A Database Publication

Computing with the AMSTRAD

Vol. 2 No. 1
January 1986
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The independent magazine for Amstrad computer users

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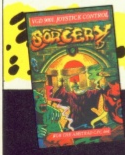

Remember "SORCERY", this year's most ACCLAIMED title for the AMSTRAD? Well VIRGIN GAMES' unrivalled reputation for AMSTRAD software is upheld again with the Gang of Five's latest MASTERPIECE.

Vol. 2 No. 1 January 1986

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9 NEWS
Keep up to date with the latest happenings and arrivals in the ever expanding world of the Amstrad.

14 CP/M
The start of a brand new series on CP/M. After finding out exactly what it is, we provide an easy-to-follow guide to that vital step – backing up your master disc.

16 MOLECULE
Can you find the hidden molecule's structure? This fascinating game of logic will keep you amused for hours as it puts your mental ability to the test.

21 BEGINNERS
Totally DIM when it comes to arrays? Fear not, help is at hand as our series for the novice programmer enters new dimensions!

27 BUSINESS
Jo Stork provides a first-timer's guide to buying a business system and reviews a complete Stock Control, Sales Invoicing and Sales Ledger package from Quest International.

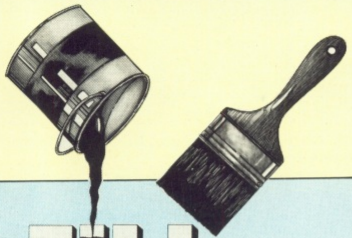
32 ADVENTURES
Our intrepid explorer Gandalf continues his wizard series as he uncovers the weird and wonderful world of the Amstrad adventurer.

35 SOFTWARE SURVEY
The Way of The Exploding Fist from Melbourne House, Knightsoft's Lucky Fruits and Battle for Midway from PSS are just three of the recent releases that come under scrutiny this month.

41 MACHINE CODE
ADD or ADC – which do you use? We reveal all as our series for beginners in machine code shows how easy 16 bit additions really are.

Contents

46 HARDWARE
We look at two interfaces to extend the power of your Amstrad: a device to send that missing eighth bit to your printer, and the official RS232 interface.



52 FILL
Wish your CPC464 had a graphics FILL command like its successors? You can give it that extra painting power with this neat machine code utility.

54 DISCMAN'S REVENGE
Imprisoned on the planet Dartsma, the discman must survive the ghosts and deadly plants to provide the reactors with power.

61 WORDSQUARE
Are you a puzzle freak? Into wordsquares? Now you can amuse your friends, and baffle your foes by designing your own with our wordsquare creator.

66 BIRTHDAY
We're one year old this month, and here's just the program to celebrate the occasion. Can you light our candle before your flame blows out?

69 SHOWTIME
All about our next great Amstrad Computer show. We're back at the Novotel, Hammersmith, London on Saturday and Sunday January 11 and 12. Lots more room and lots more products for you.

71 BINARY TRAINER
Still confused by decimal, hexadecimal and binary? This colourful practice program will sort out your problems in no time at all.

74 ALEATOIRE
A couple of teasers to get the New Year off to a flying start: Quasimodo and his tangled bell ropes, and opening the modulo safe.

76 ANALYSIS
The Amstrad has four delay timers at your disposal, controlled from Basic by the AFTER command. Trevor Roberts' simple program shows their use.

79 WINDOWS
A superb split screen utility that's certain to be a boon when developing those major programs.

81 MEMDUMP
This interrupt-driven routine will help you keep track of how your programs affect memory. Invaluable for inveterate RAM explorers.

93 ORDER FORM
Take out a subscription, order a back issue, cassette tape, disc, dust cover or binder – and you can do it all on one simple form.

97 POSTBAG
The part of the magazine you write yourselves. Just a small selection from the many interesting and informative letters you've been sending us.

Now YOU can fly with the legendary Red Arrows – in the most challenging flight simulation ever!

It's the most exciting flight simulator ever written for a home computer – the product of many months of dedicated work by some of Britain's top programmers, enthusiastically aided by the talents of aircraft designers, engineers, mathematicians – and the Red Arrow pilots themselves.

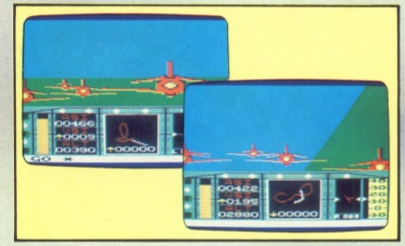
Every ounce of power contained in the micro, and its enhanced sound and graphics capabilities, is used to give the utmost realism to re-creating the most spectacular aeronautical displays ever seen in the skies of Britain.

You start by practising take offs and landings. Then, once you have won your wings, you fly in formation as part of the Red Arrows team. There's no margin for error as you fly a mere six to 10 feet from each other – at speeds of between 300 and 350 miles an hour!

But the real drama begins as you plunge into the death-defying manoeuvres that have been thrilling crowds at air shows for the last 21 years.

On the panel in front of you are all the instruments you need – plus a screen giving you an external view of the complete formation you are flying. Slip out of line for a second and the eagle-eyed Red Leader will be on the radio ordering you back into position.

The program comes with a detailed flight handbook that will soon give you the confidence to take YOUR place alongside the ace pilots of the Red Arrows, even if you've never flown before!



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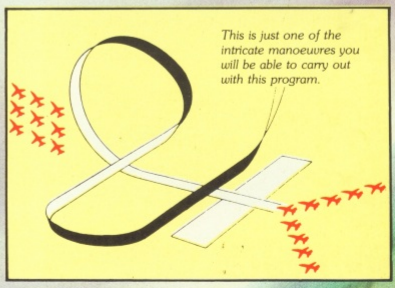

This is just one of the intricate manoeuvres you will be able to carry out with this program.

Put yourself in the pilot's seat of the most manoeuvrable fighter in the RAF!

RED ARROWS
"If you want to have some fun and say that you were flying in formation with the 'Big Nine' then this is the program for you."
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Now available for the Amstrad CPC-6128, PCW-8256 and CPC-464 (with CP/M)

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Imagine you have to prepare a report, plan a holiday, launch a new product, arrange a wedding or simply sort out your ideas on a new activity.

BrainStorm is a three dimensional scratch-pad designed to be the quickest and most efficient way of organising your thoughts on any subject. It allows you to think, write, edit and structure all at the same time.

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BrainStorm is the equal to a word processor on words, or a spreadsheet on numbers. With it you will develop the ideas in your mind...all in a fraction of the time it takes with a scratchpad and pencil.

If you think you must BrainStorm.

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It enables you to assign any long, repetitive, or difficult-to-remember set of keystrokes to any single key on your keyboard. Press this key once and SmartKey, the electronic assistant, will do the work for you. It can be used with, and is invisible to, your other programs.

With word processors you can type standard paragraphs, reformat text, find files and change margins instantly. With spreadsheets you can define keys to display windows, recalculate models, save files and print automatically. And with databases you can find records, enter data and produce reports with just one keystroke.

Introductory Amstrad Offer
Usually £113.85 Now **£49.99** inc VAT

With these and other software products the possibilities are endless! SmartKey will increase your productivity, improve your accuracy and reduce your frustration. Your Amstrad computer will be a lot easier and a lot more fun to use.

Are you frustrated by the keyboard barrier? Would 'error prone and slow' fairly describe your keyboard skills?

Touch 'N' Go will change all this. It is a carefully designed keyboard skills course developed over the last 20 years. Having been implemented on today's business micro-computers it has achieved success as the UK's most popular typing tutor. And now it's available for the Amstrad range of disk-based computers.

Introductory Amstrad Offer
Usually £63.25 Now **£24.99** inc VAT

The course develops your skill on the QWERTY keyboard and numeric keypad. With a little concentrated effort you can achieve mastery in just 24 hours.

It is actually so much fun to use that it becomes addictive. So don't start using Touch 'N' Go when you have something more important you should be getting on with!

Touch 'N' Go gives you the opportunity to banish keyboard frustration forever and increase productivity with the software products you use.

Cardbox is the most popular, the most flexible, the fastest and in fact THE BEST simple electronic card-indexing system on the market.

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You can have up to 65,000 cards in any one file (depending on disk capacity). Each card can have up to 1404 characters on it. There can be up to 26 fields on each card. The largest field you can have is 1404 characters (the size of the card). And there is absolutely NO LIMIT to the number of indexed words you can have on a card or in a file.

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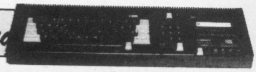


New products galore mean a Happy New Year for Amstrad

They'll all appear at the January Show

TWO-thirds of the companies exhibiting at this month's Amstrad Computer Show will be displaying new products.

Many are launching more than one item, which means there could be as many new products as there are exhibitors – and there will be 71 firms with stands at the Novotel, Hammersmith, on January 11 and 12.

All available space was booked within two weeks of the show being announced, testimony to the tremendous success of the first Amstrad Computer Show at the Novotel last October when the doors had to be closed several times to control the flood of visitors.

It all adds up to a very happy New Year for Amstrad owners, with a wealth of brand new hardware add-ons and software of all kinds on show.

These are just a few of them:

Timatic Systems is launching its new large capacity disc drives, the new Winchester system for the PCW8256 and CPC664, and previewing its enhanced eprom programmer with four-way sideways ROM card and ability to program Basic on ROMs.

Screens Microcomputer is introducing some of the products it is importing from Vortex Micro Systems of West Germany, including a CPC464 RAM upgrade giving 512k capacity, allowing disc programs of 448k to be run.

Totally ROM-driven and fitted internally, it comes with a 32k printer buffer and RAM disc of 256k. It also gives extended Basic commands.

A new floppy disc station comprises twin 5¼in drives, each with 720k capacity, complete with the VDOS controller which is totally Amsdos compatible and serves 464, 664 and 6128 machines.

DK'Tronics is releasing the 6128 versions of 64k and 256k expansion packs and 256k silicon disc.

From **PSS** comes Mcoder III, a full floating point Basic compiler, and four games – Contamination, Eden Blues, Swords and Sorcerers and Battle of Britain.

Woolf Graphics is launching a graphics utility called The Animator which allows the user to produce line drawings and then animate them to produce a 25 frame-a-second cartoon effect.

Bernard Babani Publishing is introducing its new book, "How to Write Word Game Programs for the Amstrad CPC464, 664 and 6128". The 112 page paperback tells how to write your own word games, gives a screen dump to the DMP1 printer and pull-out routines to use in your own programs.

Datastar Systems is launching the Amstrad version of its Magic Modem, which costs under £100. It has full Prestel facilities, 300 baud full duplex and 1200 baud half duplex, and autodial. Auto answer is an optional extra at about £15.

Britannia Software is releasing Play Your Cards Right, the computer version of the Bruce Forsyth TV game, at £7.95.

From **Bubblebus Software** comes Starquake, an arcade action game with 650 screens priced at £8.95.

Grafsales is showing several new technical drawing packages including Grafpad 2, and an A4 digitiser pad complete with freehand graphics software that will run together with EG Computer Graphics' Draughtsman package.

Accounting software publisher **Cornix** has promised to give show visitors a sneak preview of Amstrad programs it is to launch later in the year.

Computer Contact is releasing CCS Easy Ledger and CCS Ledger, accounts packages and integrated systems for the PCW8256.

Cirkit Holdings will be showing the Admate DP100 printer for the first time. The dot matrix, near letter quality printer has a Centronics interface and the ability to operate at 100 characters a second. Its price is £160.

Cambrian Software is unveiling a number of vertical market software programs at the show, including one for estate agents and another for dairy farmers. It will also be showing recently-enhanced versions of its Camsoft business packages.

Sagesoft is planning to release a new database called Retrieve. Priced at £195, it has full data retrieval, 20 English language variables, and works with the Amstrad word processor to provide a direct mailmerge facility for Logo-Script.

Phoenix Publishing will launch The Planter's Guide Pack detailing 1,000 shrubs, conifers, heathers and climbers by height, position, light, moisture, soil type and colour – a cassette and book allowing Amstrad users to choose plants that ideally suit their own gardens. It costs £14.95.

New games range

GAMES publisher Ariolasoft has launched what it calls a new "mid-price product range". First of the series for the Amstrad is Kaiser, set in a small German province in 1700.

The player manages crops and estates and lays down all the economic and social laws while working up through the hierarchy of the nobility with the aim of becoming Kaiser over the entire country. Titles in the series will cost £9.95 on disc and £7.95 on cassette.

Radio links Amstrad educational network

AMSTRAD has achieved a breakthrough on the education front with a revolutionary first – a network for its machines which uses a unique radio telecommunications link.

It enables up to 120 workstations to be linked together at distances up to 3km apart.

Developed by Northern Computers, its official launch takes place at the January Amstrad Computer Show.

Originally designed for mainframe terminal communications, the company has now adapted it for use with the entire Amstrad computer range. And it has facilities which enable any new computers coming on to the market to interact with it.

A pilot network has been in operation at Bootle High School, Merseyside, since September, and two more in Norway and Finland.

The Bootle scheme, which involved linking two sites over half a mile apart via radio aerials on the school buildings, proved a total success. It enabled both sites to share expensive equipment such as printers and disc storage space and to interact with different operating systems such as the BBC and with other networks.

The company also claims it is quicker than using a floppy disc drive with data being transmitted at 250 Kbaud.

Spokesman Gareth Littler explained how the network operates.

"The network is a ring made up of a dedicated micro system which handles all ring protocols – two computers each with a network interface – and wall socket boxes into which up to 120 stations can be plugged", he said. "This enables any computer in the ring to access the network's disc storage space, printers or other equipment.

"And if any area larger than three kilometres needs to be covered another ring is set up and linked to the existing one via a gateway".

The system has already aroused international interest. To date, Northern Computers have received system requests from Australia, New Zealand, Singapore, Lebanon, Holland and Ireland.

● Amedia, a group of education software houses making up the Amstrad Education Software Consortium will be sharing the Northern Computer stand at the show.

DRAGONTORC author Steve Turner has good reason to look satisfied with life. His chart-topping adventure game for the Amstrad is not only chalking up impressive sales in the UK but is also proving extremely popular in Holland, Spain and France, according to publisher Hewson Consultants.

"We expect Dragontorc to go from strength to strength abroad", says Hewson sales manager Debbie Sillitoe.

Musical adventure

SOFTWARE house CRL has announced two new releases for the Amstrad.

Genesis is a programming system designed to allow the user to create graphic adventures with three channel music and sound effects which will run independently of the original software when completed.

A free adventure game called In Like Minsk is included in the package, which costs £9.95.

The authors of Formula One have designed Endurance, where the player competes in the world of long distance bike racing.

Success depends as much on the maintenance of the bikes during pit stops as on the racing ability of the player.

It costs £7.95.

A FULL range of self-tuition GCE courses is to be launched by Ludinski Computer Assisted Learning at the January Amstrad Show.

LCL made the decision after its Micro Maths O level course was greeted with such enthusiasm at the October show. The program was its first Amstrad conversion.

The range, which also includes the follow-on Mega Maths course for A level students and Micro English, is claimed to be the first complete self-tuition one for the Amstrad 464, 664 and 6128.

All three include tuition, sophisticated colour graphics, sound and multi-tasking.

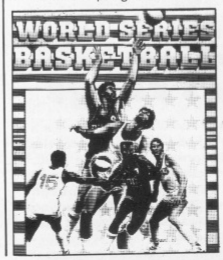
Each course contains 24 programs on two cassettes or on disc and costs £24.

Ocean launches utilities, games

OCEAN has launched a new IQ range of interactive software and utilities for the Amstrad micros.

They include its first text adventure, Neverending Story. Based on the book, it follows the adventures of a boy magically transported to the land of Fantasia to help save its doomed people. Price: £9.95.

Other games in the range are simulation programs World Series Baseball, Match Day and Daley Thompson's Supertest, and arcade action game Frankie Goes to Hollywood. All except Supertest, which is £9.95, cost £8.95.

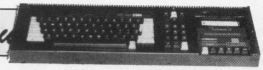


The company has launched three utilities for the graphics hobbyist. The first, Amstrad Laser Basic, is an extension of the machine's resident Basic.

It adds 200 new commands and features while using only 12k of RAM. It includes a sprite and graphics designer.

Second is the Laser Compiler, tailored to produce fast code for the extended interpreter. Last of the three is Amstrad White Lightning, which combines Forth, demonstration software, sprite generator program, two sets of pre-defined sprites and graphics extension.

Laser Basic costs £14.95 on cassette and £19.95 on disc, and the remaining two £19.95 on cassette, £24.95 on disc.



Write your own adventures

THE latest crop of new releases for the Amstrad brings a double bonus for adventure writers.

It comes in the form of a Graphic Adventure Creator from Incentive Software and an upgraded version of Genesis from Camel Micros.

Incentive claims its program frees the Amstrad CPC range from the restrictions of two-word noun/verb input, limited descriptive text and complicated graphic production.

It has been developed to enable the user to produce fast compact adventure games with the minimum of effort and the maximum creativity.

Providing more than 25k of free memory – even more without a disc drive – GAC's features include an intelligent command interpreter, text compression and full feature graphic editor. There is a space for up to 785 different verbs, nouns and different verbs, nouns and adverbs and the ability for objects to have individual characteristics.

Other features include alphabetical word scanning and sorting, a full diagnostic screen showing current status of the 255 markers and 128 counters, acceptance of synonyms, disc and tape compatibility and separate printer menu.

The program, which runs on any Amstrad CPC, costs £22.95 on cassette and £24.95 on disc.

Camel Micros has upgraded its adventure writing utility, Genesis. The new V1.1 version has expanded graphics facilities including infill with any user-defined pattern, positioning of user-defined graphics to the nearest pixel and faster plotting.

It is obtainable by mail order for £8.50 or by returning the original cassette with £2.

The company warns that while text data files are compatible any graphics will have to be re-drawn on the new system.

DANES ARE GOING FOR AMSTRADS

WITH their bacon and lager finding a receptive market in this country, the Danes have more than a few kroner to spend on quality goods they don't produce themselves.

Thousands have already decided that Amstrad manufactures probably the finest computers in the world for the price – and their fellow Scandinavians obviously agree.

In the first nine months following its launch in that part of the world the CPC464 captured nearly 25 per cent of the home micro market, with more than 12,000 units being sold.

This swift success has opened the way for UK producers of Amstrad software and peripherals to enter the Scandinavian market in a big way.

Smoothing the path for them is Amstradbladet, a Danish magazine which first appeared a year ago and now has a circulation of 7,000 in Denmark and Norway.

Recognised as the region's official user magazine by Amstrad, the publication is offering a package of services to would-be exporters.

These include free translation and typesetting of advertisements, product reviews, help in finding a local distributor and even taking care of shipping and documentation.

An arrangement has been concluded with experienced computer product exporters JRS of Worthing to provide companies new to overseas markets with guidance.

The company will handle not only the shipment of goods but also the important matter of payment, without the supplier having to get involved with foreign drafts or letters of credit.

There is also a UK facility for handling editorial and advertising for Amstradbladet, operated by Peter Cornforth, of Cornforth Media Services, Godalming.

"Unlike the work of that famous Dane, Hans Christian Andersen, this is no fairy tale – but there could be some very happy endings for UK suppliers of Amstrad software and peripherals", Cornforth told *Computing with the Amstrad.*

Where the accent is on action

AN all-action trio of programs has been released on cassette for the Amstrad by Mirrorsoft.

Spitfire is set in the summer of 1940 with the player as a trainee pilot learning the characteristics of the legendary Battle of Britain fighter plane before going into lone combat with the enemy.

Practice modes allow the player to master take-off, flying and landing as well as how to outmanoeuvre an enemy. In combat these skills enable the player to build up his flight log and kills while rising through the ranks of the RAF to the position of Group Captain, VC, DSO, DFC. It costs £9.95.

Spectrum best-seller Dynamite Dan has been converted for the Amstrad. This platform game costs £8.95 on cassette.

Dr Blitzen and the Islands of Arcanum, a follow-up to Dynamite Dan, contains more than double the number of screens of the original game and costs £8.95.

Deal over Pocket Wordstar

FOLLOWING the signing of a manufacturing and distribution agreement with MicroPro, Cumana now has exclusive worldwide rights for Pocket Wordstar.

This is a full implementation of Wordstar and Mailmerge, and is aimed at the CP/M market including Amstrad.

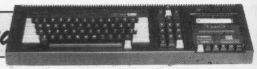
Features include automatic wordwrap each time a line is typed, special print functions like boldface, underline, subscript and superscript, on-screen menus and a command card, mailing list and file merging. Price: £119.

Trilogy parody

A VERSION of the Delta 4 adventure, Bored of the Rings, has been released for the Amstrad CPC range by Silver-Soft.

The game, a parody of Tolkien's classic trilogy, was written using The Quill and Illustrator, and uses mainly the standard verb-noun format.

It costs £6.95 on cassette and £11.95 on disc.



Micros move into church

THE recently-formed Christian Micro Users Association is including Amstrad computers in its work of linking together computer users of various denominations and promoting the use of micros in church activities.

Association secretary Philip Clark told *Computing with the Amstrad:* "There is a great need to discover and make contact with the individuals and companies producing Christian software.

"We also need to share the expertise and ideas of the many who have sought to use micros in their church-related activities".

The aim of CMUA is to concentrate on the popular home computers like Amstrad and it has already unearthed a significant number of programs based on Bible studies.

One of them, "Star of David", is listed in the first issue of the Association's magazine, Christian Micro.

This publication will be produced quarterly and, from next January, will be supplemented by a series of tape magazines for specific micros including Amstrad.

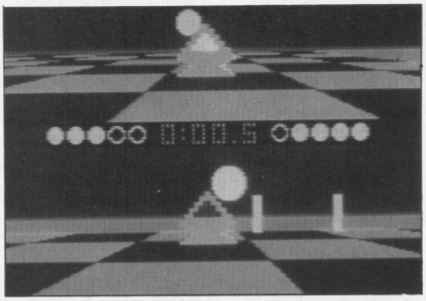
Other Association activities include the formation of local groups, arranging Christian micro exhibitions and conventions throughout the country, acting as a forum for the sharing of information about micros in the church, and promoting the highest quality Christian software.

On the beach

SOFTWARE house Activision has released its text graphic adventure Mindshadow for the Amstrad.

The player finds himself on a deserted beach suffering from amnesia and must make a complex journey round the world to rediscover his identity.

Described as "a living computer novel", Mindshadow costs £9.99 on cassette.



SPEEDY IN SPACE

CLAIMED by publisher Activision to be the fastest and most competitive home computer game ever built, Ballblazer will be released on cassette for the CPC464 early this year.

The Lucasfilm Games program involves the player in the final round of the interstellar ballblazer championship competing for the title of Masterblazer against an extraterrestial opponent.

Two can play simultaneously or one player can take on one of nine Droid players each with differing levels of skill and speed.

PRINT PACKAGE

AN Amstrad-based computer and software package called TypeWriter designed for people whose words appear in print has been producted by Wordsmiths Typesetting.

It consists of Anvil TypeFit copyfitting software, full WordStar word processing and the 256k Amstrad PCW8256, together with alternative word processing software and utility programs.

TypeFit is an Anvil Systems program which emulates the justification and copyfitting systems of phototypesetting equipment. It produces text files on a micro which are line-for-line the same as the typeset text.

TypeWriter will sell for £595, which Wordsmiths says is about a quarter of the price of the nearest comparable system.

BASKETBALL FOR TWO

FOLLOWING quickly on each others heels are two basketball computer games for the Amstrad.

First to be launched was International Basketball from Elite Systems. The company was granted sole rights to produce both this and its sister game International Soccer for the machine.

The two, originally written for the Commodore 64 by Andrew Spencer, were successful in the charts, the latter achieving 100,000 plus sales worldwide.

The World Series Basketball game from Imagine Software was announced shortly after Elite's. It is the second in its World Series, the first being a baseball simulation game.

Both companies' games are similar with players having to develop good passing, handling and team-building skills and control of the field.

Where they differ is in the price – Elite's costs £5.99, Imagine's £8.99.

Club for the war gamester

SOFTWARE publisher Lothlorien has formed the Warmaster Club, an organisation for war game and adventure game enthusiasts, including Amstrad users.

There will be no charge for membership, says Lothlorien director Roger Lees. Members will receive regular detailed advance information about new war and adventure releases available through computer dealers.

"The additional benefit of club membership will be to offer a range of club only titles", says Lees, "some of which we hope to publish within the club on behalf of members who are software authors.

"It is hoped that the club will become a vehicle for publishing a range of low volume, special interest software which cannot justify the costs of full commercial publication".

Fleet Street package for the Amstrad

A VERSION of the Fleet Street Editor package from Mirrorsoft is to be produced for Amstrad computers.

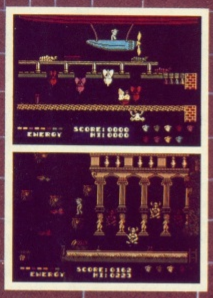
It enables users to turn out professional-looking printed materials, from simple news sheets and notices to multi-page newsletters and posters.

The six distinct stages of the print production process are represented by stages in the program: a graphics library, studio, copy desk, page make-up, preview and print, and administration manager.

Following these stages with the help of a manual, the user can blend words and pictures that have been created within the program or loaded in from external files, to produce printed materials for a wide variety of applications.

The package costs £39.95.

WATCH OUT! IT'S



DYNAMITE DAN

94% Crash Smash

Amstrad/C64	£7.95
48K Spectrum/Spectrum+	£6.95

Popular Computing Weekly Pick of the Week

MIRRORSOFT

Maxwell House, Worship Street, London EC2A 2EN. Tel 01-377 4644
Trade orders to: Mirrorsoft Purnell Book Centre, Paulton, Bristol BS18 5LQ.

First in a new series

The universal standard

Now you can explore the full potential of CP/M on your Amstrad with COLIN FOSTER's comprehensive series

IT is now a year since Amstrad launched their disc drive for the CPC464 amid a blaze of publicity about it being the first home micro capable of running CP/M, and indeed "gave away" CP/M with the disc interface. And of course CP/M comes free with the CPC128 and the ill-starred CPC664.

Unfortunately, as few home users seem to know much about it – a state of affairs which Amstrad's disc drive manual has done little to improve – this fairly major advance for home computing has managed to pass largely unnoticed by the majority of owners.

This is really rather a shame, as I hope this series of articles will show. Over the next few months we will explore CP/M on the Amstrad in detail, starting with "What is it?" and progressing through the "How do I use it?" to "How does it work?"

It is only fair to warn here that several of the later articles will assume a reasonable working knowledge of Z80 machine code programming. If you've been following Mike Bibby's articles on machine code programming, you shouldn't find this too much of a problem.

In any case, those of you not wanting to delve too deeply into the darker arts will still benefit from a greater understanding of CP/M's structure, use and potential.

What is it?

So what do you get for your money when enter CPM, other than the mysterious A> prompt? Well, typing in DIR performs a function similar to the Amsdos CAT command by listing the files present on the disc.

