-(H>10)
170 NEXT V
180 IF ABS(P-H)>3 THEN
  GOTO 40
190 CLS
200 PRINT AT 19, P-3: "X X X":
  AT 20, P-3: "XXXXX": AT 7, E:
  "GAME OVER": S
210 PAUSE 40000
220 POKE 16437, 255
230 RUN
240 PRINT AT V, H-E:
  "███"
250 LET S = S+100-V*5-50*
  (CODE AS = 14)
260 GOTO 40
```

COSMAX RUNS ON A SINCLAIR ZX81 IN 1K.

# COSMAX

BY TIM BULL



BY PETER AND MATTHEW RICHARDS



# SOLVE THE CUBE!

Cubism is more popular today than Picasso would ever have thought possible.

But if working 10-year-olds solve Mr. Rubik's little box of tricks on the T.V. screen in ever decreasing times, is getting you down, then go one better and tell people you got your Pet to solve it.

This program enables anyone to solve the cube by giving them a precise list of rotations to carry out. Rather than cutting for information at various stages during the solution, the program issues a complete solution from the initial data. The computer holds the state of the entire cube as it manipulates it internally until it reaches the final solution. The would-be solver has only to enter the original pattern of colours on each face of the cube.

The solution is printed on the screen and the solver can manipulate the cube directly from this information. If required he can also have the list of rotations output to a standard printer by simply replying "yes" to the question "WILL YOU WANT THE SOLUTION TO BE OUTPUT TO A PRINTER".

The program holds the state of the cube, after every move is made, in "percent" (integer) variables, namely E% and C%. This saves memory, since one element of a subscripted "percent"

variable takes up only 2 bytes, but this is sufficient as only integers are involved.

The program itself takes up about 8K of RAM, but the variables being the total of memory needed is about 11K. It was designed for Pets with Basic 2 or 3 but will also work on a Basic 4 machine with 40 columns.

The part of the program before line 1000 prints the instructions and sets up the subscripted variables. The part from 1000 to 4900 works out, in stages, what rotations are necessary to solve the cube.

As each stage is completed the instructions are put into a string, M%, and the program jumps to a subroutine at 5000 which prints out these instructions and arranges the cube in the memory in preparation for the next stage. It then returns to the main part of the program and continues this procedure until it "sees" that the cube is finally complete and prints FINIS.

The program is written with the notation instructions based on the suffixes "-1" and "2", but when it comes to printing out the instructions a notation based on lower case letters is used, as this is a more convenient notation for the solver to follow. The solution usually runs to about 100 rotations and a specimen printout is shown.







**SOLVE  
THE  
CUBE!**

```

328 PRINT#PTR "Face 1" GOTO 808
349 PRINT#ML "Face 1" GOTO 811
358 PRINT#ML "Face 1" GOTO 811
365 PRINT#808
368 PRINT#808 ALL IF @M=1 THEN PRINT#808 "F1"
370 PRINT#1 "F1"
371 POKE144,50
374 GET# : IFR#=""THE874
375 POKE144,46 IFR#<>"THE874" GOTO377
376 PRINT "M" IFR#<>"THE874" PRINT#4
377 FORJ=1TO500 NEXT PRINT#2 : POKE53468,12
378 A=0
379 FORL=8TO5
380 PRINT"28.08K AT THE "CHR$(I)*"FACE OF YOUR CUBE"
381 PRINT#1TAB(18);CHR$(I)*"48.0L=808L=533"
400 PRINT#1TAB(12)"
410 FORZ=1TO3
420 PRINTTAB(12)" | | | "
425 PRINTTAB(12)" | | | "
430 PRINTTAB(12)" | | | "
435 ST=STHEH450
440 PRINTTAB(12)" | | | "
450 NEXTZ
460 PRINTTAB(12)" | | | "
470 PRINT#1TAB(18);CHR$(I)*"48.0L=808L=533"
480 POKE33176,FR$(I)*"48.0L=533"
490 POKE33194,FR$(I)*"48.0L=533"
500 PRINT#M"THE LETTER OF PAGE WHICH HAS THE CUBE"
505 PRINT#C"THE SOURCE OF FLASHING SQUARE"
510 PRINT#P"PRESS DELETE TO ERASE ANY ERROR."
512 PRINT#P"PRESS RETURN WHEN -FACE IS COMPLETE."
513 POKE33786,PEEK(32768)+120
515 PRINT#M"TAB(12)"
520 FORV=8TO5 FORY=8TO5
530 PRINT "###"
531 IFV=8THEH525
532 IFV=1ANDY=1THEH#CHR$(PEEK(32768)+64) GOTO600
533 POKE144,50
535 GET# : IFR#=""THEH525
536 POKE144,46
537 IFR#<>"THEH525"
540 IFY=8THEH530
545 IFV=8THEH533
546 V=V-1 V=2
547 PRINT " " PRINT#1TAB(22); "M" GOTO533
550 PRINT#1 "###"
555 V=V-1
563 IFV=1ANDY=1THEH530
570 GOTO533
575 G=18
577 IFV=8THEH568
578 IFR#<>"THEH533"
579 GOTO533
580 FORI=8TO5 IFR#<>"THEH533"
590 NEXTI : IFR#<>"THEH533"
600 PRINT#4:
610 IF@V=0GOTO811CY=CY+2THEH740
620 IFY=1THEH600
625 IFL=808L=5THEN620
630 T=C+V-2
640 #=I*(L-V+1) K=L
650 GOTO710
660 T=L-3
670 J=FR$(V-1-2*(L-5)) K=4+V
710 GOTO J,K,L>=0
720 GOTO J,K,J,L>=0
730 GOTO680

```



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```

1340 R=0:DFC=C(1,B,FNA(C-1),FNA(C-1))>STHEM="N-18-11" :GOSUB5000 :GOTO1370
1350 IFC=C(1,B,FNA(C-1),S)>STHEM="E22-18-1" :GOSUB5000
1360 R="E22-1" :GOSUB5000
1370 NEXTB
1375 B="B-12" :GOSUB-18-1"
1380 FORB=1TO4
1390 FORB=1TO4 :FORB=1TO4
1400 IFC=C(R,S,R)>STHEM=FCOR(S,S)>FNA(C-1)THEM=R:F=0
1410 NEXT :NEXT
1420 IFE=GRAND=FNA(C-1)THEM1390
1430 IFE=507F=5THEM1470
1440 IFF=FNA(C+1)THEM=C :GOTO1430
1440 R=F
1450 R="D4" :GOSUB5000
1460 GOTO1390
1470 IFE=STHEM=F :GOTO1400
1480 D=C
1485 ST=C(E,F,G)
1490 B=FNA(E+F-G)-1
1500 ONR+1GOTO1530,1510,1520,1530
1510 R="D" :GOTO1540
1520 R="E2" :GOTO1540
1530 R="B-1"
1540 GOSUB5000
1550 R=FNA(G)-1
1560 IFC=STHEM=D4 :GOTO1560
1570 R="D4E-14-13-13-13"
1580 GOSUB5000
1590 NEXTB
1600 R=0 :FORB=1TO4
1610 B=FNA(C-1)
1615 J(C)=0
1620 IFC=C(1,B,B,B)>C(1,B,B,B)>C(1,B,B,S)>547STHEM(C)=R+R+1
1630 NEXT
1640 ONR+1GOTO1655,1660,1660,0,1750
1650 IFC(C)=J(C):THEM=C
1655 R="B" :GOSUB5000 :GOTO1660
1660 R=C-J(C)
1670 R="E218-18-18-1" :GOSUB5000 :GOTO1680
1680 FORB=1TO4 :IFJ(B)=1THEM=B
1690 NEXT
1700 S=C(1,A,FNA(R+1),S)>C(1,B,FNA(C+1),FNA(C+1))
1710 IFS=544FNA(C-1)THEM="N-182-142-18-1" :GOTO1730
1720 R="E2E-14-132-18-14"
1730 GOSUB5000 :GOTO1680
1740 R=0 :FORB=1TO4
1750 B=FNA(C-1)
1760 J(C)=0
1770 IFC=C(1,B,B,S)>STHEM(C)=1+R+R+1
1780 NEXT
1790 ONR+1GOTO1800,1800,1800,0,1900
1800 IFC(C)=J(C):THEM=C
1810 R=C+4R2+J(C)-1+4R(C):J(C)=2-1+1 :GOTO1860
1820 R=C+13+1 :GOTO1860
1830 FORB=1TO4 :IFJ(B)=1THEM=FNA(C-1)
1840 NEXT :GOTO1860
1850 R=0
1860 IFC=C(1,FNA(C),FNA(C),FNA(C))>STHEM="N-1TH5-187-18-14-17-142-1" :GOTO18