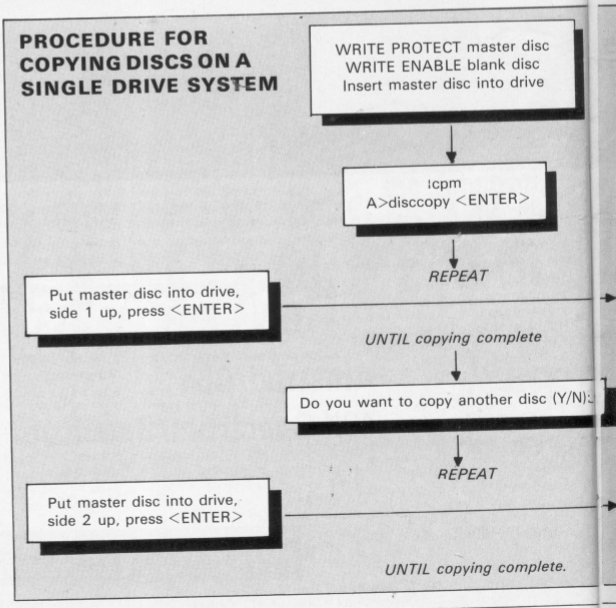
Any whose names end in a .COM extension are executable programs, and may be pulled into memory and run simply by typing their name (without the .COM on the end).

We'll discuss these in detail in a future article. For the moment, let's look at the most important program on the disc – the one which *doesn't* show up in the directory list – the control program itself. You see CP/M (Control Program for Microcomputers) is an operating system. This simply means that it is a program which carries out two main functions:

- It lets you "talk" to the machine – you can call programs into memory from disc and execute them, look at text files, manipulate the I/O (Input/Output) devices connected to your computer – printer, modem and so on – and generally keep control of things. The part of CP/M which does this job is called the CCP (Console Command Processor) and will be discussed in more detail in the next article.
- It frees programs from the extremely complex and tricky business of communicating directly with the hardware themselves by providing specific service routines which programs can call to handle input and output functions from and to discs, printer, screen and keyboard. There are two "levels" to the part of CP/M which looks after this – the BDOS and the BIOS.

BDOS

The BDOS (Basic Disc Operating System) provides relatively simple to use but powerful high level routines



to open and close files on disc, read from and write data to them, input and output characters from and to the keyboard and screen – called the console in CP/M-speak.

BIOS

The BIOS (Basic Input/Output System) provides the low level routines to actually perform the nitty-gritty operations involved in handling the hardware.

CP/M's real usefulness lies not so much in any great qualities of power or flexibility – there are better operating systems around – but in the fact that it is universal. CP/M-80 version 2.2, to give it its full Sunday name, has become the standard operating system for hundreds of different 8080 and Z80-based computers, all of which have wildly different amounts of memory, disc types and sizes, I/O ports, and so on.

However the service routines provided by the BDOS and BIOS, and the command facilities available from the CCP, are all specified absolutely by Digital Research, the people who wrote CP/M, and perform exactly the same functions on all CP/M computers.

This means that if a program does all its I/O using these "approved" routines, then it can be transferred to any other computer running CP/M regardless of hardware differences, and will find present all the routines it needs to run properly.

So standard is this system in fact that the CCP and BDOS which we have running on our Amstrads are essentially the same programs as run on every other CP/M system in the world.

As the BDOS itself uses the BIOS to implement its own higher level functions, only the BIOS part of CP/M is machine specific, in other words, different for every computer.

Thus Amstrad have supplied their BIOS in the disc interface ROM, while the BDOS and CCP come on the system tracks of the Digital Research distribution disc and must be copied on to your working discs before you can use them.

What all this means is that there is a vast amount of software available, both commercial and public-domain – free – most of which will run without alteration on the Amstrad. The reason why some won't is simply that the CPC464 doesn't have as much memory available to CP/M as most machines, and some programs can't cope with this.

Disc copying

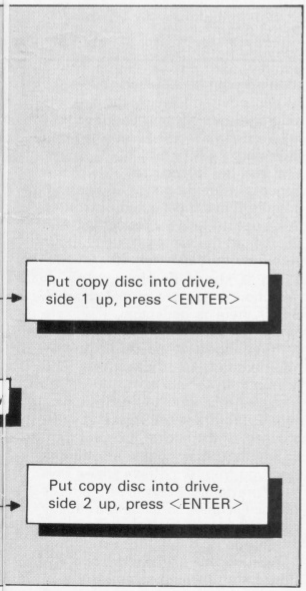
Before we go any further, you should make a copy of your distribution disc, if you have not already done so. This is important to protect you from losing your only copy should your dog decide to eat it.

The easiest way to do so at this stage is to use the DISCCOPY utility, or COPYDISC, if you have two disc drives. The procedure is detailed in the panel.

I suggest that you make sure your source disc is write protected before you start. This prevents an embarrassing accident if you get the discs mixed up somewhere along the line.

The User Manual shows how to do this for the two different types of discs which are available.

Next month we will look at how CP/M organises the Amstrad's memory and see what commands are available from the CCP.



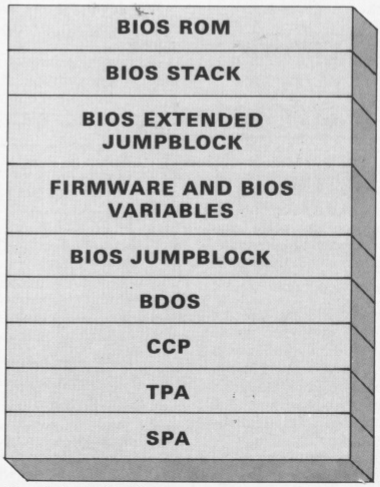


Figure I: Amstrad CP/M memory map

MOLECULE

Fire rays into an observation chamber to deduce a molecule's structure in this intellectual puzzle by DANIEL BISHOP

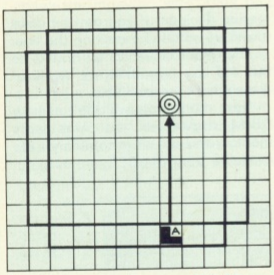
MOLECULE is a game of logic and deduction for one person. The object is to deduce by experiment, as quickly as possible, the structure of a molecule which is set up for you by the computer.

You must fire rays into a chamber and observe how the atoms in the chamber absorb, reflect and deflect these rays. As atoms make up the molecule, by noting the path of the rays you will gather clues to its structure.

Each game is virtually unique and an intellectually stimulating puzzle.

When you run the program the bottom of the screen displays all the alphanumeric commands for use during the game.

In the centre of the screen is a large rectangle with a panel along each side. The rectangle is the chamber and the panels are where the rays are fired from.



Simple absorption: Any ray which hits an atom is absorbed. This happens frequently and is a fundamental property of rays.

In the top panel is a small flashing rectangle, your cursor, which you move around using the arrow keys. It can be moved into any of the panels, as well as the chamber itself. It has wrap-around.

The chamber and panels are initially empty but as the game progesses various symbols will appear in both. However within this chamber, although not visible, are a number of atoms which make up the molecule. Each atom is the size of the cursor.

Your job is to find where the atoms are in the chamber. Initially there are only three, but in harder games there may be up to five. The atoms are stationary throughout the game.

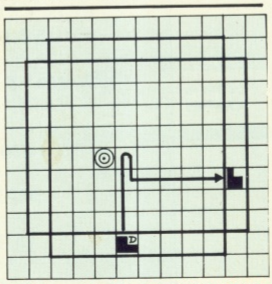
To help you find them you fire rays into the chamber and the results give you clues as to the atomic locations.

To fire a ray move the cursor into any panel, which at this stage consists of eight units. The chamber itself is a rectangle of 8 x 8 units. When you have done this, press Z. Immediately one or two symbols will appear in the panels, one of which will always be inside your cursor. These are the clues.

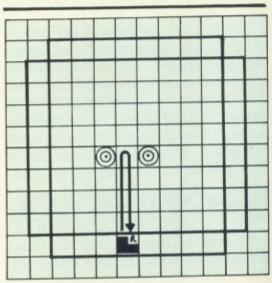
When you fire a ray it travels into the chamber from the cursor position. A symbol appears inside the cursor to show where the ray was fired from. Rays travel only up, down, left or right, and never diagonally. Also to make things more difficult the rays are invisible.

Wherever the ray emerges from the chamber, another symbol appears.

As rays travel through the chamber they will be affected if they come close to, or hit, any atoms. A number of things can happen and you would be well advised to study the example diagrams carefully to understand how rays can be absorbed, reflected and deflected.



Deflection: This describes the other fundamental property of rays. A ray which approaches an atom closely is deflected from its original path through 90 degrees. Note the U shaped overshoot which the ray path follows. This is important in determining the behaviour of rays in more complex situations.



Simple reflection: Shows how a ray can be deflected twice, simultaneously, and hence the path of the ray is turned through 180 degrees. The ray returns to its origin so it is said to be reflected.

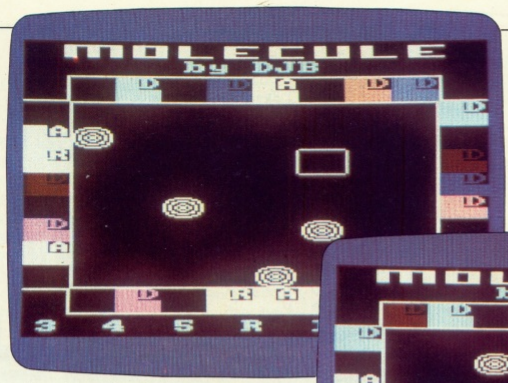
If the ray is absorbed, a white A appears inside the cursor, if reflected, a white R and if deflected a coloured D appears inside the cursor and another of the same colour turns up wherever the ray emerged.

So if there is absorption or reflection, only one symbol appears. But if there is deflection, there are two.

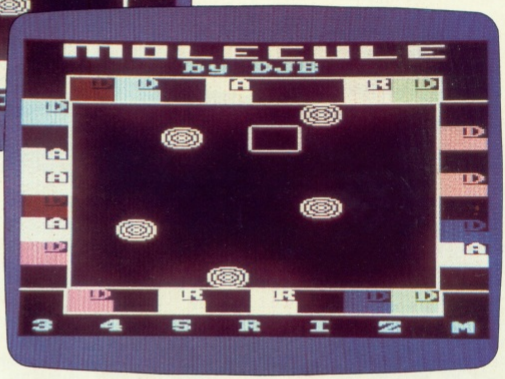
Two important points. You may not exceed 12 deflections (24 coloured symbols). If you do get as many as this, which is unlikely, you cannot fire any more rays and must proceed to the end of the game.

Secondly the computer will not stop you from firing rays where rays have previously been fired. There is no point in doing so, since you already know the result. Also you will be penalised.

After you have fired a few rays you should start gaining some idea as to



Game in progress ... 4 atoms



Game over – one incorrect ... 5 atoms

where the atoms lie. To help you visualise the set-up, you may place atom markers in the chamber. Simply move the cursor into the chamber and press Z.

You may place as many markers as you like. You may also remove ones you have previously placed. To do this, simply move the cursor over the atom marker and press Z again.

When you think you know where all the atoms are you are ready to finish. First make sure that each location of a suspected atom is marked. Also make sure that any excess atom markers are removed.

When you feel that the chamber display shows the exact arrangement of atoms press M.

Golden yellow atom markers will then appear in the chamber showing the true locations of the atoms. Your atom markers will turn yellow if they are correct, but remain white if they are wrong.

Your score for that game is printed at the bottom of the display. The lower your score, the better you have done. To start a new game, press M.

You get one point for every symbol in the panels, and five for every atom that was in the wrong place, extra or missing.

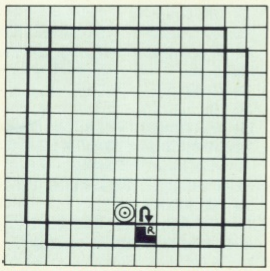
So to achieve a low score it is important not to fire more rays than absolutely necessary and to be as sure as you can about the molecular structure before pressing M.

Throughout the game you'll see the command keys displayed at the bottom of the screen:

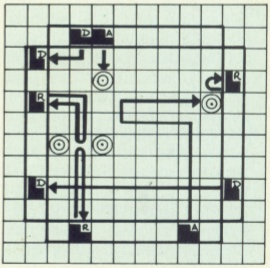
3	*Start with three atoms.*
4	*Start with four atoms.*
5	*Start with five atoms.*
R	*Start with a random number of atoms (between three and five).*
I	*Call up brief instructions. You will be returned to where you left off.*
Z	*Fire ray or place atom marker.*
M	*Molecule! Ends the game by displaying atoms and your score.*

When you first run the program the computer will by default give you a molecule with three atoms to find. You can change this by pressing 4, 5 or R.

You needn't keep pressing these keys at the beginning of every game. Just press 3, 4, 5 or R when you wish to change.



Reflection at an edge: A ray which is fired near to an atom at the edge of the chamber is also reflected.



Example ray paths: A more realistic situation, with four atoms in the chamber. For the sake of clarity overshoots have not been drawn in but absorptions, deflections and reflections can all be seen. Some rays undergo a number of these effects before they finally leave the chamber. At the other extreme, some rays may pass straight through the chamber. They are still recorded as deflections.

VARIABLES

GRID%(9,9)	Contents of chamber and panels.
ATOM%(9,9)	Locations of the atoms.
ATOM%	Number of atoms in molecule.
ATOM$	Atom marker.
ABSORB$	Absorption symbol.
REFLECT$	Reflection symbol.
DEFLECT$	Deflection symbol.
RAND%	Is number of atoms in molecule random?
COUNT%	Final score.
DEFL%	Number of deflections so far.
CURSX%	Cursor's x position.
CURSY%	Cursor's y position.
USER$	Your command.

PROGRAM STRUCTURE

10-70	REMarks.
80-210	Once only initialisation.
220-290	Every game initialisation.
300-440	Main control loop.
450-630	Screen display.
640-660	Clear keyboard buffer.
670-690	Draw cursor.
700-810	Display molecule, calculate and display score.
820-850	Start new game if 3, 4, 5 or R is pressed.
860-1030	Control cursor movement.
1040-1300	Calculate ray path and print symbols.
1310-1350	Place or remove atom marker.
1360-1570	Instructions.
1580-1630	Page instructions.

```
10 REM  MOLECULE / A solo game
20 REM  ----------------------
30 REM  by DANIEL J. BISHOP
40 REM  --------------------
50 REM(c) Computing with the Amstrad
60 REM
70 REM  ----------------------------
80 DATA 0,20,3,8,1,16,22,2,6,15,18,7,
24,26
90 FOR L0%=0 TO 13:READ N0%:INK L0%,N
0%:NEXT:INK 14,11,26
100 MODE 0: BORDER 1
110 SYMBOL AFTER 224
120 SYMBOL 224,0,7,24,35,44,73,82,85
130 SYMBOL 225,0,224,24,196,52,146,74
,170
140 SYMBOL 226,85,82,73,44,35,24,7,0
150 SYMBOL 227,170,74,146,52,196,24,2
24,0
160 DIM GRID%(9,9),ATOM%(9,9)
170 L$=CHR$(10)+CHR$(13):ATOM%=3
180 ATOM$=CHR$(224)+CHR$(225)+CHR$(10
)+CHR$(8)+CHR$(8)+CHR$(226)+CHR$(227)
190 ABSORB$=CHR$(143)+"A"+CHR$(10)+CH
R$(8)+CHR$(8)+CHR$(143)+CHR$(143)
200 REFLECT$=CHR$(143)+"R"+CHR$(10)+C
HR$(8)+CHR$(8)+CHR$(143)+CHR$(143)
210 DEFLECT$=CHR$(143)+"D"+CHR$(10)+C
HR$(8)+CHR$(8)+CHR$(143)+CHR$(143)
220 FOR L0%=0 TO 9:FOR L1%=0 TO 9:ATO
M%(L0%,L1%)=0:GRID%(L0%,L1%)=0:NEXT:N
EXT
230 IF RAND% THEN ATOM%=RND(1)*2+3
240 FOR L0%=1 TO ATOM%
250 N0%=RND(1)*7+1:N1%=RND(1)*7+1
260 IF ATOM%(N0%,N1%)=0 THEN ATOM%(N0
%,N1%)=-1 ELSE 250
270 NEXT
280 COUNT%=0:DEFL%=0:CURSX%=1:CURSY%=
0
290 GOSUB 460
300 GOSUB 650
310 PRINT CHR$(23);CHR$(1);
320 GOSUB 680
330 USER$=INKEY$:IF USER$="" THEN 330
340 GOSUB 680
350 PRINT CHR$(23);CHR$(0);
360 USER$=UPPER$(USER$)
370 IF USER$="I" THEN GOSUB 1370:GOSU
B 460:GOTO 300
380 IF USER$="M" THEN GOSUB 710:GOTO
220
390 IF INSTR("345R",USER$)>0 THEN GOS
UB 830:GOTO 220
400 N0%=ASC(USER$)-239:IF N0%>=1 AND
N0%<=4 THEN GOSUB 870:GOTO 300
410 IF USER$<>"I" THEN 300
420 IF (CURSX%=0 OR CURSX%=9 OR CURSY
%=0 OR CURSY%=9) AND DEFL%<12 THEN GO
SUB 1050:GOTO 300
430 IF NOT (CURSX%=0 OR CURSX%=9 OR C
URSY%=0 OR CURSY%=9) THEN GOSUB 1320:
GOTO 300
440 GOTO 300
450 REM- Screen display
460 CLS:PLOT -5,-5,13:MOVE 56,392:TAG
:PRINT STRING$(6,CHR$(133));" ";CHR$(
133);" ";CHR$(133);" ";STRING$(3,CHR$
(133));" ";CHR$(133);
470 MOVE 56,392:DRAWR 79,0:MOVER 32,0
:DRAWR 16,0:MOVER 112,0:DRAWR 32,0:MO
VER 32,0:DRAWR 32,0:MOVER 160,0:DRAWR
 32,0
480 MOVER -288,-8:DRAWR 16,0:MOVER 24
0,0:DRAWR 16,0:MOVER -400,-6:DRAWR 16
,0:MOVER 48,0:DRAWR 32,0:MOVER 32,0:D
RAWR 32,0:MOVER 32,0:DRAWR 32,0:MOVER
 32,0:DRAWR 16,0:MOVER 48,0:DRAWR 32,
0:MOVER 32,0:DRAWR 32,0
490 TAGOFF
500 MOVE 63,352:DRAW 576,352,13:MOVE
64,319:DRAW 575,319:MOVE 64,64:DRAW 5
75,64:MOVE 63,31:DRAW 576,31
510 MOVE 63,31:DRAW 63,63:MOVE 64,64:
DRAW 64,319:MOVE 63,320:DRAW 63,352
520 MOVE 576,31:DRAW 576,63:MOVE 575,
64:DRAW 575,319:MOVE 576,320:DRAW 576
,352
530 MOVE 0,320:DRAW 63,320:MOVE 576,3
20:DRAW 640,320:MOVE 0,63:DRAW 63,63:
MOVE 576,63:DRAW 640,63
540 LOCATE 1,25:PEN 1:PRINT "3"SPC(2)
"4"SPC(2)"5"SPC(2)"R"SPC(3)"I"SPC(2)"
I"SPC(2)"M";
550 FOR L0%=0 TO 9:FOR L1%=0 TO 9
560 IF GRID%(L0%,L1%)=0 THEN 620
570 IF GRID%(L0%,L1%)=-1 THEN PEN 13:
LOCATE L0%*2+1,L1%*2+4:PRINT CHR$(22)
;CHR$(1);USING "&";ATOM$;CHR$(22);CHR
$(0);:GOTO 620
580 LOCATE L0%*2+1,L1%*2+4
590 IF GRID%(L0%,L1%)=13 THEN PEN 13:
PRINT USING "&";ABSORB$:GOTO 620
600 IF GRID%(L0%,L1%)=14 THEN PEN 13:
PRINT USING "&";REFLECT$:GOTO 620
610 PEN GRID%(L0%,L1%):PRINT USING "&
";DEFLECT$
620 NEXT:NEXT
630 RETURN
640 REM- Clear keyboard buffer
650 S0$=INKEY$:IF S0$<>"" THEN 650
660 RETURN
670 REM- Cursor
680 MOVE CURSX%*64-1,352-CURSY%*32:DR
AWR 66,0,14:DRAWR 0,-34:DRAWR -69,0:D
RAWR 0,34
690 RETURN
700 REM- Molecule
710 PEN 12:PRINT CHR$(22);CHR$(1);:N0
%=0:N1%=0:FOR L0%=1 TO 8:FOR L1%=1 TO
 8
720 IF GRID%(L0%,L1%) AND ATOM%(L0%,L
1%) THEN N1%=N1%+1
730 IF ATOM%(L0%,L1%) THEN LOCATE L0%
*2+1,L1%*2+4:PRINT USING "&";ATOM$
740 IF GRID%(L0%,L1%) THEN N0%=N0%+1
750 NEXT:NEXT
760 PRINT CHR$(22);CHR$(0);
770 COUNT%=COUNT%+5*(MAX(ATOM%,N0%)-N
```

```
1%)
780 LOCATE 1,25:PEN 1:PRINT " SCORE="
;USING "###";COUNT%;:PRINT SPC(2)"PRE
SS M ";
790 GOSUB 650
800 S0$=UPPER$(INKEY$):IF S0$<>"M" TH
EN 800
810 RETURN
820 REM- New game
830 N0%=VAL(USER$)
840 IF N0%=0 THEN RAND%=-1 ELSE ATOM%
=N0%:RAND%=0
850 RETURN
860 REM- Move
870 ON N0% GOTO 880,920,960,1000
880 CURSY%=CURSY%-1
890 IF CURSY%=-1 THEN CURSY%=9
900 IF CURSY%=0 AND (CURSX%=0 OR CURS
X%=9) THEN CURSY%=8
910 GOTO 1030
920 CURSY%=CURSY%+1
930 IF CURSY%=10 THEN CURSY%=0
940 IF CURSY%=9 AND (CURSX%=0 OR CURS
X%=9) THEN CURSY%=1
950 GOTO 1030
960 CURSX%=CURSX%-1
970 IF CURSX%=-1 THEN CURSX%=9
980 IF CURSX%=0 AND (CURSY%=0 OR CURS
Y%=9) THEN CURSX%=8
990 GOTO 1030
1000 CURSX%=CURSX%+1
1010 IF CURSX%=10 THEN CURSX%=0
1020 IF CURSX%=9 AND (CURSY%=0 OR CUR
SY%=9) THEN CURSX%=1
1030 RETURN
1040 REM- Ray
1050 IF CURSY%=9 THEN N0%=0:N1%=-1
1060 IF CURSX%=9 THEN N0%=-1:N1%=0
1070 IF CURSY%=0 THEN N0%=0:N1%=1
1080 IF CURSX%=0 THEN N0%=1:N1%=0
1090 S0$="":N2%=CURSX%:N3%=CURSY%:N4%
=-1
1100 WHILE N4%
1110 N2%=N2%+N0%:N3%=N3%+N1%
1120 IF N2%=0 OR N2%=9 OR N3%=0 OR N3
%=9 THEN N4%=0:GOTO 1220
1130 IF ATOM%(N2%,N3%) THEN S0$=ABSOR
B$:N4%=0:GOTO 1220
1140 IF ATOM%(N2%+N1%,N3%+N0%) OR ATO
M%(N2%-N1%,N3%-N0%) THEN N0%=-N0%:N1%
=-N1%:GOTO 1220 ELSE IF ATOM%(N2%+N0%
,N3%+N1%) THEN S0$=ABSORB$:N4%=0:GOTO
 1220
1150 IF ATOM%(N2%+N0%+N1%,N3%+N0%+N1%
) AND ATOM%(N2%+N0%-N1%,N3%-N0%+N1%)
THEN N0%=-N0%:N1%=-N1%:GOTO 1220
1160 IF ATOM%(N2%+N0%+N1%,N3%+N0%+N1%
) AND NOT ATOM%(N2%+N0%-N1%,N3%-N0%+N
1%) THEN N5%=N0%:N0%=N1%:N1%=N5% ELSE
 1200
1170 N1%=-N1%
1180 IF N5%=0 THEN N0%=-N0%
1190 GOTO 1220
1200 IF (NOT ATOM%(N2%+N0%+N1%,N3%+N0
%+N1%)) AND ATOM%(N2%+N0%-N1%,N3%-N0%
+N1%) THEN N5%=N0%:N0%=N1%:N1%=N5% EL
SE 1220
1210 IF N1%=-1 AND N5%=1 THEN N1%=1
1220 WEND
1230 LOCATE CURSX%*2+1,CURSY%*2+4
1240 IF S0$=ABSORB$ THEN PEN 13:PRINT
 USING "&";S0$:GRID%(CURSX%,CURSY%)=1
3:COUNT%=COUNT%+1:RETURN
1250 IF N2%=CURSX% AND N3%=CURSY% THE
N PEN 13:PRINT USING "&";REFLECT$:GRI
D%(CURSX%,CURSY%)=14:COUNT%=COUNT%+1:
RETURN
1260 DEFL%=DEFL%+1
1270 PEN DEFL%:PRINT USING "&";DEFLEC
T$
1280 LOCATE N2%*2+1,N3%*2+4:PRINT USI
NG "&";DEFLECT$
1290 GRID%(CURSX%,CURSY%)=DEFL%:GRID%
(N2%,N3%)=DEFL%:COUNT%=COUNT%+2
1300 RETURN
1310 REM- Atom
1320 PRINT CHR$(22);CHR$(1);:LOCATE C
URSX%*2+1,CURSY%*2+4
1330 IF GRID%(CURSX%,CURSY%)=0 THEN G
RID%(CURSX%,CURSY%)=-1:PEN 13 ELSE GR
ID%(CURSX%,CURSY%)=0:PEN 0
1340 PRINT USING "&";ATOM$;:PRINT CHR
$(22);CHR$(0);
1350 RETURN
1360 REM- Instructions
1370 MODE 1:BORDER 0:PEN 1:PRINT TAB(
14)"M O L E C U L E"L$TAB(15)"Instruc
tions"
1380 PRINT L$L$"The object of the gam
e is to deduce the":PRINT "positions
of atoms in a randomly"L$"produced mo
lecule.  The molecule lies"
1390 PRINT "within the chamber but ca
n not be seen"L$"until the end of the
 game.  You may"L$"deduce the positio
ns of the atoms by"
1400 PRINT "firing rays into the cham
ber."L$L$"To fire rays, move the flas
hing cursor"L$"outside the chamber an
d press Z.  Note"L$"that the cursor i
s moved by using the"L$"cursor keys."
1410 PRINT L$"Markers will indicate t
he result."L$"White A markers show ab
sorption."L$"White R markers show ref
lection."L$"Coloured pairs of D marke
rs show"
1420 PRINT "deflection."
1430 GOSUB 1590
1440 PRINT "Try and deduce the positi
ons of all the":PRINT "atoms with as
few rays as possible."L$"(Note that a
 maxiaum of 12 deflections"L$"are all
owed before you must guess the"L$"ato
mic locations)"
1450 PRINT L$"You may place white ato
m markers in the"
1460 PRINT "chamber to help you ident
ify the atomic":PRINT "locations.  To
 do this, move the cursor":PRINT "int
o the chamber and press Z."
1470 GOSUB 1590
1480 PRINT L$"When you believe you ha
ve located all"L$"the atoms and have
marked their"L$"positions, press M fo
r molecule!"
1490 PRINT L$"The actual positions of
 the atoms will"L$"then be revealed.
 They are shown by"L$"yellow atom mar
kers."L$L$"You will be given your sco
re, which is"
1500 PRINT "1 point for every marker
and 5 points"L$"for every atom missin
g, extra, or in"L$"the wrong position
.  You must try for"
1510 PRINT "as low a score as possibl
e."
1520 GOSUB 1590
1530 PRINT "Whenever 3,4,5 or R are p
ressed, all"L$"molecules thereafter h
ave 3,4,5 or a"L$"random number of at
oms."
1540 PRINT L$"The easiest game is 3 a
nd the most"L$"difficult R.  The comp
uter always"L$"starts with 3."
1550 GOSUB 1590
1560 MODE 0:BORDER 1
1570 RETURN
1580 REM- Wait
1590 GOSUB 650
1600 PRINT L$TAB(6)"( Press any key t
o continue )";
1610 S0$=INKEY$:IF S0$="" THEN 1610
1620 CLS
1630 RETURN
```

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DRAG AREA	●	●	●	●	●	●
COPY AREA	●	●	●	●	●	●
FLIP AREA	●	●	●	●	●	●
REVERSE AREA	●	●	●	●	●	●
ZOOM EDIT/CREATE	●	★	★	●	★	★
DEFINE IKON/SPRITE	●	★	★	●	★	★
9 BRUSH SIZES — Paint/Texture	●	●	●	●	●	●
9 SPRAY NOZZLES — Paint Texture	●	●	●	●	●	●
ELASTIC LINE	●	●	●	●	●	●
PINNED ELASTIC	●	●	●	●	●	●
RAYS	●	●	●	●	●	
FANS	●	●	●	●	●	●
PENCIL	●	●	●	●	●	●
RULER	●	●	●	●	●	●
ERASER	●	●	●	●	●	●
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4 PEN DRAW	●	●	●	●	●	●
SOLID BOX	●	●	●	●	●	●
SOLID CIRCLE	●	●	●	●	●	●
SOLID ELLIPSE	●	●	●	●	●	●
ELASTIC BOX	●	●	●	●	●	●
ELASTIC TRIANGLE	●	●	●	●	●	●
ELASTIC PYRAMID	●	●	●	●	●	●
ELASTIC PENTAGON	●	●	●	●	●	●
ELASTIC DIAMOND	●	●	●	●	●	●
ELASTIC OCTOGON	●	●	●	●	●	●
ELASTIC HEXAGON	●	●	●	●	●	●
CUBE	●	●	●	●	●	●
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4 BASIC TEXTURES	●	●	●	●	●	●
TEXTURE VARIATION	●	●	●	●	●	●
DEFINE TEXTURE/PSEUDO COLOUR	●	●	●	●	●	●
TEXTURE FILL	●	●	●	●	●	●
FLECK PRINT FILE	●	●	●	●	●	●
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Taking arrays into another DIMension

Part 12 of PETE BIBBY's series on Basic programming for beginners

THIS month we'll start with a simple program that should present no problems. All Program I does is to use a FOR . . . NEXT loop to accept three numbers. Each is stored in turn in the aptly-named numeric variable *number*. A running total total of the numbers is kept in *total*.

Although it's a simple program that's hardly likely to push back the

```
10 REM Program I
20 total=0
30 FOR loop=1 TO 3
40 INPUT "Give me a number ",number
50 total=total+number
60 NEXT loop
70 PRINT "The total is"total
```

Program I

frontiers of programming on the Amstrad when you look at it more closely it does raise some interesting problems.

Notice how the same variable is used to store the three values you've typed in. If you enter 3, then 4 then 5 in response to the prompt, the value of *number* reflects this, becoming 3, then 4 and finally 5.

In this program that's all well and good, but what if it were a part of a more complex one? Suppose after finding the total, I wanted to do something else with the input numbers such as sorting them into order.

With the input method used in Program I, I'll be in trouble. I might go to look for the three numbers but when I get there the cupboard will be bare, or nearly so. The last figure typed in will still be stored in *number*, but the first two will have disappeared, replaced as *number* takes new values. Program II is an attempt to solve the problem.

```
10 REM Program II
20 INPUT "First? ",first
30 INPUT "Second? ",second
40 INPUT "Third? ",third
50 total=first+second+third
60 PRINT "The total is"total
```

Program II

Now the numbers are stored in *first, second* and *third* and summed up in line 50. The program works: three numbers are indeed entered and their sum is calculated. Also the figures are all still available for use, as a quick:

```
PRINT first,second,third
```

will show. The trouble is that although the program works, it's pretty unsatisfactory. We need a better solution, as the next problem shows.

Suppose we had to add 50 numbers. We could modify Program I to do the job with very little trouble. All we do is to change line 30 to:

```
30 FOR loop=1 TO 50
```

and we get the total.

With Program II, things are more difficult. As it has to have the values stored in different variables, it can't use a FOR . . . NEXT loop. So to adapt it to summing 50 numbers you'd have to have 50 variables, going from *first, second, third,* all the way to *forty-ninth* and *fiftieth.* And line 50 would be massive, something like:

```
50 total=first+second+third+
.....+fortyninth+fiftieth
```

It's not too practical is it? What we need is a method of INPUTting numbers into a variable that will give us the efficiency of the first program's FOR . . . NEXT loop but also let us keep a record of the numbers typed in. Program III points in the right direction.

```
10 REM Program III
20 INPUT "First? ",mark1
30 INPUT "Second? ",mark2
40 INPUT "Third? ",mark3
50 total=mark1+mark2+mark3
60 PRINT "The total is"total
```

Program III

Here there's no change in method from Program II but the way the variables are named hints at a solution to our problem. The numbers typed in are stored in *mark1, mark2,* and *mark3.* Now these are completely separate variables, but their names obviously have something in common. They consist for the most part of the same word, *mark* and are only made different by the numbers stuck on the end.

And those numbers on the end look ripe for a FOR . . . NEXT loop. They just seem to beg for a structure like:

```
FOR x=1 to 3
INPUT markx
NEXT x
```

where as *x* changes so does the variable name *markx.* It's a great idea and only has one drawback – it doesn't work. But don't worry, Amstrad Basic provides the means for making it work, as Program IV shows.

```
10 REM Program IV
20 DIM mark(3)
30 INPUT "First? ",mark(1)
40 INPUT "Second? ",mark(2)
50 INPUT "Third? ",mark(3)
60 total=mark(1)+mark(2)+mark(3)
70 PRINT "The total is"total
```

Program IV

This looks remarkably like Program III, but what is that DIM doing in line 20? And why are the numbers after the *mark* in brackets? The answers are that the DIM is there to dimension an array, and the numbers in the brackets are subscripts.

To be formal, an array is an ordered

set of linked variables. All the variables in an array have similar names such as *item(1), item(2), item(3)* and so on. We call them the elements of the array. The root is the same – in this case it's *item*- only the numbers in the brackets are different.

These numbers are what are known as the subscripts of the array. They actually pick which element of the array you're talking about. A subscript of 1, as in *item(1)* means you're referring to the first variable or element in the array, 2 to the second *item(2)*, and 50 to the fiftieth *item(50)*, if there is one.

Don't worry if that seems a little complicated, arrays are quite simple and a lot easier to use than to read about. So let's see how Program IV uses the array *mark()*.

The DIM in line 20 is used to tell the Amstrad to set aside enough memory space for an array. The number inside the brackets tells it how many variables, or elements, will be in the array. So a line like:

```
DIM result(20)
```

will set aside memory space for 20 variables ranging from *result(1)* and *result(2)* all the way up to *result(20)*. Each element is given the initial value of 0.

There's a little more to DIM, but we'll come back to it later. For the moment let's see how the array *mark()* – with elements *mark(1), mark(2), mark (3)* – is used in Program IV.

Lines 30 to 50 are our familiar input lines, only now they're storing the numbers in the elements of an array. Line 60 adds up the values of all these elements and stores them in *total* with line 70 displaying the result.

But, you may be thinking, Program IV is more or less the same as Program III. Why bother dimensioning an array and then use its elements just as you would a normal variable?

It's a very good point. If you're going to dimension an array, then use it properly. If you cast your mind back, you'll remember that we were after a way of linking variables together so they could be used in a FOR . . . NEXT loop. Program V shows you how to do this by making proper use of an array, *mark()*.

Here we're combining an array with a FOR . . . NEXT loop for the first time. As you'll see, it's a very powerful

```
10 REM Program V
20 DIM mark(3)
30 FOR loop=1 TO 3
40 PRINT "Enter mark number"loop
50 INPUT mark(loop)
60 NEXT loop
70 total=mark(1)+mark(2)+mark(3)
80 PRINT "The total is"total
```

Program V

combination.

Line 20 dimensions an array, *mark()*. This will consist of three elements, *mark(1), mark(2),* and *mark(3)*. Lines 30 to 50 form a FOR . . . NEXT loop with a control variable *loop*. This will increase in value from 1 to 2 and then to 3 as the loop cycles.

Inside the loop, line 40 just prompts you to type in a number. Line 50 is the heart of the matter, and it's a strange looking beast:

```
50 INPUT mark(loop)
```

The INPUT is familiar, it's just asking for a number which it will store in the following variable. It's this variable that looks odd. After all, we know we have *mark(1), mark(2),* and *mark(3)* but what is *mark(loop)?*

The answer is that *mark(loop)* is either *mark(1), mark(2)* or *mark(3)*, depending on the value of *loop*. You see, the number inside the brackets doesn't have to be a figure, it can be a numeric variable such as *loop*. And by giving different values to this variable you can deal with different elements of the array.

Again it's easier to see in practice than in theory, so let's look at what happens to *mark(loop)* as the FOR . . . NEXT loop of Program V cycles.

The first time round, *loop* has the value 1 so:

```
50 INPUT mark(loop)
```

effectively becomes:

```
50 INPUT mark(1)
```

When you satisfy the INPUT by giving it a number, this number is stored in *mark(1)*. When *loop* is 2, *mark(loop)* becomes *mark(2)*. I'll leave it to you to figure out what element of the array is used to store the third number, input when *loop* is 3.

By using a variable inside the bracket of an array you can, by changing the value of the variable, get at every member of the array. Rather more grandly, this means that using a variable as a subscript allows every element of the array to be addressed as the variable changes in value.

And now we've got what we were searching for – a technique that allows us the flexibility of using FOR . . . NEXT loops to input values and also lets us get at those values later in the program.

Take another look at Program V. Line 70 looks a little ugly, doesn't it? Surely there's a better way of doing the addition now we're using an array? There is, and Program VI shows how it's done.

```
10 REM Program VI
20 DIM mark(3)
30 total=0
40 FOR loop=1 TO 3
50 PRINT "Enter mark number"loop
60 INPUT mark(loop)
70 NEXT loop
80 FOR loop=1 TO 3
90 total=total+mark(loop)
100 NEXT loop
110 PRINT "The total is"total
```

Program VI

The second FOR . . . NEXT loop of the program is the one that does the adding. Each time round the loop, *mark(loop)* is pointing to a different variable. The first time round the number stored in *mark(1)* is added to *total*. The second time round it's *mark(2)* that is accessed and the third time *mark(3)*.

While this may seem a rather longwinded way of doing things – after all Program V was shorter – it is more flexible. If you wanted to add together 100 numbers think of the problems you would have adapting Program V.

With Program VI all you have to do is to change the scope of the FOR . . . NEXT loops with:

```
40 FOR loop=1 to 100
80 FOR loop=1 TO 100
```

Well, almost. You also have to change line 20 to:

```
20 DIM mark(100)
```

which allows for the fact that you now want to use 100 elements ranging from *mark(1)* to *mark(100)*. Try changing the loops but not the DIM in

Program VI and see what happens. You get the error message:

```
Subscript out of range in 60
```

as you try to give a value to *mark(4)*. This is fair enough, after all, the DIM of line 20 has only told your micro to set aside space for three elements in the array. You can't complain if the Amstrad baulks when you suddenly try to use a fourth.

And this brings us to the further discussion of DIM promised earlier. First of all I must cough to something (as my mate Al would put it). When I told you that:

```
DIM mark(3)
```

set up three elements of an array, *mark(1)*, *mark(2)*, and *mark(3)* I didn't tell you the whole truth. In fact it sets up four elements. As well as the three we've already mentioned, it sets up a variable with a subscript of 0, *mark(0)*. This is because while humans begin counting at 1, computers tend to start at 0.

So if we wanted an array of 10 elements we could do it with:

```
DIM score(9)
```

which would set aside memory space for 10 elements ranging from *score(0)* to *score(9)*. This is fine and it works, but I find it a little obscure.

What I mean is, that if I want to use an array of 10 elements in a FOR . . . NEXT loop, I find it easier to deal with a loop that goes from 1 to 10 rather than one which goes from 0 to 9. This is especially so in long programs when I may be using a lot of arrays in nested FOR . . . NEXT loops. The Amstrad can keep track of things but I can't!

Because of this I tend to always dimension my arrays to the full number. If I want 12 elements of an array *month()* I use:

```
DIM month(12)
```

and only ever use elements *month(1)* to *month(12)*. I ignore the element *month(0)*, which only confuses things. After all, what is *month(0)?* It's a fairly good guess that *month(1)* refers to something that happened in January and *month(12)* to December . . . but *month(0)?*

So for clarity I ignore the elements with subscripts of zero. Of course this means there are some variables that aren't used and the memory used to hold them is wasted. However your Amstrad has so much memory that this is rarely a problem.

A point to bear in mind is that once you've dimensioned an array with a line like:

```
10 DIM cat(3)
```

then that's your lot. you can't then go on to dimension it again if you find you need more elements later on in the program. An attempt to do this, such as:

```
100 DIM cats(20)
```

will result in the program crashing with the message:

```
Array already dimensioned in 100
```

for your pains. So when you dimension an array make sure that you allow for all the elements you need. And it's also good practice to keep all your DIMs at the head of the program where both you and the micro can get at them easily.

The last point I'll make about DIM is that you don't always need it. If you leave it out and then try to use an array element such as *notdimmed(3)* you'll get away with it.

This is because when the Amstrad comes across something like *not dimmed(3)* it realises that the brackets mean that it's part of an array. It looks to see if it's been DIMmed and, if not, being a very friendly machine it does it for you. It sets up the array *notdimmed()* and the program runs. But beware, it only sets it up with 11 elements. In other words it does the equivalent of a:

```
DIM notdimmed(10)
```

If you try to use *notdimmed(15)* you're in trouble. The program crashes with a:

```
Subscript out of range
```

message. The moral is, while you'll get away with not dimensioning arrays, you can only go so far.

My advice is always DIM your arrays, even if they have so few elements that the Amstrad would normally do it for you. It makes things clearer and saves a lot of bother.

As an example of what I mean, all the programs in this article will work without the arrays being dimensioned. But would it be as easy to see how they worked?

And what if you decided to have Program VI adding 100 numbers? If there was no DIM sitting there at the top of the listing you might easily forget to:

```
DIM mark(100)
```

And now, after all that, we can see how Program VII, which we met at the end of the last article, works.

```
10 REM Program VII
20 DIM number(5)
30 FOR loop=1 TO 5
40 READ number(loop)
50 NEXT loop
60 FOR loop=1 TO 5
70 PRINT number(loop)
80 NEXT loop
90 DATA 100,200,300,400,500
```

Program VII

Line 20 sets up a six element array *number()*, with members ranging from *number(0)* to *number(5)*. The program ignores *number(0)* and just uses the other five elements.

Lines 30 to 50 form the familiar FOR . . . NEXT loop, with control variable *loop* taking values from 1 to 5.

What's different about the program is that each time round the loop value is READ from the data list of line 90, rather than INPUT from the keyboard as before.

So the first time round the loop *number(1)* takes the value 100, the next time *number(2)* becomes 200, and so on. The second FOR . . . NEXT loop just prints out the values held by each element of the array.

And that's the last program for this month. Why not use it to explore how to use arrays?

For a start, try changing the number of elements in the array. See what happens if you try to read in more numbers than there are elements in the array? And can you make the program print out the values of the elements in reverse order?

As I keep stressing, programming is an activity. You can read about it all you want, but to be able to do it you have to practice.

So don't just accept what I say about arrays, try it out for yourself. And after a few hours of arrays on your Amstrad you'll be ready for next time when we take our arrays into a whole new dimension.

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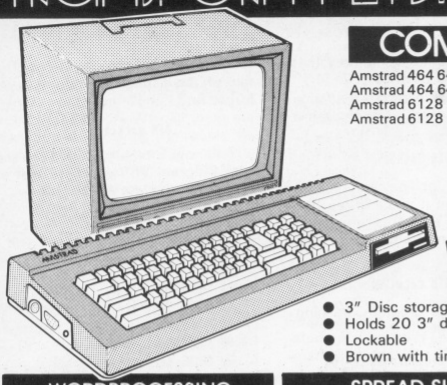

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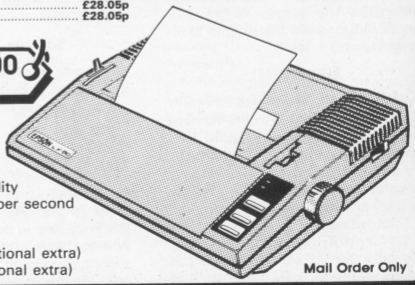

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Access VISA

What it offers the Amstrad user . . .

Give your micro mainframe power

With MicroLink your micro becomes a terminal linked directly to the Telecom Gold mainframe computer, and able to tap its tremendous power and versatility. Right away you'll be able to use giant number-crunching programs that can only run on a mainframe. You can set up your own computerised filing systems, store and update statistics and other information, cross-reference material between files, selectively extract the information you want, perform massive calculations and design reports to display information from any of the files and in any format you choose.

The biggest bulletin board of them all

The number of bulletin boards is growing rapidly. New ones are springing up in all parts of Britain and all over the world, with people of like minds chatting to each other on all manner of subjects. The only snag is that the vast majority are single-user boards – which means lots of other people are also trying to make contact and all too often all you get is the engaged tone. But with the MicroLink bulletin board there is no limit to the number of people using it at the same time. And no limit to the number of categories that can be displayed on the board.

We're only a local phone call away

More than 96 per cent of MicoLink subscribers can connect to our mainframe computer in London by making a local phone call. This is possible because they use British Telecom's PSS system, which has access points all over Britain. A local phone call is all you need, too, for access to the international Dialcom system through MicroLink.

Telemessages – at a third of the cost

The modern equivalent of the telegram is the telemessage, which if sent before 8pm is delivered by first post the following day (except Sunday). Originally designed for people to phone their message via the operator, the service costs £3.50 for 50 words. Now it's available via MicroLink – and costs only £1.25 for up to 350 words!

Send and receive telex messages

With MicroLink you can turn your micro into a telex machine, and can send and receive telex messages of any length. You will be able to communicate directly to 96,000 telex subscribers in the UK, 1½ million worldwide – and even with ships at sea via the telex satellite network. Business people can now send and receive telexes after office hours, from home or when travelling. You can key in a telex during the day and instruct MicroLink not to transmit it until after 8pm – and save 10 per cent off the cost!

The mailbox that is always open

MicroLink is in operation 24 hours a day, every day. That means you can access your mailbox whenever you want, and from wherever you are . . . home, office, airport – even a hotel bedroom or golf club! No-one needs to know where you are when you send your message.

What does it all cost?

Considering all the services you have on tap, MicroLink is remarkably inexpensive. You pay a once-only registration fee of £5, and then a standing charge of just £3 a month. On-line costs are 3.5p a minute (between 7pm and 8am) or 10.5p a minute during office hours. There is an additional 2p a minute PSS charge if you are calling from outside the 01· London call area. Charges for telex, tele-messages and storage of files are given on the next page.

How much it costs to use MicroLink

Initial registration fee: £5.

Standing charge: £3 per calendar month or part.

Connect charge: 3.5p per minute or part – cheap rate; 10.5p per minute or part – standard rate.
Applicable for duration of connection to the Service. Minimum charge: 1 minute.
Cheap rate is from 7pm to 8am, Monday to Friday, all day Saturday and Sunday and public holidays; Standard rate is from 8am to 7pm, Monday to Friday, excluding public holidays.

Filing charge: 20p per unit of 2,048 characters per month.
Applicable for storage of information, such a telex, short codes and mail files. The number of units used is an average calculated by reference to a daily sample.

Information Databases: Various charges.
Any charges that may be applicable are shown to you before you obtain access to the database.

MicroLink PSS service: 2p per minute or part (300 baud); 2.5p per minute or part (1200/75 baud).
Only applies to users outside the 01- London call area.

Telex registration: £10.

Outgoing telex: 5.5p per 100 characters (UK); 11p per 100 (Europe); 16.5p per 100 (N. America); £1.15 per 400 (Rest of world); £2.75 per 400 (Ships at sea).
Deferred messages sent on the night service are subject to a 10 per cent discount.

Incoming telex: 50p for each correctly addressed telex delivered to your mailbox. Obtaining a mailbox reference from the sender incurs a further charge of 50p.

It is not possible to deliver a telex without a mailbox reference. If a telex is received without a mailbox reference the sender will be advised of non-delivery and asked to provide a mailbox address.
Each user validated for telex and using the facility will incur a charge of 6 storage units a month. Further storage charges could be incurred depending on the amount of telex storage and the use made of short code and message file facilities.

Telemessages: £1.25 for up to 350 words.

Radiopaging: No charge.

If you have a BT Radiopager you can be paged automatically whenever a message is waiting in your mailbox.

International Mail: For the first 2,048 characters – 20p to Germany and Denmark; 30p to USA, Australia, Canada, Singapore, Hong Kong and Israel. For additional 1,024 characters – 10p; 15p.

These charges relate to the transmission of information by the Dialcom service to other Dialcom services outside the UK and the Isle of Man. Multiple copies to addresses on the same system host incur only one transmission charge.

Billing and Payment: All charges quoted are exclusive of VAT. Currently all bills are rendered monthly.

Software over the telephone

MicroLink is setting up a central store of software programs which you'll be able to download directly into your micro. The range will include games, utilities, educational and business programs, and will cover all the most popular makes of micros.

Talk to the world – by satellite

MicroLink is part of the international Dialcom network. In the USA, Australia and a growing number of other countries there are many thousands of users with electronic mailboxes just like yours. You can contact them just as easily as you do users in Britain – the only difference is that the messages from your keyboard go speeding around the world via satellite.

What you need to access MicroLink

You must have three things in order to use MicroLink: a computer (it can be any make of micro, hand-held device or even an electronic typewriter provided it has communications facilities), a modem (it can be a simple Prestel type using 1200/75 baud, or a more sophisticated one operating at 300/300 or 1200/1200 baud), and appropriate communications software.

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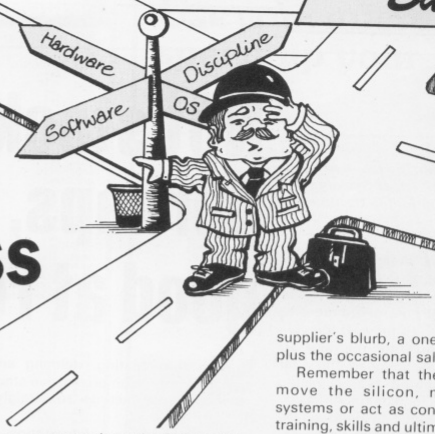
Four roads to success



THERE are at least four essential requirements for a successful business system. If any one of them is weak then the whole operation becomes pointless. Put as simply as possible, these requirements are:

- Hardware with enough muscle for the job asked of it.
- An operating system which eases your problems, not adds to them.
- Software for all your tasks, without confusing you by offering unnecessary facilities.
- A user with enough discipline, to ensure the system and data are kept up-to-date, backed up and so on.

Keeping these four points in mind, imagine yourself standing at any town centre crossroads. You can probably see these three shops claiming to sell Computer Systems:

(a) A chain store which has diversified from cameras through TV and into micros.

(b) A bookseller with a corner devoted to micros.

(c) A flash outfit specially set up to sell micros.

Where do you go for advice about a business system, considering the cheapest system of (c) will probably cost at least double the price of an Amstrad? My unreserved answer is none of them, since seeking advice at any of these shops is, putting it as charitably as possible, akin to playing poker.

First you must accept that no matter what the emporium's advertising might claim, it is in the business of shifting silicon. There is no way on this earth that they will give you independent guidance.

If your original preference is for a Numcrunch 2B and it is out of stock, or they are not even the agents for it, prepare yourself for responses ranging from silence to disdain.

Shortly after you will receive pressure to purchase the Gizzmo 64k, Whizbyte Mk III or whatever is currently buckling their shelves. After all, you would not expect a Ford dealer to sell or praise the MG Metro.

Consequently, before entering any shop, whether for hardware or software, you must know what you want before showing any sign of a willingness to spend some money.

This does not mean knowing the precise configuration of the exact piece of hardware, or software to run on it. What you must keep clear in your mind is the task to be done, plus the resources – whether cash, time or expertise – that can be devoted to its completion.

At least this way if you have any sales resistance whatsoever you will not end up with the duff stuff that the dealer foolishly over-ordered.

Secondly, you must accept that the person you question is probably more ignorant than you in the matter of business systems. This often surprises the customer, but is sadly true. Prove it to yourself with the simplest of questions. Two particular favourites of mine are:

Show me!

How many have you personally installed?

If this seems unduly hard on people who are only trying to earn a crust, then it is not meant to be. At the Amstrad end of the market the sales have so far primarily been to hobbyists, games players and the like. Many are quite expert in these areas.

It is the harsh commercial realities of managing a business which has them running for cover, since their knowledge is limited to their supplier's blurb, a one week course, plus the occasional sales convention.

Remember that they are paid to move the silicon, not to install systems or act as consultants. Their training, skills and ultimately financial rewards are in completely different areas. To each their place – just do not confuse the role of the man in your High Street store.

The person who has only zapped aliens, entered dungeons or flown with the Red Arrows assesses hardware muscle with all the scientific method of a Roman reading the entrails of a sheep.

Discussing operating systems with a person who only ever enters RUN "DISC" is obviously a waste of time.

Discussing a balance sheet with the person whose understanding of commerce is restricted to the financial section of the Daily Mirror is equally futile.

Discussing discipline with the person who can not copy his purchased games is likely to be pointless.

However, all is not lost, because there is a valuable source of advice.

There are organisations, frequently tucked away from the High Streets, which are run by enthusiasts who are also taking their own business decisions. They are like pearls: hard to find but priceless once traced.

They may not give the largest discounts, nor have the widest range of merchandise, but they certainly understand your problems. Seek out these small independents and take your trade there before they become an extinct species.

You will be amply rewarded for they can devote the time to your problems, thereby ensuring that you do not end up with the best advertised, rather than the best system, for your organisation.

Jo Stork

Not stock control perhaps, but darned good at recording

Amsoft Business Control, Stock Control System, Sales Invoicing System, Sales Ledger System. Quest International Computer Technology

ON seeing the title I seriously wondered whether this package deserved reviewing. The reason for this is that stock control is a massive and highly complex topic. It requires at least eight times the memory, 20 times the processor speed and a far more sophisticated file-accessing system than you find on the Amstrad.

Having said that, I am pleased I did not reject this software as being just another attempt by the ignorant to wangle cash from the gullible, even though nothing remotely like stock control is achieved.

What you get for your money is a first rate *stock recording* system which feeds via an invoicing system into a sales ledger system, comprising three discs operating under CP/M.

One disc contains the pre-created datafiles while the other two contain all the program software.

Before you can run the suite you must have a twin disc Amstrad since the programs must be in drive A and the files in drive B. Also you have to carry out a simple action to eliminate the risk of the software being pirated.

The suite will not run on one drive or if the action – which I am not prepared to reveal – is not carried out. The anti-pirating routine impressed me and gave me confidence in what was to follow. I was not disappointed.

Once you have your system up and running it is a delight. The response times are excellent, hence the code must be efficient.

Data entry is very quick and easy into the clearly defined areas of the screen, so much so that I hardly ever referred to the well-written manual.

My guess is that a manager could leave one of his juniors to work this system. No more than minimal supervision, after an hour or so practice, is needed to carry out all the transactions since virtually every single instruction you are likely to require is presented to you on the screen.