```



**SOLVE  
THE  
CUBE!**

```

1900 IF(X<5,FX(2),FX(2)+4*(5-FX(2)),5+(4*FX(4)-THEIR)*425*(1-2*H+1*H^2)) GOT
01900
1970 RR="425-15H-1425H-15-142"
1980 GOSUB5000:GOTO1990
2000 R=0:R=1:FORB=1TO4
2010 J(B)=0
2020 IF(X<5,5.5*(THEHJ(B)+1-R)*1
2030 NEXT
2040 DR=100*(20000.0-2050.0-20000
2050 IF(J(1)=J(3))THEH(2)=7
2060 R=(J(2)+2*(J(2)-J(3))+4*(J(2)+2-1)+1)*R:"SST-122827242H-12282278-15-15-1":GOTO
2090
2070 R=2-J(1)
2080 RR="SST-122827242H-12282278-15-152"
2090 GOSUB5000:GOTO2090
3000 IF(E=120)E=20:THEPRINT:IFPP=1THEPRINT#4
3005 PRINT"2-1-1-1":IFPP=1THEPRINT#4,"2F1N15",C,0054
4000 END
5000 IFRR=""THEMRETURN
5010 R=LEFT(RR,1)
5015 ZFR=RRTHEH(5)
5020 IFASC(LEFT(RR,2))<64:THEH(R=LEFT(RR,1)+ASC(LEFT(RR,2))/5)
5030 RR=RIGHT(RR,LEN(RR)-1)
5040 FORL=OTOS:IFASC(OR)=FNF(CU)THEH=L+FN(CU)
5050 NEXTU
5054 IFPP=1THEPRINT#4,"TCHRR(FNF(L))"
5055 PRINTCHR(FNF(L)+128)
5056 EE=EE+1
5057 IFLEN(RR)=2:THEHSP#=#2:GOTO5059
5059 SP#=#2:IF(LEN(LR)+1+LEN(RR)/2.1>#)
5060 PRINTSP# :IFPP=1THEPRINT#4,"M"SP#
5061 IF(E=3)THEHPRINT:IFPP=1THEHPRINT#4
5062 IF(E=2)THEHPRINT"R":EE=0:IFPP=1THEPRINT#4:PRINT#4
5065 FORL=1TOLEN(R)
5070 R(C)=4+CL=00(L=5):R(4)=R(5)
5080 R(1)=FNF(L-1)+2*(L=5)+L=5)
5090 R(2)=5+2*(L=00(L=5)
5100 R(3)=FNF(L+1)+2*(L=5)+(L=5)
5105 FORL=2TO4:R(L)=R(L):NEXT
5110 E1=ENCL:R(2)=L
5114 E2=ENCL:R(3)=R(2)
5120 FORTH=3TO1STEP-1
5130 ENCL:ACTH=L):ENCL:ACTH=L)
5140 ENCL:ACTH):ACTH)=ENCL:ACTH=L):ACTH=L)
5150 ENCL:TH):L:ACTH)=ENCL:ACTH=L):L:ACTH=L)
5160 ENCL:TH):L:ACTH)=ENCL:ACTH=L):L)
5170 NEXTTH
5175 ENCL:R(5):L)=E1:FORO(5):L=L):E1
5180 ENCL:R(5):R(5))=E2:ENCL:R(5):L:R(5))=E2
5190 IFL=0:ENCL:CTHEH(R(5))=L:R(4)=L:R(2)=L
5200 T=-L=5)
5210 C1=CN(T:R(2):R(5):L)
5215 C2=CN(T:R(2):R(5):R(5))
5220 C3=CN(T:R(2):R(5):R(5))
5230 FORTH=3TO1STEP-1
5240 T1=-((TH:R(5)):R(5))=5)
5250 T2=-((TH:R(5)):R(5))=5)
5260 CN(T):ACTH=L):ACTH)=CN(T2:ACTH):ACTH=L)
5270 CN(T):ACTH):ACTH=L):L)=CN(T2:ACTH=L):ACTH=L)
5280 CN(T):ACTH=L):ACTH):CN(T2:ACTH=L):ACTH=L):CN(TH=L):CN(TH=L)
5290 CN(T):ACTH):ACTH=L):CN(T2:ACTH=L):ACTH=L):CN(TH=L):CN(TH=L)
5300 CN(T):ACTH):ACTH=L):CN(T2:ACTH=L):ACTH=L):ACTH=L):CN(TH)
5310 CN(T):ACTH=L):ACTH):CN(T2:ACTH=L):ACTH=L):CN(TH)
5320 NEXTTH
5330 CN(T:R(5):R(5):L)=C1:CN(T:R(5):R(5):L)=C1
5340 CN(T:R(5):R(5):R(5))=C2:CN(T:R(5):R(5):R(5))=C2
5350 CN(T:R(5):R(5):R(5))=C3:CN(T:R(5):R(5):R(5))=C3
5360 NEXTL
5370 GOTO5000

```



# Kit Korner

## TROUBLE SHOOTING ZX81

THIS year Sinclair has flooded the home computer market with the ZX81, giving almost everyone the chance to break into this fascinating field. Despite the low cost of a ready-built ZX81, the saving offered on the kit has tempted many with no constructional experience whatsoever, to chance their luck.

Unfortunately a simple fault or problem can be very off-putting for the beginner, so I am going to give you a few points to look out for before and after construction. Many of these have come up on the ZX81 but most apply to all kits.

To begin with, the ZX81 has been designed to fit into an small case as possible. Consequently the board layout is a little more cruddled than some I have come across and requires careful checking.

If you bought a kit before June of this year the first thing to look out for is an incorrect component listing. An error was supposed to have been included but many kits went out without one. The circuit diagram if you can follow it shows that R3 and R6 must be swapped over, i.e. R3 — not used and R6 — 1K2. Also R15 should read 220K but this is not crucial and works well with the 10K resistor suggested on the components list.

If there is a circuit diagram as well as a component list with any kit, check one against the other and if there is a discrepancy find out which is correct before proceeding. It will save you time and trouble in the long run.

As I mentioned before, always take care when soldering in components, especially transistors, to prevent overheating. Two transistors are supplied with the ZX81, TR1 and TR2. Both are 2TE312's, which are very small physically, and proved a real problem to even the skilled kit builders. The effects of overheated transistors are distorted characters or no picture at all. For those who think they may

have damaged their's the direct equivalent to the 2TE312 is the 2TE308.

Take care this time to mount the transistors at least a quarter-of-an-inch above the board and solder lightly. Also make sure that you have put the transistor in the right way round as the pin layout may be different.

Another problem I found, even with ready-built versions, was the keyboard connector. Initially the connectors are very stiff but after a few insertions it becomes easier, although you must still take care not to crease the keyboard tails. If the ZX81 will not accept inputs from the keyboard check this point first.

the regulator will overheat and may even cut out after a time. This will not harm the circuit for so soon as the regulator has cooled down it will return to operation, but it is annoying if you have just entered in a long program.

To cure this I cut out a larger heat sink from a piece of 12 gauge aluminium sheeting, which sits all the way across the front of the board, as I sometimes use a power supply of 14.5 volts, i.e. a spare car battery. Of course you must never run a computer off a battery in a running car!

There is one precaution you should take to prevent "blowing up" chips. This can occur when a



BY KEITH MOTT

even if yours is ready-built. It may have been shaken loose in transport.

One trick I had to learn was to cut the tails, having fractured one of the tracks through creasing, and carefully scrape away the insulation on the right side to make contact again. This is a bit messy as a dressed tail is not a serious problem unless you intend to take the ZX81 apart often. However, send the ZX81 back for a replacement if the fault is in the keyboard lead.

When specifying the kit version you are given the option of buying the power supply which is recommended. If, however, you decide to use your own, be warned that if it gives more than 12 volts, which is permitted by the regulator but not by Sinclair,

static charge accumulates on one or more of the pins of the chip. To prevent this, touch something earthed, like a water tap or some large item of electrical equipment, such as a washing machine or cooker, before going to work. Also touch the chips as little as possible. Dirty pins are as difficult as open circuits to trace.

Fortunately the ZX81 comes with a circuit and layout diagram as well as a connected component list. The board, even in its cruddled design, has a helpful layout printed on it, so never do these days, with the component number nearby. Build it correctly and carefully as instructed, as you will be very lucky to find the faults afterwards!





# THE CHRISTMAS

## COUNTDOWN TO PANIC

If you panic in stress situations, the bomb defusing game, *La Bomb*, will either kill or cure you.

Discover whether you are deep-headed and steady-nerved enough to compete with the army's bomb disposal unit. It is your job to defuse a rocket-shaped bomb from electronic clues before the thing goes off.

A choice of four different skill levels, generate the game's electronic sounds, which form the clues to preventing the big bang. You must also choose the length of fuse wires — the longer the wire, the more time you have to find the correct sequence to stop the bomb from exploding.

## MUSICAL MEMORY TWINS

The design teams of Weddingtons and Adam Imports must have got together to produce their respective versions of the musical memory money-spinner, *Simon*.