Also the operation of one option is basically similar to any of the other dozen. In short, I praise Quest for making the creating, deleting and updating of the comprehensive stock and customer records so straightforward.

The management information is also more than adequate for a businessman who is only using an Amstrad.

Where I do feel that something is missing is in the suite's inability to put these reports, which are many and various, on to the screen. They only go to the printer. A simple option of choosing:

<S>creen / <P>rinter

is all that is required.

This is not to imply any criticism of the information provided by these reports, for this is excellent. The potential problem lies in the amount of printed data available.

The information about the state of the sales ledger or the stocks themselves is so comprehensive as to be more than some people might feel they want.

I foresee the situation where some of these listings will not be used even though the businessman does require them all to manage the organisation adequately.

Another minor criticism is that because there is so much information to be printed some of the reports look rather messy.

I am sorry to return to my opening theme, but I must. The Amstrad is the smallest computer that can be satisfactorily used in business, and therefore what follows is no criticism of Quest or Amsoft.

One has to compromise when the equipment sets low limits on files, either opting for comprehensive data on few records or scanty data on more.

The maximum stock file size of this package is 250 records – that is, 250 different stock items.

This will be quite restrictive in many environments, even though I believe Quest has got the compromise just about right. If this looks like becoming a problem then you probably need a larger computer than the Amstrad. The limit of up to 200 customers should be far less of a problem.

To sum up this package, I rate it highly. It takes on some of the much better-known systems for larger micros and holds its own well.

The fact it needs two drives is a virtue not a drawback. The facilities offered are worth every penny you pay.

I look forward to reviewing the other parts of the combined business package which interface with this suite.

This is particularly true of the purchasing aspects, which would complete the "stock in/money out, stock out/money in" loop. It may not be stock control, but it certainly is good at recording.

Jo Stork

'A manager could leave a junior to work this system'

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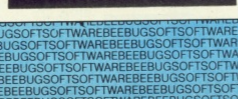

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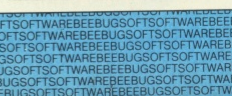

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BMOVE Move Basic program in memory

FORMAT Very quick disc formatter

LIST List program from disc/tape without corrupting the program in memory

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LMOVE Move Basic program lines

HELP Syntax of all Toolkit commands

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BEEBUG SOFT

Adventuring with Gandalf

Flying start on the eighth day

I HAVE been looking at three adventures from a new company, 8th Day Software. Ice Station Zero is for beginners and has you playing a secret agent.

Your job – to infiltrate an international terrorist base in the Arctic and prevent them detonating a remote-controlled atomic bomb in New York.

Quann Tulla, an adventure of moderate difficulty, is set in the far future and has you as an agent of the Federation, taking on the might of the evil Empire in an attempt to kill a spy and also to destroy the Federation's crippled flagship before the Empire reaches it and learns its secrets.

Faerie is an advanced game full of magic and with an element of "A Midsummer Night's Dream". The synopsis doesn't say what the purpose of the adventure is and I haven't got far enough to find out.

Suffice to say it is full of fiendish puzzles and definitely for lateral thinkers. All three have been written using Gilsoft's The Quill which is no reason to be put off them.

Two things that greatly impressed me were the price, £2.50 each, and the high quality of the review material and hint sheets enclosed with the game. Other software houses please note.

All three adventures are extremely good and excellent value for money. One thing I missed in the first two though was a LOOK command (REDESCRIBE didn't seem to work) though Faerie had implemented it. Overall, a very impressive start by 8th Day and I highly recommend all three of these games.

I'd like to thank those of you who have sent in maps and solutions, the response has been staggering. Next month I shall be announcing the winner, or since several readers have sent in a lot of solutions, the winners.

N. Hadi has asked me to publish his address so that any Amstrad adventurers in his area can contact him. He has also asked me to congratulate Roland Waddilove on his excellent machine code graphics article.

N. Hadi's address is 80 York Road, Montpelier, Bristol.

Nick Arundel has written in with three guidelines for adventurers:

- Never start an addictive adventure after 7pm – if your mother finds out she might seriously damage your health.
- Never telephone the Interceptor helpline because the person on the other end has always lost your help sheet and ends up giving you another number to ring.
- Never telephone the second number as it is in darkest Peru and you never get an answer.

I can't agree with the last two as I have always found Interceptor have been able to give me an answer immediately. If you substitute wife for mother in the first one though, you'll have hit the nail on the head.

Glynis Pickering has written another nice letter. I really appreciate it when readers write in for a chat rather than with just pleas for help. One thing she says is that she is having problems with Classic Adventure.

When she returns underground after depositing treasure back at the building, she finds that the list of visible objects runs off the screen and then she gets a "Press any key to continue" message.

On pressing a key the computer crashes completely and then she has to do a hard reset and reload the game back in from the beginning.

She is now playing The Hobbit. Don't place too much reliance on the book, Glynis.

David Marshall has sent in a two-page hint sheet to some of the problems found in Lords of Time. Anyone who wants a copy should write in enclosing an sae.

P.J. Bell has asked for a review of Azimuth 3000. Do you mean the azimuth head alignment tape? If so, this is not at adventure but a utility for properly setting the alignment of your tape head. It is a utility that I regularly use and it cured the loading problems I had with Sorcery. I can certainly recommend it.

Lea Somerfield and Mark Yates have written in again asking how to get into the inner castle in Dun Durach. Any suggestions?

Nigel Brookes can't get anywhere and Stuart Hutchinson can't open the safe in Subsunk. I haven't seen it so I can't help. Can anyone oblige me with a map and solution? Stuart goes on to ask when Level 9's Worm in Paradise will be released. Soon!

Next time I will be giving the first of the adventure Top 10s, but meanwhile read on for this month's helpline.

SOS Dept.

David Lomas wants to know how to kill the alien commander in ***Message from Andromeda.*** *This is a hatchet job!*

Derek Lightfoot, Chris Appleby and **Paul Dobson** are having trouble with ***Forest at Worlds End.*** *To get into the hovel you need to wear a ring. Kill the elf with the bow. Try climbing into the boat.*

Jewels of Babylon is causing problems for **Neil James, Lynn Brankling, Riaz Ali, D. Hunter** and **Barry Newell.** *The crocodile has put you in an explosive situation. The slab of rock is an exit.*

The sailor will get you if you don't get the parrot and then him, first, so get it right as you have places to go. The cannibals don't even know the time of day. You'll find the key across the pit, you plank. And that should solve the door after the trapdoor, too.

David Lomas wants to know how to get past the bear in ***Colossal Adventure.*** *The bear is hungry, so if you don't want to end up in his stomach you had better feed him. Your problem now is not how to get past him but what to do with him and how many points you can get. Be restrained, you'll see what I mean.*

Angela White – thanks for the tips on ***FAWE*** – is having problems with ***Adventuring Quest.*** Thanks to **Brian Standing** I can answer this. *Type TAKE SUN-DIAL. If you don't enter it in full the command parser thinks you are trying to get the sunstone. I don't quite know what you mean about finding the lamp at random after the djinn. Getting past him is the problem you have to solve to get the lamp.*

Richard Hyams wants to know how to get into the monument in ***Emerald Isle.*** *Have you had a good look at it?*

K. Nash, Peter Harman and **Paul Martin** are struggling with ***Heroes of Karn.*** *Bribe the guard to get out of jail. Stab the pirate in the back. A potion will ensure that the fire gates stay open.*

The clam? There must be a suitable tool somewhere, so open your eyes and the clam. Paul should kill that irreligious barrow-right and then read all the clues in this column. K. Nash should send me information as I can now help.

Lea Somerfield and **Mark Yates** want to know how to get the pearl from the strongroom without the door locking in ***Dun Durach.*** *If you want to steal something you had better make sure you are an accredited thief.*

Nick Arundel wants to know what the key is for in ***Red Moon.*** *Have you been through the wide gateway yet?*

Tom Houghton can't get past the pygmy in ***Mordon's Quest.*** *Everybody knows what pygmies use as a weapon, so turn the tables on him.*

Richard Hyams wants to know how to get into the stone age invention room in ***Lords of Time.*** *Was it Archimedes who shouted this and then went running from his bath into the streets?*

Neil James can't get past the executioner or the warriors that appear when you bury the teeth in ***Dungeon Adventure.*** *The executioner doesn't like ivory so throw something suitable – and you shouldn't bury the teeth unless they have an army to fight.*

Claire Tyndall, Mark Vickers, Andrew Clelland, Rick Jones, C.R. Woodings and **D.P. Watts** have all written in with problems about ***Fantasia Diamond.***

Drink the wine and rub the glass in the dingy cellar. You cross the river from the other side. To open the musical door, give the conductor and the violinist the tools of their trade, drop a coloured book and ask them to play what is in it. The trapdoor will break if you are persistent.

You need to get Boris and the diamond back across the river. I think the TV is a red herring. The score is in a chest behind the secret door, Boris will help here.

By large key do you mean rusty key? If so, the librarian can help. By wooden door I presume you mean brown door. Try being polite before entering. Use a key to open the chest and a valuable key to open the rusty door.

Craig Baldwin has asked for help with ***Mayday.*** *The purpose of the adventure is to escape, so try repairing the ship. You will find an identity card and that will get you through the door.*

Hints Dept.

I HAVE some answers to previous problems that have been raised in this column. The response has been phenomenal and there simply isn't room to mention everybody, but I would like to thank all those who have written in, especially J.S. Turner, whose enigmatic answers I have used.

In *Forest at Worlds End:* Bilbo Baggins would have no problem getting into the hovel, the centaur is definitely fishy and the key in the hovel will open the chest in the volcano to reveal the crystals.

In *Jewels of Babylon:* Crocs eat gunpowder, cannibals are fond of timekeeping, if a sailor is not drinking or sleeping then he must be dead. Exits can be seen to be smooth and vertical, crabs can be lured into what should be noiseless zones, parrots use fruity language so reply in kind to obtain a means of killing the pirate. And spears are handy in caves.

In *Message from Andromeda:* Take the bowl from the pedestal and place it on a pedestal of a similar type in another room.

Brian Standing and Claire and Paul Wilkins are to thank for these solutions for *Heroes of Karn:* Kill the pirate with a small weapon, use a bird of prey to dispose of the bat, use music to soothe the spider, wet the ashes to prevent the phoenix appearing, use a holy relic on the vampire, open the clam with a burglar's tool and a suitably prepared frog will give the serpent the bird.

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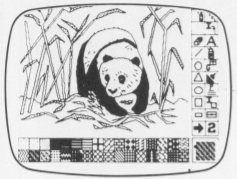

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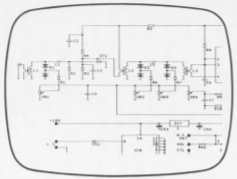

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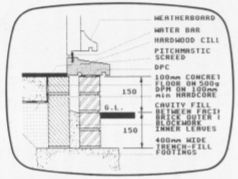

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And it won't cost you a penny, apart from the price of the cassette, that is.

It has all the thrills of most pub fruit machines featuring holds, nudges, gambles and specials such as super series.

You are first asked how much credit you want. Your money is displayed at the bottom of the screen.

To spin the reels you press any key and wait for Lady Luck to come your way.

The scroll on the reels is fairly smooth and the graphics symbols are simple but effective.

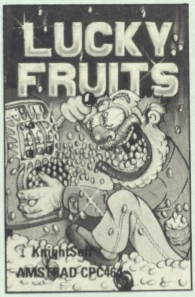
After each spin a small amount of the hidden symbol shows at the top and bottom of each reel. This is a nice touch because it's just like the real thing when you are looking for the best way to nudge for a winning line.

Numbers occasionally appear on the symbols on the win line. These light up an appropriate number of letters on the word "Feature" just below the reels. Once you light up the whole word all the available features flash in sequence underneath. The aim is to stop on the feature you want to use.

A line of symbols is shown down the right hand side of the screen and next to each is a letter of the words LIGHT* A*LINE.

Every symbol which drops on the winning line lights up its corresponding letter. Once the complete word has been lit up you have a crack at the super series, which is a win each time you spin the reels.

The screen layout is a bit untidy. Borders round the different features would have neatened it a bit.



I found it very addictive and easy to play. If only those five pound notes were real . . .

David Andrews

Pacific power play

THE turning point of the World War II Pacific battle came on June 4,1942 when American divebombers sank three Japanese aircraft carriers in five minutes.

Without doubt the Americans were lucky – like Waterloo this victory was close run, and therefore an excellent choice for a computer-aided war game simulation.

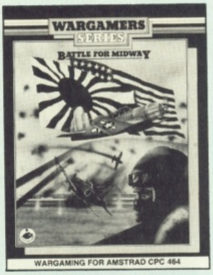
Battle for Midway, from PSS, is in three stages. All use a fast real time clock (you lose if you do nothing) and display a map of Midway Island plus the initial positions of the American task forces.

The first, tutorial stage shows the tracks of all the Japanese forces as they move in to attack Midway.

You have little difficulty in learning how to locate and identify the enemy carriers with joystick/cursor controlled spotter planes and then launching air attacks in five waves.

You direct your planes to the target area and also back to a safe landing on either Midway airfield or the mother ships.

The second stage is tougher and more realistic because the Japanese are now hidden. In addition, they begin to attack your ships and airfield.



WARGAMING FOR AMSTRAD CPC 464

The third stage is toughest because the Japanese now have seven aircraft carriers, three more than in the actual battle.

It is an excellent introduction to simple computer-aided war games – well thought out with sensible real time speeds and grades of difficulty.

My biggest problem was remembering where my forces were when the animated attack sequences – you can shoot at planes and ships – interrupted the map display.

Although this increased the sense of the "fog of war" I recommend it more as an adventure to solve rather than an arcade blaster.

Leslie Maxwell

Scout's outing is fun

WHEN I first spotted **The Scout Steps Out,** by H.R. Software, I was unsure of what to expect. Would it be a Roland goes bob-a-jobbing I wondered?

I was pleasantly surprised to find it a little gem.

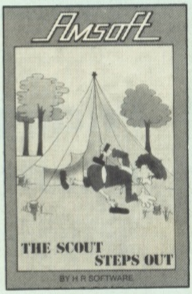
The aim is to wander round a series of ladders and levels type screens collecting various objects. These include the troop's missing trophies, flags on flag day, components for the camp radio and even mushrooms for the troop's tea.

All of the screens and characters are drawn in full colour and great detail. You are not required to complete each screen before going on to the next. Just wander off one side of the screen and you will appear somewhere else.

If you've played these sort of games before, you are soon able to pick the correct route through a screen.

There appeared to be a higher degree of randomness associated with the movement of the obstacles. Thus these safe routes, if they actually existed, were much more difficult to spot.

The result of this was that the game was far harder than others of the ilk.



The number of lives that you begin with is determined by the number of cornflakes you eat for breakfast.

There is a dish full on the opening screen but even a scout can only eat nine at a time.

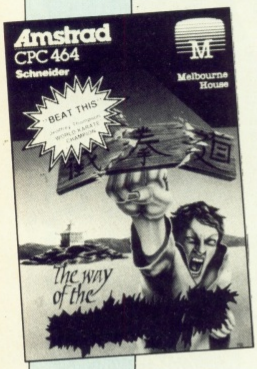
Fortunately our diminutive hero is allowed to return at any time to top up his reserves.

The little tune that plays while the scout is on the opening screen is superb. It is played in stereo with multiple voices and is so catchy that should it be made into a single it would go straight to number one.

This is one of the most well written, difficult, and enjoyable games that I have played in a long while.

Carole Barrow

Where skill really counts



A NEW class of game is appearing in the arcades at the moment. With the arrival of boxing and Kung Fu simulations it would seem that unarmed combat is in vogue.

Not to be left out, Melbourne House has produced a karate game for the Amstrad. **The Way of The Exploding Fist** is set to become a blockbuster, or should it be rib buster?

The action takes place against the backdrop of a pagoda. A tinny burst of oriental music echoes around the arena and the competitors bow.

From here on you're on your own. You have 16 different jumps, punches, and kicks at your disposal, and believe me you will need them all.

The two characters involved are 4.5cm high and dressed in suitable martial attire. The game can be played by one or two players using either keyboard, joystick or both.

Control via the joystick is by far the easiest. Each of the joystick's eight directions will execute a jump or punch. Hold in the fire button and you have the choice of eight kicks.

The scoring system is quite complex, with each manoeuvre having its own score. You must aim to score two full points to win a bout.

However should the 30 second time limit expire the player with the most points wins. If the number of points is level then the referee will decide.

The game begins at novice level. Having won two bouts here you progress to First Dan.

This continues until some Bruce Lee look-a-like beats your brains out while you're contemplating which way to move the joystick next.

Two features of the game contribute to its almost certain success.

The first is the quality of the animation. The characters exhibit all of the grace, speed and athleticism that you normally associate with karate.

The second is the fact that your success or failure is entirely attributable to your own skill.

James Riddell

Pricing a mite catastrophic?

YOU'RE up against time and the elements in **Catastrophes,** from Andromeda Software.

For some insane reason you've been given planning permission to build a tower block on a small island in an area of outstanding natural beauty.

An identical building is being constructed by your computer opponent on the left-hand side of the screen.

Blocks float towards you on a raft and you must manoeuvre a helicopter to pick up the block, take it to the building and ease it into place.

As you go about your task the sun moves slowly across the sky and you must have completed enough of the building by the end of the day to qualify for an overtime bonus and continue building the following day.

Each subsequent day your target increases by a larger margin.

Things wouldn't be too bad if it weren't for the weather and low-flying aircraft which buzz you at regular intervals.

Earthquakes destroy your towers, wind blows blocks off the higher levels, electrical storms destroy the highest points and floods attack the foundations.

Sound has been well used. A tune plays whenever the building isn't under attack, and at other times there are the appropriate sounds of wind, thunder and quakes.

One of the best things about Catastrophes is the two-player option which allows head-to-head competition.

The game is certainly fun to play for a couple of hours but unfortunately there isn't enough variation to maintain interest for much longer.

I played it using a joystick as I found Andromeda's choice of keys almost unplayable.

Catastrophes sells for £8.95. That's a lot to pay for a single game, and I think it too much for this one.

Brian Finnerty

No go zone

SUPERB sound, excellent graphics, playability and addictiveness must be the main criteria of a good arcade game.

Airwolf, by Elite Systems, scores well in the sound and graphics departments but falls down badly when it comes to playability.

I didn't find it addictive at all, simply because I just couldn't get anywhere.

The game is based on the TV series of the same name which graced our screens not so long ago. It features a helicopter bristling with all the lastest weaponry which you have to manoeuvre through a series of caverns.

Pillars have been erected in the caverns just to make life awkward. These must be blasted away using your guns and bombs before you can procede to the next level.

There are also assorted objects and obstacles to be negotiated – radar towers, cylindrical shapes and rocket jets bar the way.

The slightest brush with either a wall, floor, roof or obstacle and you lose one of your six lives.

The problem is that very often there's only a pixel or two spaces around the chopper and it's next to impossible to fly through certain parts without touching anything.

As if this weren't bad enough, instead of merely hitting a wall, for instance, you actually embed yourself in it with no way of extricating yourself.

This means that all your lives are usually lost in one go.

Airwolf is an excellent game with good graphics, smooth animation and very good sound, but is impossibly difficult to play. I wouldn't recommend it to a novice.

Roland Waddilove

Pipe full of peril

SUPER Pipeline II, from Taskset, is an exciting "stop the nasties" game where you, as Foreman Fred, have to defend your pipeline from invaders intent on stopping the flow of water.

Armed with a gun and a team of workers you must ensure that the water flows through the pipe from the tank at the top into the barrels at the bottom.

This task is complicated by baddies puncturing the pipe and killing off your workers.

Keeping your finger permanently on the fire button seems to be the best way of dealing with the baddies, but you also have to round up your workers to take them to any leaks which need fixing.

Having got to the leak you must then protect them until they have finished the job.

The more workers you gather around you the better, because you can also use them to shield you from the attackers.

This may not be very good for industrial relations but it's the only way to get the job done.

Some nasties to watch out for are the shower of tacks which you can't kill, and the Blue Lobster which you can only kill from behind.

The best way of getting the lobster seems to be to hang around at a loop in the pipe and then soom round as fast as possible and zap it in the hindquarters.

If you aren't quick enough at repairing the leaks and the water level is getting critically low, the whole pipeline will start to flash.

The graphics are excellent, with smooth animation and pleasant use of colour. It is accompanied by music which can't be switched of .

The game is well up to the standard of many of the best arcade games on the market.

Allan Mitchell

Memory limits value

SOMEWHERE between Amsoft, the editor and myself the instructions for running Dialog's **Stock-Aid** went astray. It is a credit to the system's simplicity that this did not matter.

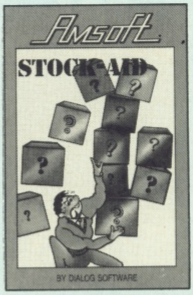
Apart from a model of user friendliness, what do businessmen get for their hard won money?

The short answer is a mass of facilities to enter, update, sort, list and analyse the movement and value of inventory.

Unfortunately everything is limited to so few records that most organisations will find the program of restricted practical use. It is the old CPC464/664 memory problem again.

Now if that nice Mr Sugar would give us proper random access to the full disc capacity or Dialog rework this program for the new, larger memory models, this review would be much less critical.

The only way round the problem of having only 200+ items available at any time is



to adopt one of the following:

- Conform to Pareto's "80:20 Law" which states: "In business 80 per cent of something is usually 20 per cent of something else".

This might sound crazy but it works. For example 80 per cent of absenteeism is caused by only 20 per cent of staff. And 80 per cent of stock value is tied up in only 20 per cent of the items.

The latter may be the user's saviour: Processing only these top 20 per cent would monitor the most valuable items. Leaving the remainder to fend for themselves could still constitute a sizeable benefit. And reducing the data entry required is no bad thing.

- Have sufficient separate files to accommodate the complete inventory. Sadly this seems pointless. By the time all the headings are set up and the records created, one can earn enough to buy a larger computer plus software for it.

Stock-Aid is therefore an oddity. A user with a manual can easily record and analyse inventory.

However its shortcomings, which also include the apparent lack of assistance in preparing the company books or linking to systems which do this, completely outweigh its merits.

Sorry Amsoft, but if users must put stock on to unsuitable hardware they can find many better systems on the market.

Jo Stork

Chaos in the caverns

INSIGHT offers an arcade game which takes you into dark caverns to rescue captive humans from evil aliens in **Subterranean Stryker.**

You are in command of an aircraft-like vehicle and zoom around the caverns picking up your hapless kinfolk. The aliens, naturally, object violently.

The program is written for keyboard or joystick control and rather thoughtfully starts by asking you if you are using a green screen monitor. The shading is quite adequate if you are, but the colour is excellent.

The screen is split. On top is the scanner which gives you an overall view of the cave, showing you where all the nasties are. The bottom few lines give you your score, remaining fuel, energy and so on while the rest of the screen

is the action section.

Your position remains fixed in the middle of the screen and the caves scroll past as you move from side to side.

The men you have to rescue are picked up by positioning yourself close to them. The rest is a bit more tricky.

Your gun fires straight ahead, but the attackers come at you from all directions and fire plasma bombs which home on to you.

There are various other hazards – opening and closing doors, bouncing spiders and other strange moving objects. The slightest touch of any is fatal.

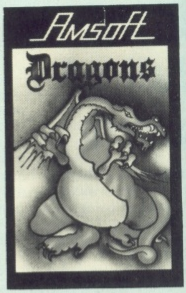
You have five lives to rescue as many men as possible and you can apparently progress to lower levels if you rescue all the humans on your level.

Despite trying very hard to get to another level, I always managed to get killed first.

Quite a reasonable arcade game, but I felt that it was a bit too difficult to get past the first screen. As it is you need to be a pretty accomplished games player to gain the full benefit.

Alan Mitchell

Dragons – eggsactly right!



THERE is a breed of games player which considers a computer game as good only if the keyboard/joystick disintegrates during play, having directed marathon-class energy through the system in a matter of seconds.

Dragons, from Amsoft, is not for them unless they're under doctor's orders to take things easier while still enjoying a little of what they like.

It is a relatively peaceful levels and ladders games, featuring 20 colourful screens of varying difficulty and a lot of eggs.

The latter, which are large, blueish and beautiful, are dropped from a white queen dragon which flies gracefully across the top of the screen.

(I had forgotten just how slowly big dragons fly, always left to right, and how frequently they lay their enormous bomb-like ovules.)

The eggs gently come to rest on one of the eight platform levels, while you guide your man around the screen to dislodge them.

A simple shove sends them further downwards, with the malevolent intent of squashing any one of five types of smaller coloured dragons.

These unfortunates are condemned to roam the platforms/ladders system, using a variety of declared strategies to thwart your man's attempt to possess the red and green diamonds that are scattered around.

Quite simply, diamonds or dead dragons equal points to you, while suicide leaps, shell shock, or dragon dating means one life less.

The game features reasonable sound, good instructions, title page, joystick/keyboard operation, jolly tune, demo mode, and so on with only the delay on the Score/Bonus display and lack of abort facility annoying me to any extent.

The graphics and flicker-free animation of the bouncing, toppling eggs are particularly good, and indeed provide the main source of interest in the game.

I think, however, it would be largely unplayable without a colour display. And, although the action is slow, initial failure comes all too easily.

On the morality front, neither humans nor dragons emerge with credit. One uses the unhatched young of its enemy as weapons, whilst the other not only drops them recklessly, but sometimes on to its own kind.

Phil Murfitt

Relax, zap an alien

THE micro world is a tough place for star pilots these days. Hoards of aliens are all around causing chaos and destruction. Can I save the universe yet again?

3D Starstrike, by Realtime Games Software, is just the sort of game I love. After a hard day's work slaving over a hot micro there's nothing better than flying through space zapping nasties for relaxation.

Star Wars fans will recognise the scenario. The first section involves a dogfight with enemy ships.

There's a time limit with each section in which you must fry as many aliens as possible and either blast or dodge their fireballs.

If you survive, in the next section you fly low and fast over the surface of a hostile planet. The aliens' ground bases, hidden among giant towers, must be smashed.

It gets quite hairy at times as you speed between the skyscrapers performing barrel rolls in order to fool the opposition.

In the third section you must fly down the Death Star's equatorial trench. Laser bases line the walls and obstacles partially block the way. A quick blast with the laser, a few daring manoeuvres and it's on to the final screen.

The Death Star's defence shield can be deactivated only by direct hits in both its main reactor pods. It may look easy, but the ship is constantly buffeted by the strong surrounding force field.

The only fault is that there isn't a high score table. Don't let this put you off though, I think it's great fun.

Roland Waddilove

Let down by the manual

IT has become a principle of computing that the standard of manuals supplied with most home micro business systems rarely do justice to the software.

Either this is due to unseemly haste to re-coup the investment or the programmer/analyst becomes so familiar with the innermost workings of his brainchild, he forgets that everyone else has less knowledge of it than him.

Indeed, users may have no knowledge of the subject at all. In any event they look to the creator for guidance, and the handbook is normally the sole point of contact between them.

Amstat1's creators are therefore in good company, since my guess is that they spent less than 5 per cent of their time in producing their manual, whereas 50 per cent is actually needed. It is a classic, but familiar, example of how operating notes should not be written.

Amstat1's documentation fails in that it gives no guide as to which calculation to use. Recommending a statistics text book is a total abdication of this responsibility.

As for running the program, regurgitating on paper what appears on the screen is just not good enough.

If you know enough statistics to select your calculation, you will obtain an excellent program at a very competitive price.