Each is made of the same white and blue plastic casing with four coloured, triangular-shaped buttons in the corner of the mould. There's also a circular screen on the top of the game with a grid of nine squares marked on it and circles in the squares contain containing red lights.

The only differences in the physical appearances of the game are the name and each firm's

*La Bomb* is built to last and it's durable plastic moulding will withstand most violent bangs. If you fail to defuse the thing don't worry, it won't blow you to kingdom-comes — but you do get a series of explosion noises imitating the real thing.

Your sense of panic is prompted by the electronic din getting louder as the bang comes closer. The toy is a welcome addition to the range of electronic toys brought out by Selenolabre-based toy manufacturers Action Games and Toys.

In addition it falls into the low end of the electronic games market with the cheap price tag of £14.99 and runs on four 1.5V/300 batteries (not supplied). A good Christmas bargain from most large stores with toy departments.

own logo. The Adam Import version is called *Adam Super 15* (pictured) from the company's Standard range of electronic toys while the Weddingtons' one goes by the name *Wizard*.

Both games are for one to four players, with a minimum age of six, an *Wizard*, and even on *Adam Super 15* both run off six HP11 batteries (not supplied).

The biggest difference between the two and the most important, is the price. *Wizard* clocks in at £24.95 but *Adam Super 15* comes into its own at a price of £18.95. In some stores it will cost up to £20.95, depending on the manager's discretion.



## GRAND PRIX ON A "SPACESHIP"

If racing cars are more up your street than space vehicles then try one of the electronic versions around.

In the replica of the arcade game you have got two options to go for. Either the player can try a circuit race completing a certain number of laps, or he can race against the clock.

The car is controlled by two small joysticks which adjust the car's speed by accelerating and braking, as well as steering the car.

Other cars on the race track are controlled by the micro-processor. The track itself is displayed on an LCD screen divided into three lanes. But the actual body of the game looks more like a space ship than anything remotely to do with formula one racing.

## DESTRUCTION FROM THE DEEP

People who prefer shooting down enemy craft under the sea, rather the deepest voids of space, will like a 3D hand-held game, *Tarpedo Shoot*.

Its neatly shaped body is based on an arcade games machine with a screen at the top. The aim is to destroy the fleet of battleships which sail across the path of a torpedo under your control, using the two arrow buttons you can manoeuvre the submarine into one of four positions from which to fire at the ships.

This is no ordinary hand-held game though, the screen with its LCD display of red lights is also three dimensional adding depth and realism to the entire game.

Everytime you wipe out a battleship another one comes breezing onto the screen until your time is up. When you manage a direct hit the little machine provides you with accompanying explosion sounds to add to the realism and the target sinks.

*Tarpedo Shoot* is aimed at the over-eights and runs off one nine volt battery (not included in the package) it costs £18.95 from Leicestershire-based distributors AA Hales.

When you opt for the circuit race the computerized game works out the time taken to complete a fixed distance of 800 kilometres. When you're racing against the clock the idea is to cover as many kilometres as possible in 140 seconds.

Points are scored for timings, the number of crashes with other cars, and the whole game comes complete with sound effects of car engines and thunderous crash noises.

A record of your achievements and lap times, number of crashes are kept by the microprocessor at the heart of the game.

It costs £21.95 and is available from Computer Games.





# Sound

BY DAVID ANNAL

DOES your computer squeak when you want it to roar? Several of the "second generation" microcomputers have sound circuits built in but their output power is small and the loudspeaker often mutes, one example being the Apple.

Such a loudspeaker is not capable of anything but a small squeak and will certainly not do justice to a music program or speech output.

Other computers, such as the Pet, are not equipped with any on-board amplifier or speaker at all although the circuit to generate sounds in these and pin-outs are provided (80 column Pets do have a small "beep").

familiar with the DIL package, we show the chip as particularly looks when viewed from above.

The chip houses all the amplifier circuit except for the low ohm load impedance shown.  $C1$  is an isolating capacitor.  $C2$  and  $VR1$  form a top end tone control and may be omitted if desired.  $VR2$  is the volume control.  $R1$  and  $C3$  are a frequency sensitivity for the circuit to maintain a high, immediate response and thus lose power. They are not essential and the circuit should work without them. If the amplifier is supplied by a power pack running anything else, then decouple it with a 100  $\mu$ F electrolytic capacitor from pin 18 to ground.

The output will work on voltages from 5V to 25V and, depending on this, will give 2-5 watts output. The speaker should be of reasonable size (e.g. an 8 ohm 1.5" or 4-8 ohm 4" impedance given a large PA type) as the output will be surprised.

By simplicity and ease of operation, power can be provided by a battery of PP3 type. Alternatively, a small separate mains power pack could be constructed. This needs to be rated 100mA and a circuit for one is shown in figure 2. If the sound box is to be permanently housed inside the computer case, there may be some power available to run it from the computer power pack — see your manual but take care!

Construction is straightforward. Use 0.1" Veroboard or, if soldering is not a strong point, make it up first on a small breadboard. Make sure the electrolytic caps are the right way round. Use a 14 pin socket for the integrated circuit. The latter is quite sturdy and will stand about 100°C. It also incorporates a temperature overload and will cut out if it gets too hot. For this reason, if more power is needed a heatsink can be clipped to the integrated circuit.

If a box is purchased big enough for the loudspeaker, all the rest, including the power supply, should fit inside. If using a battery, it is a good idea to

incorporate a L.E.D. indicator to show when the amp is on. The current used when nothing is being output is quite low but does slowly run the battery down.

The indicator should be a flashing type e.g. using a LM3909 so as not to use up all the battery power itself by staying on all the time!

Connecting to the computer should not be difficult. In the case of a 40 column Pet for example simply join the input wire to pin M of user port and the ground to pin H. The circuit will also give increased output from your music cassette player and can be used to monitor the cassette functions on the computer — consult your manual.

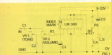
All the components are standard and should be easily obtainable from component shops or by post. The total cost of the whole sound box including speaker and mains power pack should be no more than £8, excluding case.