If you are unaware of the differences between the tests available, Amstat1 merely computes gobbledegook to a zillion decimal places, or gives a blizzard of "Divide by Zero" errors.

Setting this major criticism aside, the software is powerful, performing its task extremely well. Data entry is easy, the calculations available are plentiful and useful.

Amstat2 is currently in production offering still more tests. Might I suggest that the authors G.J. and S.C. Coleman raise their price by £2 and use this revenue to produce sensible documentation. Amstat will still be outstanding value for money.

Jo Stork

Sorcery gets a Plus

ASK any Amstrad user "Which was the best graphics game of 1985?", and the chances are that they would reply Sorcery from Virgin.

Until recently I would have agreed completely. But not any more, Sorcery has now been superseded by an even better game... **Sorcery Plus.**

For those of you unfamiliar with the original, I will recap. It falls into the arcade/adventure category. The evil necromancer has imprisoned eight of your fellow sorcerers in his nasty castle and you must release them.

Using a joystick you guide your sorcerer around breath-taking screen designs patrolled by evil servants of the necromancer.

By clever use of the objects to be found on the screen these creatures can be destroyed. However your main objective is to free the sorcerers.

They are all held under lock and key and can only be released when you are in possession of one particular object – but which one?

The main difference between the old and new versions is that Sorcery Plus is only available on disc. It won't be released on tape as it relies upon things known as disc overlays to make the game much larger than before.

As you move between rooms the drive whirrs while new data is loaded into the computer.

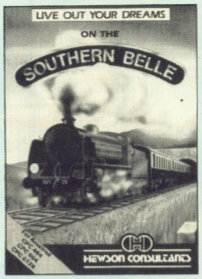
There are now 47 screens to negotiate while searching for the sorcerers.

Having completed this mammoth task you must then scour a further 27 screens in search of the necromancer himself.

Sorcery was good, but Sorcery Plus is the best reason I can think of for buying a disc drive.

Carol Barrow

Nostalgia on the Brighton line



THE **Southern Belle Steam Engine Simulator** from Hewson Consultants is an entertaining alternative to those zap-em, shoot-em arcade games.

The idea is to take the Southern Belle from London Victoria to Brighton. You're actually on the footplate of this King Arthur class locomotive.

Sound the whistle, open the vacuum brake, close the cut off, open the regulator and, with a slow clickety click and the hiss of the pistons, you sluggishly move off.

You are provided with a menu of seven options which include a demonstration run, various practice options and a problem run.

The instructions advise you to watch the demonstration, which automatically starts after a minute with no input.

There is also a leaflet explaining the principles of the steam locomotive, putting you in the picture regarding the use of such things as the regulator, cut off and damper.

After the demo you should start on the training run. When you have mastered this – and it will take you a while – you can move on to more challenging schedules such as the record breaking run of 48 minutes 41 seconds set on July 26, 1903.

You must keep to speed regulations and be careful not to derail when going round bends.

The screen is built round a central window containing a 3D graphic representation of the track, surrounding countryside and the footplate.

The information display includes analog and digital clock, water, coal, and speed indicators, and a typical rail-side signal. There is also an indication as to your current position.

The passing countryside and stations are depicted using 3D wire graphics. Unfortunately they aren't very smooth, jumping in big blocks as the train moves forward, particularly at speed.

But if there's one thing going for this program it is its originality. As an attempt to provide something new it succeeds and I enjoyed reviewing it, if only for that reason.

It will certainly be a hit with railway enthusiasts, but whether it will catch on with arcade addicts like myself is doubtful. **David Andrews**

Tougher breed of android

A FEW months ago, I thoroughly enjoyed reviewing Android One, the almost invincible hulk which could blast its way through walls.

So when Vortex Software produced **Android Two** I couldn't wait to load it in to have a bash.

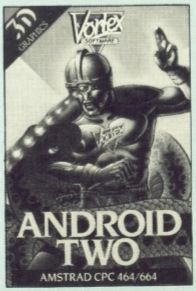
A few minutes and a quite attractive loading screen later, I was ready to try out my android against the assembled ranks of Hoverdroids, Bouncers and land mines.

I have to say straight away that I preferred the first tape – mainly because I could achieve a modicum of respectability in the hi-score table.

In Android Two, however, my fingers are worn down and yet I still find it very difficult to feel I've really got anywhere.

The scene is a well implemented 3D maze comprising several distinct portions viewed from a high angle. Scattered around are vast numbers of lethal land mines. You get an audible warning when you are about to lose a part of your life strength, but there's not time to react when there's a Bouncer coming.

After these relentless beasts the Hoverdroids almost seem tame, only needing three shots in the head to kill, and always changing direction at the oddest moment.



Still, at least there are a few points to rack up towards the hi-score table for shooting these, and a feeling of great achievement.

There are one or two quiet little cul-de-sacs where the android can enjoy a moment of near sanity, but then it's back into the fray once more.

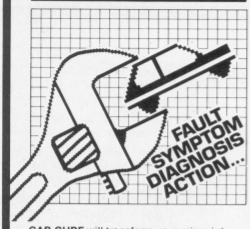
The sound effects are rather overdone, but with the volume down they do get the adrenalin pumping around the body.

Graphically its super, although the scrolling is very tough on the eyes, and there's always something nasty just off-screen waiting to jump as you blink.

If you are looking to test your joystick to the limit, or to do the same to your eyesight, then have a look at Android Two.

Phil Tayler

CAR CURE



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–CRASH

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–Popular Computing Weekly

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–ZX Computing

"... one of the most useful programs I have ever used. Makes 'xyz' look very childish and useless. A software company to keep an eye on"
–ZX Appeal (Canada)

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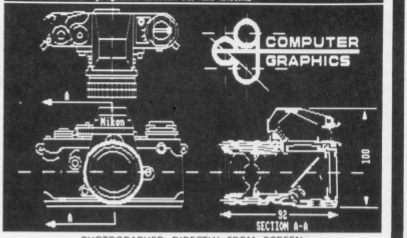

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CARRY ON IN REGISTER PAIRS

Part XII of MIKE BIBBY's series on Machine Code

BY now you should be fairly used to the Carry flag. We've used it in a number of loops, taking advantage of the fact that whenever we increase the contents of a byte past 255 or decrease it below zero, the Carry flag is set – that is, it takes the value one.

We saw that while we could set the Carry flag with the single byte instruction SCF, there was no corresponding instruction to clear the flag to zero. We had to resort to ADD A,0 to do this.

Programs I and II both begin by setting the Carry flag. The object of both programs is to load the A register with zero and add four to it, storing the answer in &7FF8, which we've labelled *answer*.

In Program I we've done the addition with our familiar ADD instruction. Program II uses another form of addition, ADC. With all the emphasis so far on Carry, you might be able to guess what it does – even if you can't see a reason for doing it.

If you haven't worked it out yet, run both programs before reading on, taking careful note of what goes in *answer*.

Program I stores the correct value in *answer*, four, but Program II seems to have gone haywire, giving us 4+0=5!

As you've probably guessed, ADC stands for ADd with Carry. In other words, the value of the Carry is added in with the sum. So since Carry is set with its first instruction, Program II boils down to:

0+4+1=5

Of course our usual ADD doesn't concern itself with Carry, so Program I does the sum:

0+4=4

which is what we'd expect to get from adding four to a register which contains zero.

So why, you might be wondering, do we need ADC, which gave us the wrong value, instead of ADD, which gave us the correct result?

The point is that, as we've seen, the Carry flag can contain some useful information, and sometimes we take notice of this by adding it into our sums. Consider the following sum:

hex	denary
& F0	240
& 10	16
&100	256

As you can see, the answer is %100000000. No, that's not a misprint, there are supposed to be nine bits there. You need the ninth column – it's the 256s column. One way to think of it is that the answer has spilled over from the eight bits into a ninth.

Of course since the Z80 only deals in groups of eight bits at a time, we should really write this as %0000000100000000. (Now you know why we use hex!) It translates to &0100, where &01 is the hi byte and &00 is the lo byte.

The trouble is if we weren't expecting our answer to exceed the size limit placed on one byte we wouldn't bother to look for the hi byte and would take our answer to be just the lo byte – which is, of course, wrong.

If we write the hex version of the sum using two bytes all the way through it appears as:

hi	lo
00	F0
+00	10
01	00

When you think about it, if we were to add &F0 and &10 together with:

```
LD A,&F0
ADD A,&10
```

as we go past 255, the Carry flag will be set to 1. In fact we can consider this Carry as signalling one 256 – that is, 1 in the 256s column since the

```
Pass... 2           ORG &8000

8000:               .answer=&7FF8

8000:37             SCF
8001:3E 00          LD A,0
8003:C6 04          ADD A,4
8005:32 F8 7F       LD (answer),A
8008:C9             RET
8009:               END
```

Program I

```
Pass... 2           ORG &8000

8000:               .answer=&7FF8

8000:37             SCF
8001:3E 00          LD A,0
8003:CE 04          ADC A,4
8005:32 F8 7F       LD (answer),A
8008:C9             RET
8009:               END
```

Program II

Carry is generated on reaching 256 when the byte has "wrapped round" to zero.

As far as the byte itself is concerned the count starts again at 256, so it will hold the amount we have passed 256 by, thus giving us the right "units".

If we then transfer the 1 from our carry into the hi column, we get the right answer. In fact, if we use it like the carry in our normal tens and units and add it to the next column, we'll get the right answer for two byte adds. For instance:

hi	lo
03	F0
+	29
4	19

Remember: You carry when you reach 16, not 10. Adding the units column, the &F0 and &29 give you &19 down and one to carry. To see this, think of the sum as:

&F0 + &29
= &F0 + &10 + &19
= &100 + &19

We carry one for the &100 – 256 in denary – to our 256s column.

Program III shows how we can use this idea of adding the Carry into a hi byte to make sure we get the right answer to the above sum. Our lo and hi bytes are the appropriately named *lo* and *hi*.

The first three instructions:

```
LD A,&F0
ADD A,&29
LD (lo),A
```

ensure that the two numbers are added together and the answer stored in lo. Of course since the answer exceeds 255 – setting Carry – this isn't totally correct. It is, however, the correct low byte of a two byte answer, the high byte of which is one – which is, conveniently, the value of the Carry.

To transfer the Carry into our second byte we use the sequence:

```
LD A,0
ADC A,0
LD (hi),A
```

The LD A,0 "blanks out" A and the ADC A,0 adds zero to it. You might imagine that this leaves zero in the A register, since it contains zero and you're adding zero to it. You'd be wrong though – as we've seen, ADC stands for ADd with Carry, so we add in the Carry.

The outcome of all this is that A contains one, which we then store in *hi*, at &7FF9.

Hang on, haven't I got things the wrong way round in with *hi* at &7FF9 and *lo* at &7FF8 – that gives us the answer &19, &01? Well perhaps it is "about face" for reading purposes but, as you've met in the CALL instruction, when we handle two bytes numbers – such as addresses – we put the lower byte before the higher.

If you now run the program and examine &7FF8 on, you'll find the expected 19 01 there. Try it with other values in *lo* and *hi* and see if you get the results you predict.

Actually Program III is rather limited, since we're only adding single bytes – although it's a fine way of catching the spill-over from a byte when our result exceeds 255. What, though, if we want to add numbers larger than 255? That is, what if we want to add numbers already stored as pairs of bytes in lo, hi fashion?

Program IV shows one method – not the best, but adequate for our purposes. It takes the two byte number at &7FF8,9 *(firstlo,firsthi)*, adds to it the number stored at &7FFA,B *(secondlo, secondhi)*, and stores the answer at &7FFC,D *(answerlo, answerhi)*.

All right, it looks tortuous, but in reality it's fairly easy to follow – and it works.

Here, instead of using ADD A,n and ADC A,n we're using two variants of them that allow us to add registers to A as opposed to constants: ADD A,r and ADC A,r. Their opcodes are given in Tables I and II. Notice the (HL) options, where the register pairs

'It looks tortuous, but it works'

```
Pass... 2           ORG &8000

8000:               .lo=&7FF8
8000:               .hi=&7FF9

8000:3E F0          LD A,&F0
8002:C6 29          ADD A,&29
8004:32 F8 7F       LD (lo),A
8007:3E 00          LD A,0
8009:CE 00          ADC A,0
800B:32 F9 7F       LD (hi),A
800E:C9             RET
800F:               END
```

Program III

```
Pass... 2           ORG &8000

8000:               .firstlo=&7FF8
8000:               .firsthi=&7FF9
8000:               .secondlo=&7FFA
8000:               .secondhi=&7FFB
8000:               .answerlo=&7FFC
8000:               .answerhi=&7FFD

8000:3A F8 7F       LD A,(firstlo)
8003:47             LD B,A
8004:3A FA 7F       LD A,(secondlo)
8007:80             ADD A,B
8008:32 FC 7F       LD (answerlo),A
800B:3A F9 7F       LD A,(firsthi)
800E:47             LD B,A
800F:3A FB 7F       LD A,(secondhi)
8012:88             ADC A,B
8013:32 FD 7F       LD (answerhi),A
8016:C9             RET

8017:               END
```

Program IV

ADD A,B	80
ADD A,C	81
ADD A,D	82
ADD A,E	83
ADD A,H	84
ADD A,L	85
ADD A,(HL)	86
ADD A,A	87

Table I: ADD A,r opcodes

ADC A,B	88
ADC A,C	89
ADC A,D	8A
ADC A,E	8B
ADC A,H	8C
ADC A,L	8D
ADC A,(HL)	8E
ADC A,A	8F

Table II: ADC A,r opcodes

```
&7FF8 onwards : FF 1C 36 21 4D 35
```

Figure I: Outcome of Program IV

```
ADD HL,BC  09
ADD HL,DE  19
ADD HL,HL  29
```

Table III: ADD rr,rr' opcodes

```
ADC HL,BC  ED 4A
ADC HL,DE  ED 5A
ADC HL,HL  ED 6A
```

Table IV: ADC rr,rr' opcodes

specify an address, the contents of which are to be added to A.

Step by step, the Program IV works as follows:

* **LD A,(firstlo)** loads the A register with the lo byte of our first register.
* **LD B,A** stores it out of harm's way in the B register as we're going to use A in the next instruction.
* **LD A,(secondlo)** loads the A register with the lo byte of our second number.
* **ADD A,B** adds the two registers – in effect the lo bytes of our numbers – and leaves the result in A. If the answer is over 255, that is, if it's in the form *256 + n*, the value *n* will be left in A and the Carry flag set to 1, which we can consider to mean "one two-hundred-and-fifty-six". Of course, if 255 isn't exceeded Carry will be set to zero.
* **LD (answerhi),A** stores the result of the addition as the lo byte of our answer.
* **LD A,(firsthi)** loads A with the hi byte of the first number – if you like, the number of "two-hundred-and-fifty-sixes".
* **LD B,A** squirrels it away again.
* **LD A,(secondhi)** gets the hi byte of the second number into A.
* **ADC A,B** adds the two hi bytes together, plus any Carry. Remember, a one in this column means one 256.
* **LD (answerhi),A** stores the hi byte of our result.
* **RET** takes us back whence we came.

```
Pass... 2          ORG &8000

8000:              .first=&7FF8
8000:              .second=&7FFA
8000:              .answer=&7FFC

8000:2A F8 7F      LD HL,(first)
8003:ED 5B FA 7F   LD DE,(second)
8007:19            ADD HL,DE
8008:22 FC 7F      LD (answer),HL
800B:C9            RET

800C:              END
```

Program V

Try it out by putting two byte numbers, lo byte, hi byte fashion, into &7FF8 and &7FFA respectively. Run the program and look for the answer in &7FFC,D. Figure I shows the outcome of one particular run.

Unfortunately we're making an assumption – that the answer can be fitted into two bytes, which won't always be the case.

Suppose we perform &FFFF + &0001. The answer would be &10000, so we'd need to go to three bytes to show it, taking into account the Carry flag from the sum of the second bytes (which already incorporate the Carry flag from the sum of the first bytes) and so on ...

This is rather academic, since I doubt you'll be dealing with numbers over 65535 – the largest number you can fit into two bytes.

And all this fiddling with two bytes is rather inelegant. We've already seen that you can LD rr,nm where rr is a register pair and nm is a two byte number. We could also "poke" into memory locations pq and pq+1 with LD (pq),rr where rr is a register pair. Similarly we could peek with LD rr,(pq) – everything lo,hi byte fashion.

The good news is that you can also ADD and ADC register pairs. Tables III and IV gives the relevant opcodes. Notice that the destination register pair – the one the answer's left in – is always HL, just as with a single byte ADD or ADC the destination is always A.

Program V is simply Program IV rewritten to take advantage of the register pairs instructions, assuming the pairs of numbers to be added are in &2FF8, &2FFA respectively. Take a look. Those register pairs make it so much easier ... Let's have none of this "why didn't he show us this way in the first place?" You really understand the use of Carry, now, don't you? And anyway, doing things the hard way first is good for your soul!

'Doing things the hard way is good for your soul'

We still haven't catered for the spill-over if the number happens to be bigger than &FFFF (65535). One way would be to allocate four bytes per number – a hi pair and a lo pair. We'd have a second stage as we did in Program III, this time using a two byte ADC to add the hi pair of bytes together with the Carry from the lo pair, which is worth 65536 this time.

I'll leave you to do the actual coding if you must. Program VI shows a fudged solution which bleeps at you if you go over the limit. As usual, try it for several different values.

● *That's all for this month. Next time we'll see how Carry comes into play in subtraction – and look at some interesting tricks with register pairs.*

```
Pass... 2          ORG &8000

8000:              .first=&7FF8
8000:              .second=&7FFA
8000:              .answer=&7FFC
8000:              .charout=&BB5A
8000:              .bleep=7

8000:2A F8 7F      LD HL,(first)
8003:ED 5B FA 7F   LD DE,(second)
8007:19            ADD HL,DE
8008:22 FC 7F      LD (answer),HL
800B:30 05         JR NC,okay
800D:3E 07         LD A,bleep
800F:CD 5A BB      CALL charout
8012:              .okay
8012:C9            RET

8013:              END
```

Program VI

SUPERCHARGE

SUPERPOWER SIDEWAYS ROM CARD (Ref B101)

This unit opens up a whole new field of personal computing, previously only available to owners of the BBC Micro and other top of the range computers.

The SUPERPOWER Sideways Rom Card has the following features:

- Matching case, with easily detachable cover.
- Fits snugly to rear of computer.
- Bus extension for fitting of Disk Interface etc.
- Houses up to 7 Roms. (Foreground, Background & Extension).
- Any mix of 8K or 16K Eproms.
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SUPERPOWER ROM BASED SOFTWARE

CURRENTLY AVAILABLE:

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COMING SOON:

Word Processor; Database... SEPTEMBER
Spreadsheet; Graphics/Statistics... OCTOBER

Rom-based Software has the following important advantages:—

1. Written in machine-code, it is very fast in operation.
2. Programs are instantly available from the keyboard.
3. The program code does not use RAM, thus permitting much larger files to reside in memory, reducing the number of disk accesses and saving time when manipulating files.
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SUPERPOWER DISK USER'S UTILITIES (Ref B103)

Program allows detailed inspection and modification of information held on disk and is of particular use for recovering data from corrupted disks. Individual sectors can be read from and written to. All data can be output to the screen and/or printer. Program also contains a number of functions of use to assembly language programmers.

TABULATE DIRECTORY: Displays directory and enters EDIT mode. READ DISK SECTOR: Read sector and enter EDIT mode. LOAD DISK FILE: Load first sector into buffer and remainder to memory for fast access. Enter EDIT mode. LOAD UPPER ROM: Catalogues resident roms, prompts for rom selection and enters EDIT mode. EDIT MEMORY: Displays current buffer. Data displayed is Buffer Address, Hex and ASCII. Comprehensive editing facilities. 'COPY' key gives Intelligent Data Copy. 'TAB' key gives printer output. WRITE: Write sector to disk. DISASSEMBLE: Disassembles code from specified address, giving address, object code, menmonics and ASCII. Screen and/or Printer output. SEARCH MEMORY: Search sector or a complete file for ASCII string or series of Hex codes. UTILITIES: Includes Format, Hex/Decimal conversions, jump calculations etc.

SCREEN UTILITIES: Select from four display modes; choose background and foreground colours.

SUPERPOWER SIDEWAYS ROM CARD (Ref B101)

SUPERPOWER MAILING LIST AND CLUB MEMBERSHIP PROGRAM (Ref B102) **£39.95**

SUPERPOWER DISK USER'S UTILITIES ROM (Ref B103) **£39.95**

SUPERPOWER PROGRAMMER'S TOOLBOX (Ref B104) **£39.95**

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SUPERPOWER WORD PROCESSOR (Ref B106) **£39.95**

SUPERPOWER DATABASE (Ref B107) **£39.95**

SUPERPOWER MAILING LIST AND CLUB MEMBERSHIP PROGRAM (Ref B102)

Program handles thousands of name and address records (label and non-label fields). Twenty classification indicators make possible sophisticated selective examination, counting and printing of records. Alphabetical order is dealt with on data entry, allowing user to select 'key' word. Works with single and double disks as well as cassette.

Main Commands ... ENTER: Data entry(*) GET: Load new file. COUNT: Selective Count. FIND: Find 'Name'.or any String(*). LIST: List current file on screen (*). PRINT: Print label data or whole records selectively. MERGE: Merge and Sort files. SAVE: Write a file to disk or cassette. RESET: Reset colours, label sizes, class definitions, string constants etc. (*Editing facilities available).

SUPERPOWER ASSEMBLER, DISASSEMBLER & MACHINE-CODE MONITOR (Ref B105)

This suite of routines represents the complete Development Package for the Amstrad Z80 programmer. The assembler has a sophisticated text editor, a comprehensive set of options, is very fast and incorporates special techniques enabling large source files to be handled in memory. The full-feature disassembler produces files which can be edited and then re-assembled. The Machine-code Monitor routines are extremely powerful, including the setting of conditional breakpoints (including loop counter option), single-step execution, alternative five column binary and mnemonic formats. Both sets of Z80 registers can be displayed.

Other options include Intelligent Move, Modification of code to run at a new address and colour selection of border, paper and pen.

SUPERPOWER PROGRAMMER'S TOOLBOX for the CPC 464 (Ref B104)

ADDITIONAL BASIC

TURTLE: Logo-like turtle graphics. TUNE: Output music string. CIRCLE: Draw a circle. FILL: Fill an area surrounded by foreground colour. GRAPHICS PEN/GRAPHICS PAPER: Set graphics and background colours. COPYCHR: Read a screen charter. ECHO ON/ECHO OFF: Printer output on and off. PAGE ON/PAGEOFF: Paged screen output on and off. CLEAR INPUT:— clear input buffer. (+extra graphics commands).

PROGRAMMER'S AIDS

EDITOR: Gives 2 additional windows for program editing. FIND (& REPLACE): Find a string and optionally replace. XREF: List references to particular line numbers (GOTO's, GOSUB's etc). COMPACT: Remove REM statements. FRAME: Synchronise screen update with frame fly-back. PRINTER: Epson-compatible or Amstrad printer for dump routines. FDUMP: Fast two-tone screen dump, with user-definition of 'pen' and 'paper'. CDUMP: Shaded screen dump depicting up to 9 colours. PLOAD: Load program saved under 'P' option. INFO: Give details on specified disk file. MEDIT: Comprehensive HEX and ASCII memory editor. LTRON (LTROFF): Send TRACE output to printer. HELP: List commands, functions and their parameters.

ROM-BASED SOFTWARE FULFILS THE PROM

YOUR AMSTRAD.

SUPERPOWER WORD PROCESSOR (Ref B106)

This program incorporates the most useful facilities offered by the best Word Processors currently available on the BBC Micro and other up-market Home Computers.

Text Entry/Editing. User choice of 40 or 80 column mode. Document formatting achieved through use of embedded commands. Text can be formatted and justified on screen, if required. Find <and Replace>with 'wild-card' option. Word count, character count and page numbering reported.

Formatting. Multiple rulers are provided, allowing sophisticated layout of documents e.g. different combinations of TAB stops at different points in the text. All the normal controls are available e.g. page lengths & width, margins, indents, tab stops, justification, headers, footers etc., together with output of control characters to the printer.

Virtually UNLIMITED Document Length. The disk routines in the program handle multiple data files representing parts of a total document, with loading and saving carried out automatically.

Simple Calculator. A calculator window can be called to carry out simple arithmetic calculations. It is also possible to embed a calculation in the text, with the result being calculated and printed on output.

Data Exchange. As part of an integrated suite, the program will be able to handle ASCII files originating from the Spreadsheet, Database and Graphics/Statistics Packages.

Disk/External Commands. Direct Access available.

MANY MORE FEATURES. Ask your dealer for information.

SUPERPOWER DATABASE (Ref B107)

This menu-driven program has been designed to be the most comprehensive and flexible Database which can be achieved in 16K of machine code. Of special note are the PROCEDURES which have been implemented, enabling the more advanced user to write simple structured programs to manipulate the database information in order to meet his more specialized requirements. Databases need not be limited in size since the program contains routines for multiple file handling.

Field types — alphanumeric, integer, currency, floating point, logic, calculated and date.

MAIN FILE COMMANDS
— Create/Modify database structures, reports and procedures.
— Create ASCII file from a Database, enabling data to be passed to the Word Processor, Spreadsheet and Graphic/Statistics programs.
— Copy data to new Database.

RECORD EDITING
— Add, amend, delete, insert, view and duplicate.
— Search and Sort. Due to intelligent file structure and the indexing system adopted, both SEARCH and SORT are extremely fast.

REPORTS
Standard — selected fields may be output, together with totalling on those nominated. (Value fields only). Screen or printer output.

Labels — user-selected fields for printing. User-defined label size, number on sheet etc.

User-defined — user created report-format, combining entered text and designated fields. Editing and storing facilities.

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SUPER POWER

SERIOUS SOFTWARE FROM THE MICROPOWER ORGANISATION

MISE OF YOUR AMSTRAD.

Making the right connections with the RS232

THERE comes a time in every computer's life when its limitations begin to be felt. This is as true of mainframes as it is of micros.

This point is usually reached when the user finally realises that there is little point in spending hours entering data which is rarely needed and stored elsewhere.

There is even less point in writing programs which are already available, fully tested and de-bugged.

The key to overcoming these limitations without junking the whole system is either to put it in touch with a more powerful machine, or at least one which has the programs, data and facilities that you need.

You might be able to transfer tapes or discs between your Amstrad and another machine, but this is fraught with every kind of problem.

The odds are heavily against the formats being similar, never mind needing to stay within the software copyright laws.

Having posed the problem, what is the solution?

Common denominator

At present, the only way of overcoming this lack of consistency between various manufacturers' hardware is to use their sole common denominator – electricity.

The technique is to convert your Amstrad's internal codes into standard electrical signals which the device you wish to contact – this need not be another computer – can also understand.

Having received these signals along a wire, the device then translates them back into whatever codes it understands. All this coding/decoding is performed by the RS232, thereby bringing either the outside world or specialised hardware within reach of your Amstrad.

Of course the Amstrad hasn't got its own RS232 built in – hence the need for the Amstrad RS232C Serial Interface.

What you get for your money is a unit the size of a paperback book which is plugged into the Amstrad's expansion socket via its own cable. This lead has a breakout socket so that anything you previously had connected can still be used. The RS232 is powered by its own transformer.

Having installed the unit, Old Faithful, my trusty CPC, began to look like a bird's nest.

Having no confidence in the ruggedness of electronic connectors, I am extremely reluctant to insert/remove cables from sockets unless absolutely necessary.