#### Component list

- C1 0.1 $\mu$ F 100V Polyester.
- C2 0.047 $\mu$ F any type.
- C3 1 $\mu$ F min. electrolytic.
- C4 0.1 $\mu$ F any type.
- C5 470 $\mu$ F 25V electrolytic.
- C6 1000 $\mu$ F 25V electrolytic.
- C7 2000 $\mu$ F 25V electrolytic.
- VR1 10K Lin. potentiometer.
- VR2 250K log. potentiometer.

Also required — small piece 1" veroboard, 14 pin DIL holder & suitable case.

- R1 68K  $\Omega$  watt.
  - R2 2.7k $\Omega$  1/2 watt.
  - R3 470 $\Omega$  1/2 watt.
  - BR1 50V 1A min. bridge rectifier.
  - T1 12V 150mA mains transformer.
  - IC1 LM390.
  - SW 2-pole mains switch.
  - LS 8ohm loudspeaker.
- Mains neon if required.



In the case of these quarter type of computers, a sound box is necessary and it can be used to advantage in the second generation type to increase volume and fidelity. It is always possible to connect the computer to give hi-fi auxiliary inputs and thereby obtain amplified sound.

However, it is inconvenient to trape around to the club or your friend's house with the music cassette in tow! For these reasons I am giving details of a small, cheap, but quite powerful, general purpose amplifier which is easy to construct and which should prove very useful in many ways.



The circuit is shown in diagram 1. It centres around a small 14 pin integrated circuit chip, the LM380. For those of you not

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## WHEN YOU NEED TO SPEED THINGS UP

It is the computer's calculating speed which has made it such a boon to mankind but a good game can often be ruined because a calculation is carried out too slowly.

In microcomputer games, speed is particularly important in moving graphics, where slow processing will give a jerky effect. In strategy games where the computer must calculate to decide its move, a long wait will result in all-too-human boredom.

One important way of speeding up programs is to use tables which allow the computer to look up already calculated values instead of repeating the calculation every time the result is needed.

In its simplest form a "look-up table" is just an array in which each element is the required value corresponding to its index. For example, if we have a pro-

gram which uses the square roots of the numbers from 1 to 10 we could use an array  $R$  dimensioned to 10 with  $R(i)$  equal to the square root of  $i$ . Whenever a square root is needed it can be obtained as  $R=RE$ , which is much faster than the calculation:  $N=SQRN$ .

As an example of a more complicated look-up table, consider the problem of evaluating hands in five-card draw poker. (You do not need to know the game in order to follow the example, and the method can be applied to other games in which runs and pairs are important.) To avoid making the example too complicated I will ignore flushes and the fact that an ace may be high or low in a straight.

The simplified problem then consists of deciding whether a hand contains high cards only, a pair, two pairs, three of a kind, a full house (three of a kind and a pair), four of a kind, or a straight (five consecutive cards).

It would be possible to write separate routines for testing each possible case but this is likely to be very slow. It is not immediately obvious how we

can use a table to solve this problem; the key is to arrange the cards in ascending order and look at the differences between the cards.

A difference of zero means two cards of the same value, a difference of one means two consecutive cards, while a difference greater than one means that the two cards cannot contribute to pairs or a straight.

To make this clearer, let us look at a few hands:

1, 2, 3, 5, 8 differences 1, 2, 2, 1  
2, 3, 3, 3, 8 differences 1, 2, 2, 3  
3, 2, 8, 8, 8 differences 2, 11, 0, 0  
4, 5, 6, 7, 8 differences 1, 1, 1, 1

In the first hand we have a pair — a single difference of zero; in the second hand we have three of a kind — two consecutive differences of zero; in the third hand we have a full house — a single non-zero difference; in the fourth hand we have a straight, and four differences of one. The pattern of zeros, ones and numbers greater than one — can be seen to be related to the type of hand.

We can obtain a single number from the four differences by replacing all differences greater than one by two (as the actual value of the difference is irrelevant to this type of hand) and regarding the differences as



the digits of a ternary (a base 3 rather than decimal) number. Thus, the four hands above give ternary 1001 = decimal 34 ternary 1000 = decimal 30 ternary 0200 = decimal 18 ternary 1111 = decimal 40

If the five cards in the hand, in ascending order, are in the array C, the following simple routine will calculate the index for the hand:

```
100 LET I = 0
110 FOR N = 2 TO 5
120 LET D = C0 - C(N-1)
130 IF D > 2 THEN LET D = 2
140 LET I = 3*I + D
150 NEXT N
```

The value of I calculated by this routine can be used to access an array of dimension 80 containing code numbers corresponding to the type of hand, and these code numbers can then be used to select routines which further refine the valuation of the hand according to the values of the cards.

## PRINTING WITHOUT BEING DAMNED

The PRINT statement, like almost everything in Basic, is subject to numerous dialect variations. Some of the variations can be seen if we consider how we might arrange to print at different places on the screen without changing anything except where we are actually printing.

The current print position is marked on the screen by a cursor, and the cursor location is stored in memory where the Basic interpreter can find it. It is possible to change the print position by POKEing the different values into the cursor location, but most Basics provide other methods.

The most direct method is found on the Sinclair ZX81, with PRINT AT, and on the TRS-80, with PRINT @. These allow the print position to be set immediately to any part on the screen. The POSITION statement on the Atari machines works in a similar fashion, while on the Apple II the TAB and VTAB functions set the horizontal and vertical posi-

tion separately. The Pet has keys for cursor up, down, left and right, and these commands can be incorporated into PRINT lines.

It is usually necessary, when using cursor control functions, to keep track of the cursor position. Some Basics provide a function POS which returns the current cursor position, but even without the POS function it is quite simple to use variables to record the cursor position.