Consequently I now had a second disc drive, AMX Mouse, cassette, special adapter for a non-Epson standard printer plus the RS232 hanging off the back of the computer which made my desk look like a riot in a string factory.

This tangle is my first regret since it spoils an excellent product.

Making contact

You can use the RS232 in three basic modes:

- As a device driver running, for instance, a colour plotter/printer.
- As a means of converting the Amstrad into a dumb terminal connected to another computer.
- As a means of linking the Amstrad for computer-to-computer connection.

Whichever mode you need, you should have little trouble in making contact, since the RS232's handbook is comprehensive and clear, despite being decidedly curious in its presentation, each feature being described as a spell.

It took me only a few minutes to build a simple menu driven program in Basic to perform all my standard RS232 operations.

All I now need to do is plug in the transformer and select from my menu.

Consequently I can be "on the air" within a minute. If I need to I can do the same in CP/M, since this is also possible.

There is no limit to the data that can be transmitted. You can access publicly-owned databases, transfer letters/messages, run programs, retrieve data spooled by a mainframe or merely send codes to operate a device.

These transmissions can be made at speeds from 50-19200 bits/second (approximately 5-2000 characters/second) in both full or half-duplex.

Communication is normally triggered by a series of special commands contained in the unit's own ROM.

These steal about 1k of User memory and trigger the RS232 into performing the function required or set up the parameters for the dialogue between the Amstrad and the device it is contacting.

There are 30 commands in all, plus dozens of parameters, which provide more flexibility than the average Amstrad is ever likely to need.

If these simple commands are not sufficient, which should rarely be the case, the handbook contains several program listings, machine code and Basic, to provide yet more facilities.

Even wiring diagrams for connections to other popular micros, and standard pin-outs are provided for those who enjoy soldering.

When communication is complete, I leave the RS232 in the CPC but switched off, thereby preserving my sockets – and reclaiming the 1k.

Jo Stork

Amstrad RS232C Serial Interface £49.95

Verdict: Obviously if communication is with a computer or gadget which is over 15 metres from the Amstrad, you will need some extra hardware, typically a telephone modem, to handle the distance.

I suspect many will be purchased for little more than CB-type chit chat, which is a pity since even when these costs are added, the facilities which become available to an Amstrad fitted with RS232 can more than pay for themselves in a short time.

Which brings me to my second regret. I wish I had more Telecom shares!

A bit extra for your printer port

WHEN they sent me the Glendower Electronics Eight Bit Centronics printer interface for review I was a little perplexed.

As we all know, the Amstrad already has a centronics interface built-in at the printer port, requiring only a ribbon cable to connect it to the printer.

So a second interface is like putting wellie boots over wellie boots.

Could the office be testing me? Or was this an explosive way of terminating my services? Anxiously I read the documentation.

Now usually manufacturers go on for pages about the wonderful things you can do with their product, with a hasty final paragraph on how.

But there was not even a hint of what it did among the page and a bit of elaborate installation instructions, nor any manufacturer's address.

But I finally figured it out. It's an eight bit interface. Printer wise people will know that the Amstrad printer port only sends 7 of its eight bits, which means that you can't send codes above 127 and also makes graphical printing difficult.

But the Glendower interface adds the 8th bit, so that you can send codes up to 255. Now you can get at the block graphics built into your printer, or use the interface to send machine code to some other peripheral.

The interface is a solidly constructed black box, about 100 by 75 by 40mm deep, with a short ribbon cable running from it to an edge connector for the printer port.

The other side has a through connector and a long ribbon cable is supplied for connection from this to the printer.

The 5 volt cable from the monitor plugs into a socket on the interface, and a similar cable from the interface plugs into the normal 5 volt computer socket.

A very short software program drives the interface, which then responds to PRINT or LIST (#8).

For the technically minded, data is present when the strobe goes low. It will be reset in approx 1 microsecond. As soon as "strobe low" is recognised by the receiving device it must set Busy to High.

The interface will not place data on the port until the receiver signals readiness by setting Busy to Low.

Dorene Cox

Glendower Electronics Eight Bit Centronics Interface £21.50

Verdict: Sadly it's not a two-way interface, and at £21.50 it is a little pricey in comparison to similar products.

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STAR SG10 — DOT MATRIX PRINTER

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- ★ Epson and IBM compatible print codes
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- ★ High 120 CPS print speed, NLQ 55 CPS — the market cannot compare. Bidirectional, logic seeking.
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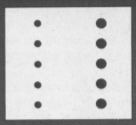
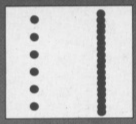
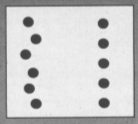
- ★ Reel to reel ribbon — infinitely cheaper than cartridge
- ★ Print head — can be replaced by user with ease.



Micro-precision allows print wires with a diameter that reduces the space between dots.



In the NLQ mode the heads move back enough to print — overlapping the adjacent dots.



Precise alignment of the wire elements is important in attaining quality.

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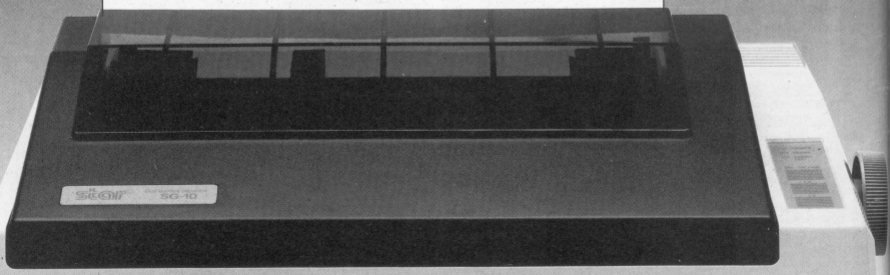

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  and £99.95 for 256K including VAT.

The 64K memory will give you the same amount and configuration of RAM as the CPC 6128, the 256K gives an extra 192K on top of this! The expansion will allow the use of CP/M+ (R) as supplied with the CPC 6128 with its massive 61K TPA opening up an even larger software base for Amstrad users.

The RAM can be accessed by means of bank switching using a single I/O port. Memory is actually switched in and out of the 64K Z80 address space in 16K sub-blocks (as are the ROMs). The port determines which particular combination of the original four 16K sub-blocks and any new sub-blocks from the expansion RAM will occupy the 64K address space at any time. The I/O port can be used from both BASIC and machine code. To use the additional 64K/256K, the expansion is supplied with bank switching software (although it can be switched without this software). The program adds some extra BASIC commands which make it possible to use the second 64K (or 3rd, 4th and 5th in the case of the 256K expansion) for storage for screens, windows, graphics and BASIC arrays. This ability means that you can write much larger BASIC programs, as most of the memory on the unexpanded CPC 464 is normally used for arrays, variables and graphics.

The additional BASIC commands are:

|BANK,n	Map a bank of 16K directly into memory space.
|SWAP	Alternate between the low and high screens.
|LOW	Change to the low screen.
|HIGH	Change to the high screen. (Default screen).
|SAVES,n	Store a screen to 16K bank.
|LOADS,n	Retrieve a screen from a 16K bank.
|SAVEW,w,n	Store a window's contents into expansion RAM.
|LOADW,w,n	Load a window with data from expansion RAM.
|SAVED,n,s,1	Transfer original RAM to expansion RAM.
|LOADDn,s,1	Load original RAM from expansion RAM.
|PEEK,n,s,v	Read the value of a byte in expansion RAM.
|POKE,n,s,v	Change a byte in the expansion RAM.

These commands make such features as pull down menus, full screen animation, and large spread-sheet type programs or Data-Bases very easily programmed from BASIC as never before possible on the unexpanded CPC 464.

NOTE: The contents of the expansion RAM are retained if the computer is reset. The consequence of this is that if the RAM is used for machine code, the contents will remain even if the computer crashes!

Available for 664 and 6128 1st November 1985.

*Except for differences in the firmware and BASIC ROMS.

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The 256K silicon disc is designed to be used with at least one normal disc drive attached. Data can be transferred onto the silicon disc from a normal disc. Application programs can then work on the data at vastly increased speed, especially on systems with only one normal drive. Software is contained in an expansion ROM.

There are two environments in which to use the silicon disc: (1) From BASIC under AMSDOS, and (2) Within CP/M. Both are detailed below:–

(1) From BASIC:

When the silicon disc is activated it will find out if there is a B drive or not. Using this information, the silicon disc is implemented as drive B or C. If there are two normal drives then an extra external command 'IC' is added. The silicon disc can then be accessed by logging on the drive using IB or IC. Alternatively specifying the drive letter in a file name will have the same effect. The silicon disc will react as would normal AMSTRAD disc drives.

At the start of a session using the computer the data can be transferred to the silicon drive using the external command :DISCLOAD. When the data is updated it can be stored on a disc using :DISCSAVE.

Even when the computer is reset (except by switching off) the contents of the silicon disc are kept. This means that it is possible to use CP/M and BASIC programs on the same data files without having to continually change disc.

(2) From CP/M 2.2.

The utility :SETDISC will write a COM file on a copy of your CP/M system disc. This program when called from CP/M will implement an additional drive, either B or C depending on whether there is a second normal drive connected. Using the SETUP.COM program you can get this program to run whenever you boot up into CP/M.

Once the drive is implemented, CP/M will treat it like the normal drives. Data can be transferred onto the silicon disc and vice versa using PIP utility.

The silicon disc is especially useful for single drive CP/M systems as the disc containing the programme is often nearly full and needs to stay in the drive. The silicon disc offers a cheap second drive for serious business applications.

NOTE: The silicon disc will also be available for the CP/M+ supplied with the CPC 6128 computer.

* 664 and 6128 versions available 1st November 1985.

CP/M+ and CP/M are registered trademarks of Digital Research inc.

Englands Lane
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Tel: (0493) 602926
Twx: 975408 DKTRON G

Add this neat machine code routine by CHRIS RATCLIFFE to your own programs and give your micro real painting power

THE Amstrad CPC464 has a very comprehensive Basic for handling graphics, but unlike some lesser machines, it has no Paint or Fill command.

But now CPC464 users need look no longer at other machines with envy, for here is a machine code routine that will do it for them.

The demonstration, Program I consists of a Basic subroutine from line 9000 which sets up the necessary machine code, lowers the top of memory, and initialises the Basic variable to point to the start of the routine.

This should be run at the beginning of your own program with a GOSUB 9000 statement as shown in line 40.

Once this has been done all you need do to fill a shape is to enter:

```
CALL paint,x,y,c
```

As you can see, the routine must be given three parameters to work. These are the coordinates of the starting point to fill from (x,y), and the colour to use (c).

Program I

```
10 REM Fill
20 REM By Chris Ratcliffe
30 REM(c)Computing with the Amstrad
40 GOSUB 9000
50 BORDER 10
60 MODE 0
70 INK 0,0
80 INK 1,18
90 INK 2,2
100 INK 3,6
110 FOR r=190 TO 0 STEP -10
120 g=g+0.2
130 c=c MOD 3 +1
140 FOR a=0 TO 6.3138 STEP 0.031733
150 d=(r*ABS(SIN(a*6+g)))+10
160 x=320+d*SIN(a)*1.4
170 y=200+d*COS(a)
180 IF a THEN DRAW x,y ELSE PLOT x,y,c
190 NEXT
200 CALL paint ,320,200,c
210 NEXT:END
220 REM
9000 REM ** subroutine to set up **
9010 REM ** the machine code for **
9020 REM **  the paint command   **
9030 MEMORY 40100:paint=42000
9040 FOR t=0 TO 465 STEP 8
9050 z=0:FOR e=0 TO 7
9060 READ a$:a=VAL("&"+a$):z=z+a
9070 POKE t+e+paint,a:NEXT
9080 READ a:IF a<>z THEN MODE 1:PRINT"c
heck data in line";9100+t*10/8:END
9090 NEXT:RETURN
9100 DATA F5,CD,BA,BB,F1,FD,21,0C,1362
9110 DATA A4,01,01,00,ED,43,E7,A5,866
9120 DATA FE,03,C0,DD,7E,00,DD,6E,1127
9130 DATA 02,DD,66,03,DD,5E,04,DD,868
9140 DATA 56,05,32,E2,A5,CD,DE,BB,1146
9150 DATA CD,11,BC,06,02,28,06,06,470
9160 DATA 01,30,02,06,04,78,32,ED,468
9170 DATA A5,7B,F6,01,5F,7A,FE,00,1006
9180 DATA 28,0B,FE,01,28,07,FE,02,609
9190 DATA C0,7B,FE,80,D0,7C,FE,00,1283
9200 DATA 28,2A,FE,01,C0,7D,FE,90,1052
9210 DATA D0,18,21,FD,6E,00,FD,66,983
9220 DATA 01,FD,5E,02,FD,56,03,FD,945
9230 DATA 23,FD,23,FD,23,FD,23,ED,1136
9240 DATA 4B,E7,A5,0B,ED,43,E7,A5,1182
9250 DATA AF,B0,B1,C8,22,E5,A5,ED,1393
9260 DATA 53,E3,A5,CD,AE,A5,28,D3,1278
9270 DATA CD,B6,A5,20,04,3E,01,18,675
9280 DATA 06,23,23,CD,7D,A5,AF,32,796
9290 DATA EB,A5,32,EC,A5,CD,CA,A5,1423
9300 DATA 20,04,3E,01,18,06,2B,2B,215
9310 DATA CD,7D,A5,AF,32,E9,A5,32,1168
9320 DATA EA,A5,CD,A6,A5,18,40,CD,1228
9330 DATA AE,A5,28,4F,CD,A6,A5,CD,1199
9340 DATA CA,A5,20,07,3E,01,32,E9,752
9350 DATA A5,18,10,3A,E9,A5,FE,00,915
9360 DATA 28,09,AF,32,E9,A5,2B,2B,758
9370 DATA CD,7D,A5,CD,B6,A5,20,07,1086
9380 DATA 3E,01,32,EB,A5,18,10,3A,611
9390 DATA EB,A5,FE,00,28,09,AF,32,928
9400 DATA EB,A5,23,23,CD,7D,A5,2A,1087
9410 DATA ED,A5,26,00,19,EB,2A,E5,971
9420 DATA A5,7A,FE,02,20,B1,7B,FE,1129
9430 DATA 00,3B,AC,2A,E5,A5,ED,5B,1120
9440 DATA E3,A5,18,41,CD,AE,A5,CA,1227
9450 DATA 6B,A4,CD,A6,A5,CD,CA,A5,1379
9460 DATA 20,07,3E,01,32,EA,A5,18,575
9470 DATA 10,3A,EA,A5,FE,00,28,09,776
9480 DATA AF,32,EA,A5,2B,2B,CD,7D,1040
9490 DATA A5,CD,B6,A5,20,07,3E,01,819
9500 DATA 32,EC,A5,18,10,3A,EC,A5,950
9510 DATA FE,00,28,09,AF,32,EC,A5,929
9520 DATA 23,23,CD,7D,A5,37,3F,EB,918
9530 DATA ED,5B,ED,A5,16,00,ED,52,1071
9540 DATA EB,2A,E5,A5,7A,FE,FF,CA,1504
9550 DATA 6B,A4,C3,24,A5,FD,E5,C1,1342
```

So the instruction:

```
CALL paint,320,200,2
```

will fill in the shape around the point 320,200 in the colour of INK 2.

It is quite likely that you will make a few mistakes while typing in lines 9100 to 9680, so the program checks the data for you. If there are any mistakes you will be informed which lines are wrong, so correcting them should be quite easy.

For simple shapes like circles and rectangles, painting is fairly straightforward, but more complex shapes with lots of nooks and crannies require the computer to "remember" to go back and fill in the fiddly bits.

As the program stands, just under 2k of RAM is allocated for this purpose, so it can remember about 500 fiddly bits.

This is more than enough for nearly all situations, but if the program is asked to remember more than this it will start forgetting things and may not fuliy colour in the shape.

And that's all there is to it – happy painting!

```
9560 DATA 78,FE,9D,28,1D,FD,2B,FD,1149
9570 DATA 2B,FD,2B,FD,2B,FD,75,00,1005
9580 DATA FD,74,01,FD,73,02,FD,72,1107
9590 DATA 03,ED,4B,E7,A5,03,ED,43,1018
9600 DATA E7,A5,2A,E5,A5,C9,E5,D5,1475
9610 DATA CD,EA,BB,D1,E1,C9,E5,D5,1703
9620 DATA CD,D9,A5,D1,E1,C9,E5,D5,1664
9630 DATA 23,23,7C,FE,01,20,05,7D,611
9640 DATA FE,90,30,0F,CD,D9,A5,D1,1257
9650 DATA E1,C9,E5,D5,2B,2B,7C,FE,1332
9660 DATA FF,20,F1,D1,E1,AF,FE,00,1391
9670 DATA C9,CD,F0,BB,6F,3A,E2,A5,1393
9680 DATA BD,C9,00,00,00,00,00,00,398
```

Give your fingers a rest . . .

All the listings from this month's issue are available on cassette.

See our special offer on Page 93.

A few things to bear in mind for successful painting:

- The routine will only notice lines which are the same colour as the paint being used – so you can only paint a shape with the same colour as it was drawn in.
- The perimeter of a shape must be continuous. Any gaps will allow the paint to leak out and fill the whole screen.
- The routine will work in all three screen modes, but is fastest in Mode 0 because of the lower horizontal resolution.
- The first thing the routine does is to reset the graphics window to the whole screen and return the origin to the bottom left of the screen, so beware.

1120

1650

DISCMAN'S R

THE Discman has been imprisoned in the power house of the planet Dartsma. This is an endless series of rooms designed to hold the numerous energy generators needed to provide the planet with its fuel.

The rooms are built from ice blocks placed in such a way as to break the area up into a maze of passages.

You play the role of the Discman and move him around the maze using the A, Z, K and L keys or a joystick.

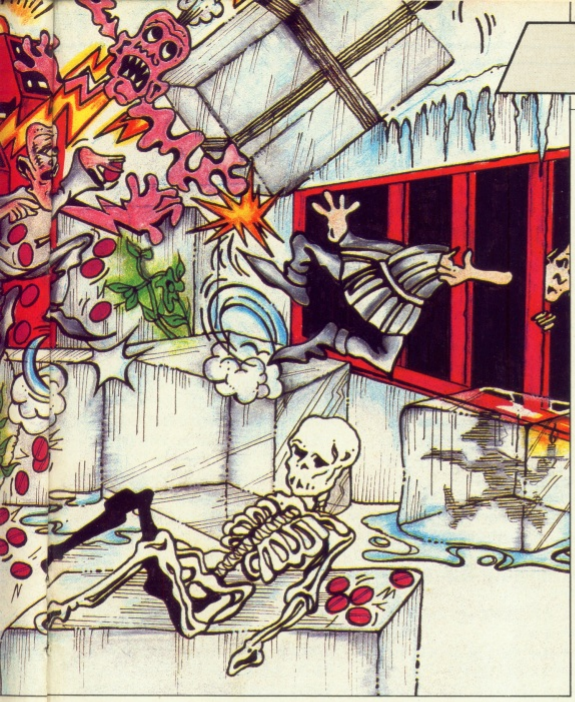
Your task is to transfer the flashing power pills that appear at the bottom of each screen to each of the eight reactors.

To make your task that little more difficult the place is littered with deadly plants which must be avoided at all costs. There are also the ghosts of previous prisoners who seem bent on seeing you off.

They are particularly dangerous because of their ability to walk through walls, and they can only be killed by being crushed by an ice block. To move a block, position the Discman next to it and kick using the Spacebar or fire button.

You can only leave a room when all the power pills have been relocated and at least five ghosts have been killed.

```
10 REM Discman's Revenge
20 REM By D.L.Lau
30 REM(c)Computing with the Amstrad
40 SYMBOL AFTER 33
50 SYMBOL 38,66,153,86,60,153,86,60:S
YMBOL 145,0,24,24,24,24,24,24,24,24
60 SYMBOL 35,255,129,129,129,129,129,
129,255
70 SYMBOL 64,24,60,126,90,126,255,255
,213:SYMBOL 91,62,254,247,31,31,255,1
26,62:SYMBOL 93,62,127,239,248,248,25
5,126,62
80 SYMBOL 123,100,102,103,255,223,255
,126,62:SYMBOL 125,62,126,255,223,255
,231,102,100
90 SYMBOL 169,255,129,129,129,129,129
,129,255:SYMBOL 170,255,24,24,24,24,2
4,24,255:SYMBOL 171,171,137,4,80,22,1
61,132,55
100 DEFINT a-z
110 ENV 1,100,2,5:ENT 1,100,-2,4:ENV
2,50,4,3:ENT 2,50,-2,2:ENT -3,50,30,2
120 ENT 4,239,-2,10:ENV 4,23,4,4:ENV
5,30,2,2:ENV 6,15,-1,4
130 DIM m(20,24),a(2),b(2),dr(2),u(20
,24)
140 n$="AMSTRAD":GOTO 1530
150 REM ******** initialise ********
160 FOR f=1 TO 25:LOCATE 1,25:PRINT C
HR$(10):SOUND 1,f*7,1,5:NEXT: MODE 0:
li=3:gk=0:pl=0
170 FOR f=1 TO 20:FOR g=4 TO 23:m(f,g
)=0:NEXT:NEXT
180 REM ******** set screen ********
190 ON screen GOSUB 2570,2760,2920,30
80,3250
200 FOR f=3 TO 17 STEP 2:m(f,3)=4:NEX
T
210 GOSUB 220:GOTO 280
220 LOCATE 1,1:PEN 10:PRINT STRING$(2
0,CHR$(143)):LOCATE 1,2:PRINT STRING$
(20,CHR$(143)):LOCATE 1,3:PRINT STRIN
G$(20,CHR$(143))
230 PRINT CHR$(22)+CHR$(1):LOCATE 1,1
:PEN 9:PRINT STRING$(20,CHR$(169)):LO
CATE 1,2:PRINT STRING$(20,CHR$(170))
240 FOR f=1 TO 20 :LOCATE f,3:PRINT C
HR$(169):NEXT
250 PRINT CHR$(22)+CHR$(0):FOR f=3 TO
 18 STEP 2:PEN 4:LOCATE f,3:PRINT CHR
$(42):NEXT
260 RETURN
270 REM ******** print screen ******
280 PRINT CHR$(22)+CHR$(1)
290 FOR f=1 TO 20:FOR g=4 TO 23:IF m(
f,g)=2 THEN PEN 2:LOCATE f,g:PRINT CH
R$(143):PEN 5:LOCATE f,g:PRINT CHR$(2
33):GOTO 310
300 IF m(f,g)=1 THEN PEN 1:LOCATE f,g
:PRINT CHR$(38):PEN 6:LOCATE f,g:PRIN
```



REVENGE

By DAK
LONG LAU

VARIABLES

m( )	Screen map.
a( )	Ghosts' x coordinates.
b( )	Ghosts' y coordinates.
dr( )	Ghosts' direction.
n$	Highest scorer's name.
li	Lives.
gk	Number of ghosts killed.
pl	Number of pills transferred.
screen	Screen number.
x,y	Discman's coordinates.
sc	Score.
hi	Hi score.
pu	Block's direction.
dp	Discman's direction.
in	Random number.
ch%	Character on screen.
du	Flag
p1,p2	Block's coordinates.

PROGRAM STRUCTURE

40-170	Initialisation.
180-260	Read screen map data.
270-310	Construct screen.
320-560	Main loop.
570-890	Discman's movement.
900-1520	Move ghost.
1530-1670	Title.
1680-2120	Ice block movement and checks.
2130-2210	Reset ghosts.
2220-2280	Deduct life.
2290-2320	Kill ghosts.
2330-2350	Dead discman.
2360-2490	Enter hi score.
2500-2560	Complete screen.
2570-3450	Different screens.
3460-3550	Game over.

```
T CHR$(145)
310 NEXT:NEXT
320 REM ********** start game ******
330 PRINT CHR$(22)+CHR$(0):du=1:LOCAT
E 10,23:PEN 14:PRINT CHR$(231):m(10,2
3)=3:ch%=0
340 LOCATE 3,1:PEN 2:PRINT"GHOSTS KIL
LED 0"
350 PEN 12:LOCATE 1,25:PRINT"HI":LOCA
TE 9,25:PRINT "SC":LOCATE 1,24:PEN 1:
PRINT STRING$(20,"-")
360 LOCATE 4,25:PEN 3:PRINT hi:LOCATE
 12,25:PRINT sc:LOCATE 2,2
370 pu=0:dp=1:PEN 12:LOCATE 17,25:PRI
NT STRING$(li,"]")
380 a(1)=2:b(1)=10:a(2)=19:b(2)=10:dr
(1)=2:dr(2)=4
390 x=10:y=22:LOCATE x,y:PEN 1:PRINT"
{":LOCATE a(1),b(1):PEN 8:PRINT"@":LO
CATE a(2),b(2):PEN 8:PRINT"@"
400 IF INKEY(36)=0 OR JOY(0) AND 8 TH
EN GOSUB 570
410 ON pu GOSUB 1730,1850,1960,2080
420 IF INKEY(37)=0 OR JOY(0) AND 4 TH
EN GOSUB 660:GOTO 450
430 IF INKEY(69)=0 OR JOY(0) AND 1 TH
EN GOSUB 740:GOTO 450
440 IF INKEY(71)=0 OR JOY(0) AND 2 TH
EN GOSUB 820
450 ON pu GOSUB 1730,1850,1960,2080
460 IF (INKEY(47)=0 OR JOY(0)AND 16)
AND pu=0 THEN ON dp GOSUB 1680,1770,1
900,2010
470 in=INT(RND*6):p=1:ON dr(p) GOSUB
900,1070,1260,1400
480 IF INT(RND*350)=2 THEN h=INT(RND*
20)+1:i=INT(RND*20)+4:IF m(h,i)=1 OR
(h=x AND y=i) THEN 490 ELSE SOUND 1,2
50,60,5,5:m(h,i)=2:LOCATE h,i:PEN 2:P
RINT CHR$(143):PRINT CHR$(22)+CHR$(1)
:PEN 5:LOCATE h,i:PRINT CHR$(233):PRI
NT CHR$(22)+CHR$(0)
490 IF INKEY(36)=0 OR JOY(0) AND 8 TH
EN GOSUB 570
500 ON pu GOSUB 1730,1850,1960,2080
510 IF INKEY(37)=0 OR JOY(0) AND 4 TH
EN GOSUB 660:GOTO 540
520 IF INKEY(69)=0 OR JOY(0) AND 1 TH
EN GOSUB 740:GOTO 540
530 IF INKEY(71)=0 OR JOY(0) AND 2 TH
EN GOSUB 820
540 ON pu GOSUB 1730,1850,1960,2080
550 in=INT(RND*5):p=2:ON dr(p) GOSUB
900,1070,1260,1400
560 GOTO 400
570 REM ******* pac right **********
580 LOCATE x,y:PEN 1:PRINT"]":dp=2
590 IF x=20 THEN RETURN
600 IF m(x+1,y)=2 THEN RETURN
610 IF m(x+1,y)=1 THEN 2230
```

```
620 IF x+1=a(1) AND y=b(1) THEN 2230
630 IF x+1=a(2) AND y=b(2) THEN 2230
640 IF x+1=10 AND y=23 AND do=1 THEN
SOUND 4,286,45,0,4,4:INK 1,24,22:do=0
650 x=x+1:LOCATE x-1,y:PRINT" ]":RETU
RN
660 REM ******** pac left **********
670 LOCATE x,y:PEN 1:PRINT"[":dp=4:IF
 x=1 THEN RETURN
680 IF m(x-1,y)=2 THEN RETURN
690 IF m(x-1,y)=1 THEN 2220
700 IF x-1=a(1) AND y=b(1) THEN 2230
710 IF x-1=a(2) AND y=b(2) THEN 2230
720 IF x-1=10 AND y=23 AND do=1 THEN
SOUND 4,286,45,0,4,4:INK 1,24,22:do=0
730 x=x-1:LOCATE x,y:PRINT"[ ":RETURN
740 REM ********* man up ************
750 LOCATE x,y:PEN 1:PRINT"(":dp=1
760 IF m(x,y-1)=4 AND do=0 THEN SOUND
 1,164,150,1,2,2:PEN 14:LOCATE x,y-1:
PRINT CHR$(231):LOCATE 10,23:PRINT CH
R$(231):INK 1,24:do=1:pl=pl+1:PEN 3:m
(x,y-1)=0:sc=sc+10:LOCATE 12,25:PRINT
 sc:IF pl=8 AND gk>4 THEN 2500
770 IF y=4 OR m(x,y-1)=2 THEN RETURN
780 IF x=a(1) AND y-1=b(1) THEN 2220
790 IF x=a(2) AND y-1=b(2) THEN 2220
800 IF m(x,y-1)=1 THEN 2220
810 y=y-1:LOCATE x,y+1:PRINT" ":LOCAT
E x,y:PEN 1:PRINT"(":RETURN
820 REM ********** man down ********
830 LOCATE x,y:PEN 1:PRINT")":dp=3:IF
 y=23 THEN RETURN
840 IF m(x,y+1)=2 THEN RETURN
850 IF m(x,y+1)=1 THEN 2220
860 IF x=a(1) AND y+1=b(1) THEN 2220
870 IF x=a(2) AND y+1=b(2) THEN 2220
880 IF x=10 AND y+1=23 AND do=1 THEN
SOUND 4,286,45,0,4,4:INK 1,24,22:do=0
890 y=y+1:LOCATE x,y-1:PRINT" ":LOCAT
E x,y:PEN 1:PRINT")":RETURN
900 REM ********* ghost up **********
910 IF b(p)=4 OR in=1 THEN 1000
920 IF m(a(p),b(p)-1)=1  THEN 1000
930 IF a(p)=x AND b(p)-1=y THEN 2220
940 IF a(p)=p1 AND b(p)-1=p2 AND pu(>
0 THEN LOCATE a(p),b(p)-1:PRINT" ":m(
a(p),b(p)-1)=0:GOTO 2300
950 LOCATE a(p),b(p)
960 IF m(a(p),b(p))=2 THEN PEN 2:PRIN
T CHR$(143):PRINT CHR$(22)+CHR$(1):PE
N 5:LOCATE a(p),b(p):PRINT CHR$(233):
PRINT CHR$(22)+CHR$(0):GOTO 980
970 PRINT" "
980 b(p)=b(p)-1:LOCATE a(p),b(p):PEN
8:PRINT"@":RETURN
990 REM **** turn left or right ****
1000 IF a(p)>1 THEN 1020
1010 IF m(a(p)+1,b(p))=1 THEN dr(p)=3
:RETURN ELSE dr(p)=2:RETURN
1020 IF a(p)<20 THEN 1040
1030 IF m(a(p)-1,b(p))=1 THEN dr(p)=3
:RETURN ELSE dr(p)=4:RETURN
1040 IF m(a(p)+1,b(p))<>1 AND x>a(p)
THEN dr(p)=2:RETURN
1050 IF m(a(p)-1,b(p))<>1 THEN dr(p)=
4 ELSE dr(p)=2
1060 RETURN
1070 REM ******* ghost right ********
1080 IF in=1 OR a(p)=20 THEN 1180
1090 IF m(a(p)+1,b(p))=1 THEN 1180
1100 IF a(p)+1=10 AND b(p)=23 THEN 11
80
1110 IF a(p)+1=x AND b(p)=y THEN 2220
1120 IF a(p)+1=p1 AND b(p)=p2 AND pu(
>0 THEN LOCATE a(p)+1,b(p):PRINT" ":m
(a(p)+1,b(p))=0:GOTO 2300
1130 LOCATE a(p),b(p)
1140 IF m(a(p),b(p))=2 THEN PEN 2:PRI
NT CHR$(143):PRINT CHR$(22)+CHR$(1):P
EN 5:LOCATE a(p),b(p):PRINT CHR$(233)
:PRINT CHR$(22)+CHR$(0):GOTO 1160
1150 PRINT" "
1160 a(p)=a(p)+1:LOCATE a(p),b(p):PEN
 8:PRINT"@":RETURN
1170 REM ** move ghost up or down **
1180 IF b(p)>4 THEN 1200
1190 IF m(a(p),b(p)+1)=1 THEN dr(p)=4
:RETURN ELSE dr(p)=3:RETURN
1200 IF b(p)<23 THEN 1220
1210 IF m(a(p),b(p)-1)=1 THEN dr(p)=4
:RETURN ELSE dr(p)=1:RETURN
1220 IF m(a(p),b(p)-1)<>1 AND b(p)>y
THEN dr(p)=1:RETURN
1230 IF m(a(p),b(p)+1)<>1 THEN dr(p)=
3:RETURN ELSE dr(p)=1:RETURN
1240 RETURN
1250 REM ****** ghost down **********
1260 IF b(p)=23 OR in=1 THEN 1350
1270 IF m(a(p),b(p)+1)=1 THEN 1350
1280 IF a(p)=10 AND b(p)+1=23 THEN 13
50
1290 IF a(p)=x AND b(p)+1=y THEN 2220
1300 IF a(p)=p1 AND b(p)+1=p2 AND pu(
>0 THEN LOCATE a(p),b(p)+1:PRINT" ":m
(a(p),b(p)+1)=0:GOTO 2300
1310 LOCATE a(p),b(p)
1320 IF m(a(p),b(p))=2 THEN PEN 2:PRI
NT CHR$(143):PRINT CHR$(22)+CHR$(1):P
EN 5:LOCATE a(p),b(p):PRINT CHR$(233)
:PRINT CHR$(22)+CHR$(0):GOTO 1340
1330 PRINT" "
1340 b(p)=b(p)+1:LOCATE a(p),b(p):PEN
 8:PRINT"@":RETURN
1350 IF a(p)>1 THEN 1370
1360 IF m(a(p)-1,b(p))=1 THEN dr(p)=1
:RETURN ELSE dr(p)=2:RETURN
1370 IF a(p)<20 THEN 1040
1380 IF m(a(p)-1,b(p))=1 THEN dr(p)=1
:RETURN ELSE dr(p)=4:RETURN
1390 REM ****** ghost left *********
1400 IF in=1 OR a(p)=1 THEN 1490
1410 IF m(a(p)-1,b(p))=1 THEN 1490
1420 IF a(p)-1=10 AND b(p)=23 THEN 14
90
1430 IF a(p)-1=x AND b(p)=y THEN 2220
1440 IF a(p)-1=p1 AND b(p)=p2 AND pu(
>0 THEN LOCATE a(p)-1,b(p):PRINT" ":m
(a(p)-1,b(p))=0:GOTO 2300
1450 LOCATE a(p),b(p)
1460 IF m(a(p),b(p))=2 THEN PEN 2:PRI
NT CHR$(143):PRINT CHR$(22)+CHR$(1):P
EN 5:LOCATE a(p),b(p):PRINT CHR$(233)
:PRINT CHR$(22)+CHR$(0):GOTO 1480
1470 PRINT" "
1480 a(p)=a(p)-1:LOCATE a(p),b(p):PEN
 8:PRINT"@":RETURN
1490 IF b(p)>4 THEN 1510
1500 IF m(a(p),b(p)+1)=1 THEN dr(p)=2
:RETURN ELSE dr(p)=3:RETURN
1510 IF b(p)<23 THEN 1230
1520 IF m(a(p),b(p)-1)=1 THEN dr(p)=2
:GOTO 1230 ELSE dr(p)=1:RETURN
1530 REM ******** title  ***********
1540 INK 1,24:INK 2,20:INK 3,6:INK 4,
18:INK 5,26:INK 8,18:INK 6,2:INK 0,3:
BORDER 10:MODE 0:INK 10,15:INK 9,13
1550 LOCATE 1,3:PEN 1:PRINT"  DISCMAN
'S REVENGE"
1560 sc=0
1570 screen=1
1580 PEN 4:PRINT:PRINT:PRINT:PRINT"
A-Up       Z-Down":PRINT:PRINT"  K-Lef
t    L-Right"
1590 PRINT:PEN 5:PRINT:PRINT"  Spaceb
ar  to kick":PEN 6:PRINT:PRINT:PRINT"
  or use a joystick"
1600 PEN 7:PRINT:PRINT:PRINT"Press a
key . . ."
1610 FOR f=1 TO 20:a$=INKEY$:NEXT
1620 FOR F=1 TO 19:IF INKEY$<>"" THEN
 1670
1630 PEN 2:LOCATE f,24:PRINT CHR$(231
);:PEN 10:PRINT"]":FOR g=1 TO 50:NEXT
:NEXT
1640 FOR f=19 TO 1 STEP -1:IF INKEY$<
>""THEN 1670
1650 LOCATE f,24:PRINT"[ ":FOR g=1 TO
 50:NEXT:NEXT
1660 GOTO 1620
1670 PRINT:PRINT:PEN 1:PRINT"HI SCORE
:";HI:PEN 2:PRINT:PRINT"          BY "
;n$:FOR f=1 TO 5000:NEXT:GOTO 160
1680 REM ******* push u, *********
1690 IF m(x,y-1)<>2 OR m(x,y-2)=1 THE
N RETURN
1700 IF m(x,y-2)=2 OR y=5 THEN LOCATE
```

```
 x,y-1:SOUND 4,0,65,0,6,0,5:PEN 2:PRI
NT CHR$(171):FOR f=1 TO 40:NEXT:LOCAT
E x,y-1:m(x,y-1)=0:PRINT" ":RETURN
1710 SOUND 1,140,10,7,0,0,8:pu=1:p1=x
:p2=y-1:m(p1,p2)=0
1720 REM ****** push block up ******
1730 IF m(p1,p2-1)=2 OR m(p1,p2-1)=1
OR p2=4 THEN pu=0:m(p1,p2)=2:LOCATE p
1,p2:PEN 2:PRINT"#":PRINT CHR$(22)+CH
R$(1):PEN 5:LOCATE p1,p2:PRINT CHR$(2
33):PRINT CHR$(22)+CHR$(0):p1=0:RETUR
N
1740 IF p1=a(1) AND p2-1=b(1) THEN a=
1:GOTO 2140
1750 IF p1=a(2) AND p2-1=b(2) THEN a=
2:GOTO 2140
1760 p2=p2-1:LOCATE p1,p2+1:PRINT" ":
LOCATE p1,p2:PEN 2:PRINT"#":RETURN
1770 REM ******* push r. **********
1780 IF x=20 THEN RETURN
1790 IF m(x+1,y)<>2 THEN RETURN
1800 IF x=19 THEN LOCATE x+1,y:SOUND
4,0,65,0,6,0,5:PEN 2:PRINT CHR$(171):
FOR f=1 TO 40:NEXT:p1=0:LOCATE x+1,y:
m(x+1,y)=0:PRINT" ":RETURN
1810 IF m(x+2,y)=2 OR (x+2=10 AND y=2
3) THEN LOCATE x+1,y:SOUND 4,0,65,0,6
,0,5:PEN 2:PRINT CHR$(171):FOR f=1 TO
 40:NEXT:p1=0:LOCATE x+1,y:m(x+1,y)=0
:PRINT" ":RETURN
1820 IF m(x+2,y)=1 THEN RETURN
1830 SOUND 1,140,10,7,0,0,8:pu=2:p1=x
+1:p2=y:m(p1,p2)=0
1840 REM ***** push block right ****
1850 IF p1=20 THEN pu=0:m(p1,p2)=2:LO
CATE p1,p2:PEN 2:PRINT"#":PRINT CHR$(
22)+CHR$(1):PEN 5:LOCATE p1,p2:PRINT
CHR$(233):PRINT CHR$(22)+CHR$(0):p1=0
:RETURN
1860 IF m(p1+1,p2)=2 OR m(p1+1,p2)=1
OR (p1+1=10 AND p2=23) THEN pu=0:m(p1
,p2)=2:LOCATE p1,p2:PEN 2:PRINT"#":PR
INT CHR$(22)+CHR$(1):PEN 5:LOCATE p1,
p2:PRINT CHR$(233):PRINT CHR$(22)+CHR
$(0):p1=0:RETURN
1870 IF p1+1=a(1) AND p2=b(1) THEN a=
1:GOTO 2150
1880 IF p1+1=a(2) AND p2=b(2) THEN a=
2:GOTO 2150
1890 p1=p1+1:LOCATE p1-1,p2:PRINT" ":
LOCATE p1,p2:PEN 2:PRINT"#":RETURN
1900 REM ******** push d. **********
1910 IF m(x,y+1)<>2 THEN RETURN
1920 IF m(x,y+2)=2 OR y=22 OR (x=10 A
ND y+2=23) THEN LOCATE x,y+1:SOUND 4,
0,65,0,6,0,5:PEN 2:PRINT CHR$(171):FO
R f=1 TO 40:NEXT:p1=0:LOCATE x,y+1:m(
x,y+1)=0:PRINT" ":RETURN
1930 IF m(x,y+2)=1 THEN RETURN
```

```
1940 SOUND 1,140,10,7,0,0,8:pu=3:p1=x
:p2=y+1:m(p1,p2)=0
1950 REM ****** push block down ****
1960 IF p2=23 THEN pu=0:m(p1,p2)=2:LO
CATE p1,p2:PEN 2:PRINT"#":PRINT CHR$(
22)+CHR$(1):PEN 5:LOCATE p1,p2:PRINT
CHR$(233):PRINT CHR$(22)+CHR$(0):p1=0
:RETURN
1970 IF m(p1,p2+1)=2 OR m(p1,p2+1)=1
OR (p1=10 AND p2+1=23) THEN pu=0:m(p1
,p2)=2:LOCATE p1,p2:PEN 2:PRINT"#":PR
INT CHR$(22)+CHR$(1):PEN 5:LOCATE p1,
p2:PRINT CHR$(233):PRINT CHR$(22)+CHR
$(0):p1=0:RETURN
1980 IF p1=a(1) AND p2+1=b(1) THEN a=
1:GOTO 2160
1990 IF p1=a(2) AND p2+1=b(2) THEN a=
2:GOTO 2160
2000 p2=p2+1:LOCATE p1,p2-1:PRINT" ":
LOCATE p1,p2:PEN 2:PRINT"#":RETURN
2010 REM ******** push l. **********
2020 IF m(x-1,y)<>2 THEN RETURN
2030 IF x=2 THEN LOCATE x-1,y:SOUND 4
,0,65,0,6,0,5:PEN 2:PRINT CHR$(171):F
OR f=1 TO 40:NEXT:LOCATE x-1,y:m(x-1,
y)=0:p1=0:PRINT" ":RETURN
2040 IF m(x-2,y)=2 OR m(x-2,y)=1 OR (
x-2=10 AND y=23)THEN LOCATE x-1,y:SOU
ND 4,0,65,0,6,0,5:PEN 2:PRINT CHR$(17
1):FOR f=1 TO 40:NEXT:LOCATE x-1,y:m(
x-1,y)=0:PRINT" ":p1=0:RETURN
2050 IF m(x-1,y)=1 THEN RETURN
2060 SOUND 1,140,10,7,0,0,8:pu=4:p1=x
-1:p2=y:m(p1,p2)=0
2070 REM ****** push block left ****
2080 IF p1=1 THEN pu=0:m(p1,p2)=2:LOC
ATE p1,p2:PEN 2:PRINT"#":PRINT CHR$(2
2)+CHR$(1):PEN 5:LOCATE p1,p2:PRINT C
HR$(233):PRINT CHR$(22)+CHR$(0):RETUR
N
2090 IF m(p1-1,p2)=2 OR m(p1-1,p2)=1
OR (p1-1=10 AND P2=23) THEN pu=0:m(p1
,p2)=2:LOCATE p1,p2:PEN 2:PRINT"#":PR
INT CHR$(22)+CHR$(1):PEN 5:LOCATE p1,
p2:PRINT CHR$(233):PRINT CHR$(22)+CHR
$(0):P1=0:RETURN
2100 IF p1-1=a(1) AND p2=b(1) THEN a=
1:GOTO 2170
2110 IF p1-1=a(2) AND p2=b(2) THEN a=
2:GOTO 2170
2120 p1=p1-1:LOCATE p1+1,p2:PRINT" ":
LOCATE p1,p2:PEN 2:PRINT"#":RETURN
2130 REM ******* reset ghosts ******
2140 SOUND 4,0,65,0,6,0,5:pu=0:m(p1,p
2)=0:LOCATE p1,p2:PRINT" ":LOCATE p1,
p2-1:PEN 2:PRINT CHR$(171):FOR f=1 TO
 40:NEXT:LOCATE p1,p2-1:PRINT" ":GOTO
 2180
2150 SOUND 4,0,65,0,6,0,5:pu=0:m(p1,p
2)=0:LOCATE p1,p2:PRINT" ":LOCATE p1+
1,p2:PEN 2:PRINT CHR$(171):FOR f=1 TO
 40:NEXT:LOCATE p1+1,p2:PRINT" ":GOTO
 2180
2160 SOUND 4,0,65,0,6,0,5:pu=0:m(p1,p
2)=0:LOCATE p1,p2:PRINT" ":LOCATE p1,
p2+1:PEN 2:PRINT CHR$(171):FOR f=1 TO
 40:NEXT:LOCATE p1,p2+1:PRINT" ":GOTO
 2180
2170 SOUND 4,0,65,0,6,0,5:pu=0:m(p1,p
2)=0:LOCATE p1,p2:PRINT" ":LOCATE p1-
1,p2:PEN 2:PRINT CHR$(171):FOR f=1 TO
 40:NEXT:LOCATE p1-1,p2:PRINT" "
2180 a(a)=20:b(a)=4:p1=0
2190 gk=gk+1:LOCATE 16,1:PEN 1:PRINT
gk:sc=sc+5:PEN 3:LOCATE 12,25:PRINT s
c
2200 IF p1=8 AND gk>4 THEN 2500
2210 RETURN
2220 REM ****** deduct life ********
2230 SOUND 2,100,190,7,0,3:INK 2,20,1
5:INK 8,8,2:INK 0,0,3:PRINT CHR$(22)+
CHR$(1):PEN 5:IF pu<>0 THEN LOCATE p1
```

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,p2:PRINT CHR$(233)
2240 PRINT CHR$(22)+CHR$(0):p1=0
2250 FOR f=1 TO 2:LOCATE a(f),b(f):IF
 m(a(f),b(f))=0 THEN PRINT" ":GOTO 22
70
2260 IF m(a(f),b(f))=2 THEN PEN 2:PRI
NT CHR$(22)+CHR$(1):LOCATE a(f),b(f):
PRINT CHR$(143):PEN 5:LOCATE a(f),b(f
):PRINT CHR$(233):PRINT CHR$(22)+CHR$
(0) ELSE PEN 14:PRINT CHR$(231)
2270 NEXT:FOR f=1 TO 2499:NEXT:INK 2,
20:INK 8,18:INK 0,3:LOCATE x,y:PRINT"
 "
2280 li=li-1:LOCATE 17,25:PRINT"   ":
IF li=0 THEN 2330 ELSE 370
2290 REM *****ghost killed **********
2300 SOUND 4,0,65,0,6,0,5:LOCATE a(p)
,b(p):PEN 2:PRINT CHR$(171):p1=0:pu=0
:qa=a(p):qb=b(p):IF p=1 THEN a(1)=20:
b(1)=4 ELSE a(2)=20:b(2)=4
2310 FOR f=1 TO 30:NEXT
2320 LOCATE qa,qb:PRINT" ":gk=gk+1:LO
CATE 16,1:PEN 1:PRINT gk:sc=sc+5:PEN
3:LOCATE 12,25:PRINT sc:GOTO 2200
2330 REM ***** pac died **************
2340 FOR f=1 TO 25:LOCATE 1,1:PRINT C
HR$(11):SOUND 1,f*2,2:NEXT
2350 IF sc>hi THEN 2360 ELSE 1540
2360 REM ****** enter name **********
2370 FOR f=1 TO 100:k$=INKEY$:NEXT
2380 CLS:n$="":PEN 1:PRINT:PRINT:PRIN
T" ENTER YOUR NAME"
2390 PEN 4:LOCATE 7,8:PRINT STRING$(8
,CHR$(208))
2400 LOCATE 1,18:PEN 3:PRINT" Your s
core is";sc
2410 f=8:WHILE f<14:f=f+1
2420 IF INKEY(18)=0 THEN 2490
2430 j$=INKEY$:IF j$=""THEN 2430
2440 IF j$=CHR$(127) AND f>7 THEN f=f
-1:LOCATE f,7:PRINT " ";:n$=LEFT$(n$,
LEN(n$)-1):SOUND 1,30,5,4:f=f-1:GOTO
2480
2450 IF j$<CHR$(127) THEN f=6:GOTO 24
80
2460 PEN 2:LOCATE f,7:PRINT UPPER$(j$
)
2470 SOUND 1,f*5,5,4:n$=n$+j$
2480 WEND
2490 n$=UPPER$(n$):hi=sc:GOTO 1540
2500 REM ****** screen finished *****
2510 SOUND 1,284,400,1,1,1:INK 0,3,1:
FOR f=1 TO 6990:NEXT:INK 0,3:FOR f=1
TO 25:LOCATE 1,1:PRINT CHR$(11):SOUND
 1,f*5,1,4:NEXT:MODE 1
2520 LOCATE 11,10:PRINT" *** Well don
e. ***"
2530 screen=screen+1:IF screen=6 THEN
 3470
2540 PEN 2:PRINT:PRINT:PRINT"      Yo
u are now going on screen";screen
2550 FOR f=1 TO 6000:NEXT
2560 INK 1,24:gk=0:p1=0:MODE 0:GOTO 1
70
2570 REM ******** screen 1 **********
2580 REM ******* set blocks *********
2590 FOR f=3 TO 6:m(f,5)=2:m(f+6,5)=2
:m(f+12,5)=2:m(f-1,11)=2
2600 m(f+13,11)=2:m(f+1,17)=2:m(f+11,
17)=2:m(f-1,20)=2:m(f+13,20)=2:m(f+6,
16)=2
2610 m(f+2,22)=2:m(f+13,22)=2
2620 NEXT
2630 FOR f=8 TO 10:m(f,9)=2:m(f+3,9)=
2:m(f-1,11)=2:m(f+4,11)=2
2640 m(f-7,14)=2:m(f+10,14)=2:m(f-6,2
2)=2:m(f+5,22)=2
2650 NEXT
2660 m(3,13)=2:m(4,13)=2:m(17,13)=2:m
(18,13)=2:m(10,20)=2:m(11,20)=2
2670 FOR f=5 TO 8:m(2,f)=2:m(19,f)=2:
m(5,f+3)=2:m(16,f+3)=2:m(7,f+6)=2:m(1
4,f+6)=2
2680 m(2,f+11)=2:m(19,f+11)=2:m(7,f+1
2)=2:m(14,f+12)=2
2690 NEXT
2700 REM **** set stinging plants **
2710 RESTORE 2730:FOR f=1 TO 22:READ
a,b:m(a,b)=1:NEXT
2720 RETURN
2730 DATA 8,5,13,5,7,7,10,7,11,7,14,7
,3,10,18,10,9,13,10,13,11,13,12,13
2740 DATA 5,15,16,15,9,18,12,18,5,19,
16,19,8,20,13,20,4,23,17,23
2750 REM ****** screen 2 ***********
2760 REM ******* set blocks ********
2770 FOR f=6 TO 9:m(f,4)=2:m(f+6,4)=2
:m(f+3,9)=2:m(f-4,12)=2:m(f+10,12)=2
2780 m(f-1,16)=2:m(f+7,16)=2:m(f+3,18
)=2:m(f-4,23)=2:m(f+10,23)=2
2790 NEXT
2800 FOR f=6 TO 8:m(f,6)=2:m(f+7,6)=2
:m(f-5,10)=2:m(f-2,10)=2:m(f+9,10)=2:
m(f+12,10)=2
2810 m(f+2,13)=2:m(f+5,13)=2:m(f-5,20
)=2:m(f+12,20)=2:NEXT
2820 FOR f=4 TO 8:m(3,f)=2:m(18,f)=2:
m(5,f+8)=2:m(16,f+8)=2
2830 m(3,f+11)=2:m(18,f+11)=2:m(6,f+1
4)=2:m(15,f+14)=2:NEXT
2840 RESTORE 2850:FOR f=1 TO 10:READ
a,b:m(a,b)=2:NEXT
2850 DATA 2,8,6,7,6,8,15,7,15,8,19,8,
3,20,18,20,6,23,15,23
2860 REM **** set stinging plants **
2870 RESTORE 2880:FOR f=1 TO 20:READ
a,b:m(a,b)=1:NEXT
2880 DATA 5,5,16,5,10,6,11,6,8,11,10,
11,11,11,13,11,1,14,20,14
2890 DATA 10,15,11,15,5,19,16,19,9,20
,12,20,4,21,17,21,7,22,14,22
2900 RETURN
2910 REM ****** screen 3 ***********
2920 REM ****** set blocks *********
2930 FOR f=5 TO 9:m(f,5)=2:m(f+7,5)=2
:m(f-4,7)=2:m(f+4,7)=2:m(f+11,7)=2
2940 m(f-1,10)=2:m(f+8,10)=2:m(f-3,22
)=2:m(f+10,22)=2
2950 NEXT
2960 FOR f=1 TO 4:m(f,12)=2:m(f+16,12
)=2:m(f+4,15)=2:m(f+8,15)=2:m(f+12,15
)=2
2970 m(f+4,20)=2:m(f+12,20)=2:NEXT
2980 FOR f=15 TO 18:m(2,f)=2:m(8,f)=2
:m(13,f)=2:m(19,f)=2
2990 m(5,f+2)=2:m(16,f+2)=2:NEXT
3000 RESTORE 3010:FOR f=1 TO 21:READ
a,b:m(a,b)=2:NEXT
3010 DATA 8,7,4,11,17,11,7,12,8,12,9,
12,7,13,12,12,13,12,14,12,14,13,1,19,
20,7,2,19,19,19,20,19,7,22,7,23,14,22
,14,23
3020 REM *** set stinging plants ****
3030 RESTORE 3050:FOR f=1 TO 24:READ
a,b:m(a,b)=1:NEXT
3040 RETURN
3050 DATA 2,5,4,5,10,5,11,5,17,5,19,5
,7,8,14,8,4,9,17,9,10,10,11,10
3060 DATA 10,14,11,14,4,16,17,16,9,17
,12,17,10,19,11,19,3,20,18,20,6,23,15
,23
3070 REM ******* screen 4 **********
3080 REM **** set blocks ***********
3090 FOR f=3 TO 7:m(f,4)=2:m(f+11,4)=
2:m(f+2,6)=2:m(f+9,6)=2:m(f+6,9)=2
3100 m(f-2,11)=2:m(f+13,11)=2:m(f+2,1
5)=2:m(f+9,15)=2:m(f+2,17)=2:m(f+9,17
)=2
3110 m(f-2,21)=2:m(f+13,21)=2:m(f-1,2
3)=2:m(f+12,23)=2:NEXT
3120 FOR f=10 TO 11:m(f,4)=2:m(f,17)=
2:m(f-2,19)=2:m(f+2,19)=2
3130 m(f-3,23)=2:m(f+3,23)=2:NEXT
3140 FOR f=4 TO 9:m(2,f)=2:m(19,f)=2:
m(5,f+2)=2:m(16,f+2)=2:m(3,f+9)=2
3150 m(18,f+9)=2:NEXT
3160 FOR f=9 TO 11:m(8,f)=2:m(13,f)=2
:m(5,f+4)=2:m(16,f+4)=2
3170 m(5,f+9)=2:m(16,f+9)=2:m(8,f+11)
=2:m(13,f+11)=2:NEXT
3180 REM *** set stinging plants ***
3190 RESTORE 3210:FOR f=1 TO 34:READ
a,b:m(a,b)=1:NEXT
3200 RETURN
3210 DATA 8,5,9,5,12,5,13,5,1,6,4,6,1
7,6,20,6,10,8,11,8,3,9,18,9
3220 DATA 6,10,7,10,14,10,15,10,10,11
```