All these methods of shifting the print position can be simulated by POKEing to a memory-mapped screen. If the screen has M rows and N columns, and the memory location corresponding to the top left-hand corner has address S, then the address for row R and column C is easily seen to be  $S + N*(R-1) + C - 1$ . To print a string RS starting at R,C we can use the following routine:

```
1000 LET Z = S + N*(R-1) + C - 1
1010 FOR W = 1 TO LEN(RS)
1020 POKE Z + W - 1,
ASC(MID$(RS,W,1))
1030 NEXT W
1040 RETURN
```

The equivalent to PRINT AT X,Y,"MESSAGE" is

```
100 LET R = X
110 LET C = Y
120 LET MS = "MESSAGE"
130 GOSUB 1000
```

The routine can easily be modified to print vertically instead of horizontally (this is not provided in most Basics).

```
1000 LET Z = S + N*(R-1) + C - 1
1010 FOR W = 1 TO LEN(RS)
```

```
1020 POKE Z + (W - 1)*N,
ASC(MID$(RS,W,1))
1030 NEXT W
1040 RETURN
```

The above routines do not alter the simulated print position, so that

```
200 LET MS = "SECOND MESSAGE"
```

would overwrite the first message. To cause a second message to be printed after the first we can add the following lines to the first routine:

```
1020 LET C = C+1
1030 IF C > N+1 THEN GOTO 1000
1040
1050 LET C = 1
1060 LET R = R+1
```

With this modification we can simulate cursor up, down, left, right as follows:

```
Cursor up: LET R = R-1
Cursor down: LET R = R+1
Cursor left: IF C > 1 THEN
C=C-1 ELSE C=N: R=R-1
Cursor right: IF C=N THEN
C=C+1 ELSE C=1: R=R+1
```

The above routines test for the left and right edges of the screen and adjust the row and column values accordingly, although no tests have been given to ensure that the print position stays on the screen. However, the letter tests are very important and should be included during the development of a program; it is sometimes possible to eliminate such tests in the final version, provided you are sure that nothing can make the print position move outside the screen.







# Graphics



BY GARY MARSHALL

WHEN we can place a shape on a memory-mapped screen by making it up with graphics characters, the next step is to make the shape move round the screen. It is fascinating to make it move in a way that can be controlled by you, the user.

In the better games programs that have been written for the popular microcomputers, a fairly standard arrangement for movement under user control has evolved. It usually involves the use of the numeric keypad, although if a particular game doesn't possess one, any square block of nine keys can be used.



Figure 5: Control keys and directions

The movement control plan is illustrated in Figure 5. The number 5 is central, and is taken to indicate that no movement is required. Since the number 5 is situated to the right of 3, this key is used to indicate that movement to the right is required, and so on with the other keys.

Using the routine given last month to plot a space invader we can write a program to move the invader around the screen. The program should scan the keyboard to see if a control key has been pressed, and if so it should move the invader appropriately.

Thus, if the invader is situated with reference to a screen position, P, and the 5 is pressed, the invader should be moved one place to the right. This can be

done by increasing the reference position by one and plotting the invader again.

Movement to the left can be achieved by subtracting one from the reference position. The changes which have to be made to the reference position for all directions of movement are illustrated in Figure 2 for the Pet, which has 40 character positions in a row.



Figure 2: Screen Locations and directions

One refinement is needed, because if an invader, or any other shape, is moved like this, it leaves parts of itself behind so that its movement is characterised by a 'bleeding' which marks its course. To avoid this, the shape can include a reserved

constituent of spaces, so that the part left behind is a space and no trail is left.

A basic program, written for the Pet, to draw an invader and move it round the screen as directed, is shown below.

The program lines have the following functions: line 10 clears the screen and line 20 sets the reference position for the initial plot of the invader.

Lines 30 to 50 plot the invader with reference to P and lines 60 to 130 plot the border of spaces around it. Line 130 scans the keyboard until a key is pressed, while lines 130 and 140 reject all depressed keys except control keys. Control only passes to line 150 if a control key is pressed, and lines 150 to 230 move the reference position in response to the depressed key before returning to re-plot the invader in the new position.

Notice that the invader can be driven off the top or bottom of the screen, which is not to be recommended. In fact, a good refinement to the program would prevent it.

Removing lines 60 to 130 converts the program to a rather pretty pattern drawer. The movement scheme gives some insight into how the pieces in many games can be moved.

## GET THINGS MOVING

```

10 PRINT CLR
130 CHALLENGE
20 P=20000
30 POKe P-1,200:POKE P,247
40 POKe P+1,127:POKE P+20,220
50 POKeP+40,249:POKEP+41,127
60 POKe P-3,126:POKE P+3,12
70 POKe P+30,23: POKe P+40,22
80 POKeP+42:POKEP+50
90 POKe 1,12:PRINT
100 FORI=1 TO100:POKEI+42
110 POKe 1,12:PRINT
120 GET C$:IFC$="7" THEN120
130 GET C$:IFC$="7" THEN120
140 PRINT

```





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# DOWN TO BASIC DOWN TO BASIC

BY MOIRA NORRIS

## DIVIDING RULES

By experiment you may have already discovered the order in which a computer will perform arithmetic operations when faced with a choice.

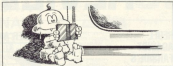
In a simple program like:  
10 PRINT 3+2\*5  
20 END

the answer would be 13 because, when faced with a choice between multiplication and addition, it will always do the multiplication first.

Similarly, by trying other examples, you would find that it always gives preference to the multiplication and division operators over the addition and subtraction operators.

So 3+4\*5 gives the answer 7 and 4\*3-5 gives the answer 5.

What would the answer be in the following case? 13/2\*2. Here the computer has a choice between multiplication and division. If the division is done first, then the answer will be 4; if the multiplication is done first, the answer will be 1. Multiplication and division are said to be of "equal precedence", meaning that there is no hard and fast rule as to which one will be done first. In this situation, the rule that is adopted is that the computer works from left to right — so that in this case it would do



the division first; not because it has any natural priority over the multiplication, but because it occurs first as we read the expression from left to right. Addition and subtraction are also of "equal precedence".

As yet, I have not mentioned the exponentiation operation (i.e. working out powers of numbers). Exponentiation has priority over any of the other operations.  
 $3^{2*2}+1$ .

This expression would therefore give the answer 14. (Remember — exponentiation is represented by sides  $^{**}$  or  $^$ .)

At this stage, these rules of precedence may seem very complex, but the important thing at the moment is that you learn to be careful when writing expressions for calculations. Don't worry — if in doubt, try it out and see what happens!

If at any time you wish to override such rules of precedence (or if you are not sure of the rules of precedence), you can use brackets. For example:

$(3+2)*5$   
will cause the computer to perform the addition first and the final answer will be 25.

## CALCULATING PLUS

You are now in the position that you should be able to write programs to perform any straightforward calculation. You may be asking yourself: "Why use a computer rather than a simple calculator?" One of the features of using a computer is that you can write a program which will perform the specified calculation for any set of values and not just one particular set of values as you have done until now.

To illustrate this, I will return to the simplest of examples — a program to add two numbers. This time, I will write a program that will add any two numbers — these numbers will be provided when the program is RUN.

```
10 INPUT A,B
20 PRINT A+B
30 END
```

This program uses "variables" A and B to describe the calculation to be performed on the numbers.

If you RUN this program, the computer will wait for you to type the values of A and B when it encounters the "INPUT" instruction. It will print the prompt "I" so that you will know that it is waiting for "input". You then type in the required values, separated by commas if there is more than one, then press the "Return" key. Therefore, for the above program you should have something that looks like:  
"I 3,2" printed by the computer.

In this example, I used the names A and B to represent the two values. As these are only "variables" to allow us to do-

3+2\*5?





cribe the operations the computer has to perform. It is not significant that I used these particular names. Some versions of basic restrict you to names consisting of a single letter or a single letter followed by use of the digits 0,1,2,3...9. The following are examples of names that could be used: A, X, Y2, T3.

Other versions can cope with longer names for variables. This means that you can have more meaningful names such as "PROFIT" or "VALUE 68". Note that I have always written my programs in uppercase letters.

Again, many systems are more flexible and permit lowercase and uppercase letters. I shall always use the more restricted form on my programs should they work, as they are given, on the majority of systems.

## REPEAT FIVE TIMES

Another powerful feature of computers is that it is easy to repeat calculations. It is no more difficult to write a program to

repeat a calculation a thousand times than it is to write one to repeat it five times.

The programs I have looked at so far have been of the form:

```
INPUT data
PRINT answer to calculation on data
```

Now let's look at examples where these instructions are repeated a given number of times. For example, I might have a program of the form:

```
Repeat five times
INPUT data
PRINT answer to calculation on data
end of repeat
```

I have used a "loop". In this example, I "loop" five times — meaning that I loop back and repeat the instructions five times. To illustrate how you can write a program to do this, I'll write a program to add, not one pair of numbers, but five pairs of numbers.

```
10 FOR I=1 TO 5
20 INPUT A,B
30 PRINT A+B
40 NEXT I
50 END
```

Two new instructions have

been introduced — the FOR statement and the NEXT statement. These will be discussed in more detail next month. For now, it suffices to say that they bracket the instructions to be repeated, and that the variable called "I" acts as a count of the number of times round the loop.

## MESSAGES IN QUOTES

The PRINT instructions used so far have been used to print the answer to a calculation. PRINT instructions can also be used to print messages. To do this you simply enclose the message that you want printed in quotes. A simple program to illustrate this is:

```
30 PRINT "THIS IS A TEST"
20 END
```

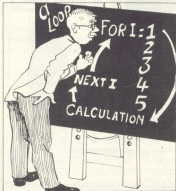
I will leave you with the following example program. It includes loops and the use of the PRINT instruction to print messages. Try running this program and then see if you can work out what each instruction does. I will go through it in detail next month.

```
10 FOR I=1 TO 2
20 FOR J=1 TO 4
30 PRINT "XXXX" XXXX
40 NEXT J
50 FOR K=1 TO 4
60 PRINT " XXXX XXXX"
70 NEXT K
80 NEXT I
90 END
```

## NEXT ISSUE

Most computer games involve graphic symbols — these are the building blocks used for drawing pictures on the screen. Many of the versions of Basic developed for microprocessor systems include special instructions for graphics. The more specialised instructions will be dealt with later in the series. Next month, I will describe how you can achieve simple graphical displays using the PRINT instruction.

## NEXT ISSUE



# **“My finger slipped, I hit the button, and nuked Washington by mistake.”**

Whether your kind of fun is saving the World in a war game, sharpening your chess strategy or piloting a 747, computer games reach new levels of exhilaration in terms of excitement, intellect and dexterity.

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You reach into your pocket and take out a watch about the size of a tiny calculator. You press the white button and see you should have been home about an hour ago. You press the white button and start to play. The game's called 'Lion' and features a number of electronically controlled 'Kings of the Jungle'. You have to log them escaping from their cage by moving two lion cubs into their path. Suddenly life is fun again, the mechanic arrives and offers to buy a few games, you're on your way.

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# SOFTWARE GLOSSARY

A beginner's guide to plain jargon

**ALGORITHM** A process or set of rules to carry out a task or solve a mathematical problem.

**ARRAY** A series of items (data or information) arranged to form a meaningful pattern.

**ARRAY SUBSCRIPT** An indexing notation e.g. X(1), X(2) where 1 and 2 are subscripts, used in an array.

**BITS** Binary digits. The 0s and 1s that make up the binary code computers understand.

**BUG** A slang term given to a mistake in a computer program which prevents it working. It can refer to a mechanical, electrical or electronic defect in a computer.

**BYTE** A term to measure a number of bits (binary digits), usually eight bits to a byte.

**CHIP** A tiny piece of silicon which holds all the components that make up a microprocessor.

**CHARACTER STRING** A sequence of characters in a row.

**CONCATENATE** To write in a series, link together or chain.

**CURSOR** A small square-shaped mark which indicates where a character will appear on the screen. It can be moved around the screen using certain keys on the keyboard.

**DECODE** To interpret and determine meaning, and to translate a code into more understandable form.

**ELECTROLYTIC CAPACITOR** A component which allows the passage of ac current but not DC current.

**ELLIPTICAL** Of or relating to an ellipse or ellipsis.

**ELLIPSE/ELLIPSE** Omission from sentence of words needed to complete construction or sense.

**ERRATA** (Errata) Errors in printing or writing, usually in lists.

**EXPONENTIATION** A mathematical operation used to calculate powers of numbers.

**FOR...NEXT** A Basic statement which is an instruction used for repetition of a sequence of program statements (see loop).

**GOSUB** A Basic command instructing the computer to go to a subroutine in a computer program.

**GOTO** A Basic command which tells the computer to jump to another line in a computer program.

**GRAPHICS CHARACTERS** The name given to pictorial representation of data such as plotted graphs, engineering drawings and computer games.

**HARDWARE** A general term given to all pieces of electronic and mechanical devices which make up a computer system, i.e. the actual machines.

**INPUT** Information which is fed into the computer.

**INTEGER** A number which does not contain a decimal point, i.e. a whole number.

**K** Abbreviation for KiloByte.

**KILOBYTE** A measurement of memory capacity. 1024 bytes of memory. So 5K is equivalent to 512 bytes.

**L.E.D. (Light Emitting Diode)** Provides a simple display and consists of an electron tube which lights up when electricity is passed through it. Used as an alternative to liquid crystal displays in calculators and watches.

**LET** A Basic statement which defines a variable. Eg. LET A=1.

# SOFTWARE GLOSSARY

A beginner's guide to plain jargon

**LOGICAL NETWORK** A series of interconnected points linked by communications facilities.

**LOOP** A Basic function relating to the repeated execution of a series of instructions for a fixed number of times.

**MEMORY** A measurement of how much information a computer can cope with.

**MEMORY MAPPED SCREEN** Data called up on the V.D.U. screen to help when processing scattered program fragments in the computer's memory.

**MESSAGE** A sequence of letters or symbols which has some sort of meaning.

**NEXT** (See FOR . . . NEXT).



**OSCILLATE** To undergo high-frequency alternations as across a spark gap or in a valve transmitter circuit.

**POKE** An instruction used in most versions of Basic allowing you to store integers in a specific place in memory.

**PRINT** A Basic command which tells the computer to perform a calculation in a program.

**PROCESSING** Handling and manipulating computer data.

**RAM** (Random Access Memory) This is a number that can only be repeated by chance. As it is like

throwing a dice these numbers are useful in games.

**ROM** (Read Only Memory) A memory chip which can only be read from and not written into.

**ROUTINE** A set of coded computer instructions used for a particular function in a program.

**SCAN** To examine stored information for a specific purpose as for content or for arrangement.

**SOFTWARE** The programs fed into a computer, which make them perform what we want them to do.

**STRING** A connected sequence of characters, words or other elements usually symbolized with the \$ (dollar) sign.

**SUBROUTINE** A computer program routine that is translated separately, generally used in several computer programs or several times in one program.

**TERRARY** Refers to the number system of the base three.

**USER PORT** The entry channel which a data set is attached to.

**VALUE** The numerical quantity of a data element, and is the number assigned to a variable.

**VARIABLE** A symbol whose numeric value can be changed at all times. It is used when writing programs.

## GOLD RUSH

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## SHARP MZ-80K software

- 1. **ALPHABET** - A program which displays the alphabet in a variety of fonts.
- 2. **ARITH** - A program which displays the results of arithmetic operations.
- 3. **BASIC** - A program which displays the results of BASIC commands.
- 4. **CONVERSION** - A program which displays the results of unit conversions.
- 5. **DATE** - A program which displays the current date and time.
- 6. **DELETION** - A program which displays the results of deletion operations.
- 7. **EDIT** - A program which displays the results of editing operations.
- 8. **EXECUTE** - A program which displays the results of execution operations.
- 9. **FORMAT** - A program which displays the results of formatting operations.
- 10. **HELP** - A program which displays the results of help operations.
- 11. **INITIALS** - A program which displays the results of initials operations.
- 12. **LIST** - A program which displays the results of list operations.
- 13. **LOAD** - A program which displays the results of load operations.
- 14. **MOVE** - A program which displays the results of move operations.
- 15. **PRINT** - A program which displays the results of print operations.
- 16. **SAVE** - A program which displays the results of save operations.
- 17. **SEARCH** - A program which displays the results of search operations.
- 18. **SETUP** - A program which displays the results of setup operations.
- 19. **SHOW** - A program which displays the results of show operations.
- 20. **STOP** - A program which displays the results of stop operations.
- 21. **UNDO** - A program which displays the results of undo operations.
- 22. **WEEK** - A program which displays the results of week operations.
- 23. **YEAR** - A program which displays the results of year operations.

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Centronics 707 dot matrix printer is a faster, smaller, and more powerful system containing a 1.25 MHz Intel 8088 processor and other improvements. It has an enhanced keyboard with 48 function keys, a new mouse, and a new software package. The Centronics 707 dot matrix printer is the most powerful TRS80 computer yet. It features a 48K DR15 memory expansion option, a built-in printer port, and a new software package.

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The Video Gene System is a faster, smaller, and more powerful system containing a 1.25 MHz Intel 8088 processor and other improvements. It has an enhanced keyboard with 48 function keys, a new mouse, and a new software package. The Video Gene System is the most powerful TRS80 computer yet. It features a 48K DR15 memory expansion option, a built-in printer port, and a new software package.



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**MICROLINE 83** 1987. This is a faster, smaller, and more powerful system containing a 1.25 MHz Intel 8088 processor and other improvements. It has an enhanced keyboard with 48 function keys, a new mouse, and a new software package. The Microline 83 is the most powerful TRS80 computer yet. It features a 48K DR15 memory expansion option, a built-in printer port, and a new software package.

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