```
,11,11,9,13,12,13,1,14,20,14
3230 DATA 10,15,11,15,2,17,19,17,10,1
8,11,18,7,20,14,20,9,21,12,21,6,23,15
,23
3240 REM ******* screen 5 **********
3250 REM **** set blocks ***********
3260 FOR f=2 TO 5:m(f,5)=2:m(f+7,5)=2
:m(f+14,5)=2:m(f+2,7)=2:m(f+12,7)=2
3270 m(f-1,11)=2:m(f+15,11)=2:m(f+4,1
5)=2:m(f+10,15)=2:m(f+5,17)=2:m(f+9,1
7)=2
3280 m(f-1,21)=2:m(f+15,21)=2:m(f+3,2
3)=2:m(f+11,23)=2:m(f+10,9)=2
3290 m(f+5,20)=2:m(f+9,20)=2
3300 NEXT
3310 FOR f=2 TO 4:m(f,9)=2:m(f+4,9)=2
:m(f+7,9)=2:m(f+15,9)=2
3320 m(f+6,11)=2:m(f+9,11)=2:m(f+1,13
)=2:m(f+4,13)=2:m(f+13,13)=2:m(f+14,1
3)=2
3330 m(f-1,17)=2:m(f+16,17)=2:m(f,23)
=2:m(f+15,23)=2:m(f+11,13)=2:NEXT
3340 FOR f=5 TO 7:m(2,f)=2:m(7,f)=2:m
(14,f)=2:m(19,f)=2
3350 m(6,f+4)=2:m(15,f+4)=2:m(1,f+8)=
2:m(20,f+8)=2:m(3,f+9)=2:m(18,f+9)=2
3360 m(5,f+10)=2:m(16,f+10)=2:m(5,f+1
4)=2:m(16,f+14)=2:NEXT
3370 RESTORE 3380:FOR f=1 TO 6:READ a
,b:m(a,b)=2:NEXT
3380 DATA 10,7,11,7,4,8,17,8,1,12,20,
12
3390 REM *** set stinging plants ***
3400 RESTORE 3410:FOR f=1 TO 41:READ
a,b:m(a,b)=1:NEXT
3410 DATA 4,4,6,4,8,4,10,4,12,4,14,4,
16,4,1,5,20,5,9,7,12,7,2,8,19,8
3420 DATA 5,10,10,10,11,10,16,10,7,12
,14,12,2,13,9,13,12,13,19,13,4,18,17,
18
3430 DATA 1,19,3,19,7,19,8,19,10,19,1
1,19,13,19,14,19,18,19,20,19
3440 DATA 6,21,15,21,8,22,13,22,4,23,
17,23
3450 RETURN
3460 REM *** end of game ***
3470 MODE 1:PEN 1:LOCATE 16,10:PRINT"
EXCELLENT!":PRINT:PRINT"    You have
completed the whole game."
3480 PRINT:PEN 2:PRINT"          Score
 = score * 1.5"
3490 sc=sc*1.5
3500 FOR f=1 TO 8000:NEXT
3510 MODE 0:GOTO 2370
3520 MODE 0:PRINT CHR$(22)+CHR$(1):PE
N 1:LOCATE 10,10:PRINT CHR$(233):PEN
6:LOCATE 10,10:PRINT"@"
3530 LOCATE 10,10:ch%=0:CALL &A000,@c
h%:PRINT ch%
3540 ch%=0:MODE 0:x=10:y=10
3550 LOCATE x,y:PEN 2:PRINT"@":PEN 1:
LOCATE x,y:CALL &A000,@ch%:PRINT:PRIN
T ch%
```

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WORD SQUARE

HAVE you ever attempted to solve a word square? I'd be very surprised if your reply is No. People spend hours and hours of their spare time trying to find words among a jumble of letters. The craze is so big that millions of magazines crammed with the mind-boggling puzzles have been sold.

Wouldn't it be fun if you could use your Amstrad to design your own word squares? And think of the money you'd save if you swopped your creations with friends. That's why we've come up with a word square designer.

Actually we've only given you the framework – before you can use it you must add several DATA lines to the end of the program. The first of these must contain the dimensions of the word square – width followed by height. Therefore, the line below indicates that the square is 12 characters wide by 14 high.

```
5010 DATA 12,14
```

As we're using Mode 1, the maximum size of word square allowed is 14 by 23 – perfectly suitable for most cases.

The other DATA lines required contain the words which are going to be hidden in the word square. The end of this list is terminated by the word THEEND – no space in the middle.

Try adding the following lines to the program:

```
5000 REM width,height
5010 DATA 14,14
5020 REM the words
5030 DATA PRINT,GOTO,PROC
5040 DATA GOSUB,ADVAL,PLOT
5050 DATA THEEND
```

Once all the relevant information has been included in the program you can RUN it. This will display a box at the left side of the screen and the words to the right of it.

DAVID McLACHLAN has created an easy to use way of designing those infuriating puzzles

VARIABLES

xs	X-location start position.
ys	Y-location start position.
x	Current x location.
y	Current y location.
xd	X direction of word.
yd	Y direction of word.
num	Word counter.
xx	Grid width.
yy	Grid height.
k$	Last key pressed.
f	Copy key flag.
ff	Incorrect overprinting flag.
flag	'Printing outside grid' flag.
word$()	Word array.

At the top left of the box is a solid block. This is the cursor which you move using the corresponding cursor arrow keys.

The first word in the list must now be placed in the box. All you do is move the cursor to a suitable position and press the Copy key. This indicates where the first letter of the word will be.

A real block is printed above your list of words showing that the start position has been given.

Next move the cursor in the direction you want the word to go. For example, move down one row if you want the word down the screen. The program allows you to place a word in any of the possible eight directions – N, NE, E, SE and so on – thus permitting vertical, horizontal, diagonal and reverse words.

When a valid position has been selected the word is displayed in the box and an asterisk is placed by the word at the right hand side of the screen, indicating that it has been used.

There are two points which must be noted.

The first concerns words near the edges of the box. All the letters in the word must be within the box. If you

try to position a word in which letters will be outside the box, a beep CHR$(7) will be generated. The word is not accepted under these circumstances.

The second point concerns overlapping words. If a word is going to overlap with another, the character(s) where the two intercept must be identical. Again, if an invalid entry is made a beep will occur.

Once all the words have been set up the blank spaces are filled with random letters – in a different colour to the hidden words. You are now asked if you want a print output. If your reply is Y the word square is printed out.

This printout can now be marked with the solution for later reference. If you don't have access to a printer you can make a list of the start positions of the words.

The next question asks you if you want to save the word square data. Responding with Y saves the data to disc or tape. The word square data files can be loaded and solved using the word square solver which will be listed next month. This allows you to build up a library of word square puzzles for solution by a friend or yourself.

Anyway, that's enough about the program. Now you can start designing your own word squares.

Happy puzzling.

```
10 REM wordsquare editor
20 REM(c) Computing with the Amstrad
30 REM David McLachlan
40 REM Idea by Kevin Edwards
50 MODE 1
60 PAPER 0:CLS
70 GOSUB 200:REM init
80 GOSUB 440:REM set up
90 WHILE num<>number-1
100 GOSUB 570:REM get key
110 WEND
120 GOSUB 950:REM fill
130 LOCATE 1,20:PRINT"Do you want a p
rint out (Y/N)"
140 k$="":WHILE k$<>"N" AND k$<>"Y":k
$=INKEY$:k$=UPPER$(k$):WEND
150 IF k$="Y" THEN GOSUB 1000:REM pri
nt-out
160 LOCATE 1,22:PRINT"Do you want to
save data (Y/N)"
170 k$="":WHILE k$<>"N" AND k$<>"Y":k
$=INKEY$:k$=UPPER$(k$):WEND
180 IF k$="Y" THEN GOSUB 1090:REM sav
e data
190 END
200 REM **** init ****
210 false=0:true=-1
220 ON ERROR GOTO 250
230 !DISC
240 disc=true:GOTO 260
250 disc=false
260 READ xx,yy
270 IF xx>14 THEN PRINT"Sorry only 14
 in width please":END
280 IF yy>23 THEN PRINT"Sorry only 23
 in height please":END
```


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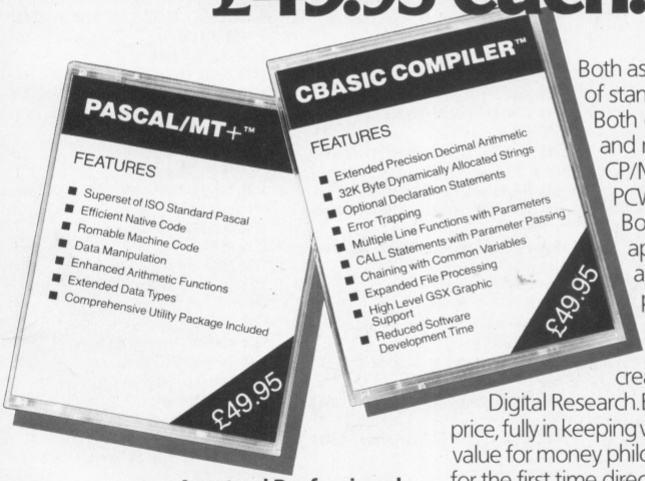

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WORD SQUARE

```
290 DIM grid$(xx+2,yy+2)
300 FOR loop=1 TO xx+1:FOR loop2=1 TO
 yy+1:grid$(loop,loop2)=CHR$(32):NEXT
:NEXT
310 IF xx>=yy THEN largest=xx ELSE IF
 yy>xx THEN largest=yy
320 DIM word$(30)
330 number=0
340 WHILE word$<>"THEEND"
350 READ word$:word$=UPPER$(word$)
360 IF LEN(word$))15 THEN PRINT word$
;" to large":END
370 IF LEN(word$))largest AND word$<>
"THEEND" THEN PRINT word$;" will not
fit in grid":END
380 word$(number)=word$
390 number=number+1
400 WEND
410 x=2:y=2:f=0:ys=y:xs=x
420 num=0
430 RETURN
440 REM **** set up ****
450 CLS
460 PEN 1
470 PRINT STRING$(xx+2,CHR$(207))
480 FOR loop=2 TO yy+2
490 LOCATE 1,loop:PRINT CHR$(207):LOC
ATE xx+2,loop:PRINT CHR$(207)
500 NEXT
510 LOCATE 1,yy+2:PRINT STRING$(xx+2,
CHR$(207))
520 FOR loop=0 TO number-2
530 LOCATE 25,loop+2:PRINT word$(loop
):NEXT
540 LOCATE 2,2:PRINT CHR$(233)
550 GOSUB 900
560 RETURN
570 REM **** get key ****
580 CALL &BFF9,&C9,&ICED,&CF00
590 k$="":WHILE k$="":k$=INKEY$:WEND
600 PEN 1:LOCATE x,y:PRINT grid$(x,y)
610 k$=UPPER$(k$)
620 IF k$=CHR$(240) THEN y=y-1
630 IF k$=CHR$(241) THEN y=y+1
640 IF k$=CHR$(242) THEN x=x-1
650 IF k$=CHR$(243) THEN x=x+1
660 IF k$=CHR$(224) AND f=1 THEN f=2:
PEN 3:LOCATE 23,1:PRINT CHR$(233):GOS
UB 1220:REM check
670 IF flag=1 THEN flag=0:f=0:LOCATE
22,1:PRINT SPACE$(2):PRINT CHR$(7):RE
TURN
680 IF k$=CHR$(224) AND f=0 THEN xs=x
:ys=y:PEN 3:LOCATE 22,1:PRINT CHR$(23
3):f=1
690 IF x=xx+2 THEN x=2 ELSE IF y=yy+2
 THEN y=2
700 IF x=1 THEN x=xx+1 ELSE IF y=1 TH
EN y=yy+1
710 PEN 1:LOCATE x,y:PRINT CHR$(233)
720 IF f=2 THEN f=0:GOSUB 740:LOCATE
1,1:PRINT CHR$(22);CHR$(0):LOCATE 22,
1:PRINT SPACE$(2):GOSUB 900:REM move
star
730 RETURN
740 REM **** print word ****
750 xd=SGN(x-xs):yd=SGN(y-ys):xp=xs:y
p=ys
760 FOR loop=1 TO LEN(word$(num))
770 IF grid$(xp,yp)<>CHR$(32) AND gri
d$(xp,yp)<>MID$(word$(num),loop,1) TH
EN ff=1
780 xp=xp+xd
790 yp=yp+yd
800 NEXT
810 IF ff=1 THEN ff=0:PRINT CHR$(7):G
OTO 890
820 xd=SGN(x-xs):yd=SGN(y-ys):xp=xs:y
p=ys
830 FOR loop=1 TO LEN(word$(num))
840 LOCATE xp,yp:PRINT MID$(word$(num
),loop,1)
850 grid$(xp,yp)=MID$(word$(num),loop
,1)
860 xp=xp+xd:yp=yp+yd
870 NEXT
880 num=num+1
890 RETURN
900 REM **** move arrow ****
910 IF num=0 THEN 930
920 PEN 2:LOCATE 23,num+1:PRINT CHR$(
42)
930 PEN 1:LOCATE 23,num+2:PRINT CHR$(
243)
940 RETURN
950 REM **** fill ****
960 FOR loop1=2 TO xx+1:FOR loop2=2 T
O yy+1
970 IF ASC(grid$(loop1,loop2))<65 OR
ASC(grid$(loop1,loop2))>90 THEN a$=CH
R$(INT((RND*25)+65)):grid$(loop1,loop
2)=a$:PEN 3:LOCATE loop1,loop2:PRINT
a$
980 NEXT:NEXT
990 RETURN
1000 REM **** print out ****
1010 FOR loop2=2 TO yy+1
1020 b$=""
1030 FOR loop1=2 TO xx+1
1040 b$=b$+grid$(loop1,loop2)+CHR$(32
)
1050 NEXT
1060 PRINT #8,b$
1070 NEXT
1080 RETURN
1090 REM **** save data ****
1100 IF disc=true THEN s=8 ELSE s=14
1110 LOCATE 1,23:PRINT"Input file nam
e - ";:INPUT fsp$
1120 IF LEN(fsp$))s THEN LOCATE 1,23:
PRINT STR$(s)+" characters maximum pl
ease"+SPACE$(13)+CHR$(7):FOR loop=1 T
O 1000:NEXT:LOCATE 1,23:PRINT SPACE$(
39):GOTO 1110
1130 OPENOUT fsp$
1140 PRINT #9,xx,yy
1150 FOR loop1=2 TO xx+1:FOR loop2=2
TO yy+2
1160 PRINT #9,grid$(loop1,loop2)
1170 NEXT:NEXT
1180 PRINT #9,number
1190 FOR loop=0 TO number:PRINT #9,wo
rd$(loop):NEXT
1200 CLOSEOUT
1210 RETURN
1220 REM **** check ****
1230 IF xs=x AND ys=y THEN flag=1:RET
URN
1240 flag=0
1250 xd=SGN(x-xs):yd=SGN(y-ys)
1260 length=LEN(word$(num))
1270 xd=xd*length
1280 yd=yd*length
1290 IF xs+xd>xx+2 OR xs+xd<1 THEN fl
ag=1:RETURN
1300 IF ys+yd>yy+2 OR ys+yd<1 THEN fl
ag=1:RETURN
1310 RETURN
```

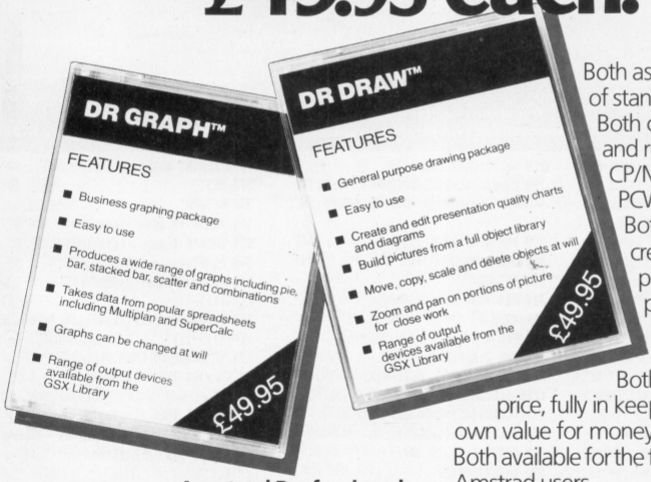
Give your fingers a rest . . .

All the listings from this month's issue are available on cassette.

See our special offer on Page 93.

AMSTRAD PROFESSIONALS FROM DIGITAL RESEARCH

Now, two interactive graphics packages at just £49.95 each.



Both as complete packages of standard Amstrad 3" disks. Both configured to load and run **now** on your CP/M bundled Amstrad PCW 8256 or CPC 6128. Both offering you the creative potential and professional impact of presentation graphics from the creators of CP/M, Digital Research. Both at an extraordinary price, fully in keeping with Amstrad's own value for money philosophy. Both available for the first time directly to Amstrad users.

Amstrad Professionals from Digital Research will progressively expand the capabilities of your Amstrad by providing you with an armoury of professional languages, tools, utilities and graphics packages of unrivalled power and value for money in the small computer field. (See also PASCAL/MT+ and CBASIC COMPILER, both released simultaneously with the above Amstrad Professionals titles.)

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Unit 12, Fenton Way
Southfields, Basildon
Essex SS15 6SL

Or contact your local Amstrad dealer.

DIGITAL RESEARCH
The creators of CP/M™

Happy Birthday!

Help us celebrate our first birthday by lighting the candles – but watch out for those devilish diagonal draughts!

BIRTHDAY is an intriguing game to celebrate *Computing with the Amstrad's* first year. All you have to do is light the birthday candle by guiding a flame from the top of the screen to the candle wick at the bottom.

To do this you steer a course between the walls using the standard movement keys A, Z, < and >.

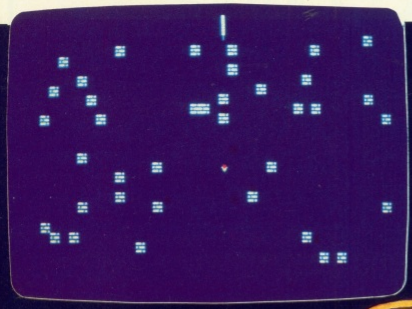
Occasionally you'll need to use the walls as windbreaks to shelter from the gusts that threaten the flame. If they reach it, out it goes.

Watch out for those gusts. They keep coming even when you don't move. Worse still, some are fairly changeable. Every now and then one blows diagonally, cutting corners to try and catch the flame.

Even more devilish, sometimes they combine, disguising two or more gusts as one.

Initially you are opposed by

```
10 REM (c)Computing with the Amstrad
20 REM      by David Andrews
30 REM from an idea by Mike Bibby
40 GOSUB 1070:REM instructions
50 GOSUB 190:REM init
60 WHILE number<20
70 GOSUB 320:REM set up
80 WHILE lit=0
90 GOSUB 840:REM move gusts
100 FOR x=1 TO 100:NEXT
110 GOSUB 1020:REM check
120 GOSUB 540:REM move flame
130 IF flamex=20 AND flamey=23 THEN G
OSUB 660
140 WHILE INKEY$<>"":WEND
150 WEND
160 WEND
170 CLS:LOCATE 14,16:PRINT"Ok you win
"
180 END
190 REM **** init ****
200 SYMBOL 240,0,0,0,0,0,16,16,16,16
210 SYMBOL 241,56,56,56,56,56,56,56,5
6
220 SYMBOL 242,0,16,16,56,124,56,16,0
230 SYMBOL 243,36,60,255,60,60,255,60
,36
240 SYMBOL 244,223,223,0,251,251,0,22
3,223
250 SYMBOL 245,16,40,40,68,0,0,0,0
260 gust$=CHR$(243)
270 wall$=CHR$(244)
280 candle$=CHR$(241)+CHR$(8)+CHR$(11
)+CHR$(241)+CHR$(8)+CHR$(11)+CHR$(240
)
290 DIM gust(20,4)
300 number=2
310 RETURN
320 REM **** set up ****
330 MODE 1
340 PEN 1
350 INK 2,0:lit=0
360 PEN 3:LOCATE 20,1:PRINT CHR$(242)
:PEN 1:LOCATE 20,1:PRINT CHR$(22)+CHR
$(1)+CHR$(245)+CHR$(22)+CHR$(0)
370 flamex=20:flamey=1
380 FOR loop=1 TO 40
390 x=INT(RND*39)+1
400 y=INT(RND*24)+1
410 IF x=20 AND y=23 THEN GOTO 390
420 PEN 1:LOCATE x,y:PRINT wall$
430 NEXT
440 LOCATE 20,25:PRINT candle$
450 REM LOCATE flamex,flamey:PEN 3:PR
INT flame$
460 FOR loop=1 TO number
470 x=INT(RND*39)+1
480 y=INT(RND*24)+1
490 IF (x=20 AND y=24) OR (x=20 AND y
=25) THEN 470
500 gust(loop,1)=x:gust(loop,2)=y
510 PEN 2:LOCATE gust(loop,1),gust(lo
op,2):PRINT gust$
520 NEXT
530 RETURN
540 REM **** move flame ****
550 LOCATE flamex,flamey:PRINT" "
560 ox=flamex:oy=flamey
570 flamey=flamey+((INKEY(69))-1)-(IN
KEY(71))-1))
580 flamex=flamex+((INKEY(39))-1)-(IN
KEY(31))-1))
590 IF flamex<1 THEN flamex=1 ELSE IF
 flamex>40 THEN flamex=40
600 IF flamey<1 THEN flamey=1 ELSE IF
 flamey>25 THEN flamey=25
610 IF TEST((flamex-1)*16,400-((flame
y-1)*16+2))=1 THEN flamex=ox:flamey=o
y
620 IF flamex=20 AND flamey=24 THEN f
lamex=ox:flamey=oy ELSE IF flamex=20
AND flamey=25 THEN flamex=ox:flamey=o
y
630 PEN 3:LOCATE flamex,flamey:PRINT
CHR$(242):PEN 1:LOCATE flamex,flamey:
PRINT CHR$(22)+CHR$(1)+CHR$(245)+CHR$
(22)+CHR$(8)
640 IF flamey<>oy OR flamex<>ox THEN
SOUND 1,80,2,5
650 RETURN
660 REM **** lit ****
670 GOSUB 720:REM music
680 flamex=20:flamey=1
```



By DAVID ANDREWS

two gusts, but each time you're successful you have an extra gust to face. If you are blown out you get another go at the same level. After all it is a birthday celebration.

If you want to change the game slightly so that you can select the number of gusts to start with on screen 1, just alter line 300 to:

```
300 CLS:INPUT "How many gusts
 ";number
```

VARIABLES

flamex	Flame's x coordinate.
flamey	Flame's y coordinate.
gust$	Characters.
flame$	
candle$	
wall$	
number	Number of gusts.
gust( )	Gust's x, y coordinates, old and new.
xd	Gust's x direction.
yd	Gust's y direction.
d,r	Direction flags.

SUBROUTINES

190	Initialise.
320	Set up.
660	Candle lit.
720	Music.
840	Move gusts.
1020	Check if caught.
1070	Instructions.

```
690 number=number+1
700 lit=1
710 RETURN
720 REM **** music ****
730 pitch=1:WHILE pitch<>0
740 READ pitch,duration
750 SOUND 1,pitch,10*duration,15
760 SOUND 1,0,1,1
770 WEND
780 RESTORE 790
790 DATA 319,1,319,1,284,2,319,2,239,
2,253,4
800 DATA 319,1,319,1,284,2,319,2,213,
2,239,4
810 DATA 319,1,319,1,159,2,190,2,239,
2,253,2,284,2
820 DATA 179,1,179,1,190,2,239,2,213,
2,239,4,0,0
830 RETURN
840 REM **** move gusts ****
850 PEN 2
860 FOR loop=1 TO number:LOCATE gust(
loop,1),gust(loop,2):PRINT" ":NEXT
870 FOR loop=1 TO number
880 gust(loop,3)=gust(loop,1):gust(lo
op,4)=gust(loop,2)
890 xd=SGN(flamex-gust(loop,1)):yd=SG
N(flamey-gust(loop,2))
900 d=INT(RND*2)
910 r=INT(RND*6)
920 IF xd=0 THEN d=1 ELSE IF yd=0 THE
N d=0
930 IF r=1 THEN d=0
940 IF d=0 THEN gust(loop,1)=gust(loo
p,1)+xd
950 IF r=1 THEN d=1
960 IF d=1 THEN gust(loop,2)=gust(loo
p,2)+yd
970 IF TEST((gust(loop,1)-1)*16,400-(
(gust(loop,2)-1)*16+2))=1 THEN gust(l
oop,1)=gust(loop,3):gust(loop,2)=gust
(loop,4)
980 LOCATE gust(loop,1),gust(loop,2):
PRINT gust$
990 SOUND 1,1000,5,5
1000 NEXT
1010 RETURN
1020 REM **** check ****
1030 FOR loop=1 TO number
1040 IF gust(loop,1)=flamex AND gust(
loop,2)=flamey THEN lit=1
1050 NEXT
1060 RETURN
1070 REM **** instructions ****
1080 INK 0,0:PAPER 0:BORDER 0
1090 INK 2,2
1100 MODE 1
1110 LOCATE 13,1:PRINT"B I R T H D A
Y"
1120 PEN 3
1130 LOCATE 1,4:PRINT"Computing with
the Amstrad's Anniversary"
1140 PEN 1
1150 LOCATE 4,8:PRINT"You must steer
the flame and light"
1160 LOCATE 4,10:PRINT"the candle's w
ick at the bottom of"
1170 LOCATE 6,12:PRINT"the screen, av
oiding the gusts."
1180 LOCATE 16,16:PRINT "A....Up"
1190 LOCATE 16,18:PRINT "Z....Down"
1200 LOCATE 16,20:PRINT "<....Left"
1210 LOCATE 16,22:PRINT ">....Right"
1220 PEN 2
1230 LOCATE 8,25:PRINT"Press any key
to continue"
1240 k$="":WHILE k$="":k$=INKEY$:WEND
1250 CALL &BC02
1260 RETURN
```

Give your fingers a rest . . .

All the listings from this month's issue are available on cassette.

See our special offer on Page 93.

Our first show was an outstanding success . . .

AMSTRAD COMPUTER SHOW

Organised by Database Publications

Champagne Suite, Novotel, Hammersmith, London W6

Saturday, January 11 10am-6pm
Sunday, January 12 10am-5pm

This time we've got many more surprises in store for you – and lots more room to wander around!

★ Amstrad goes striding into 1986 as the most innovative and profitable computer company in Britain. Come and see for yourself the ever-growing range of products that puts it head and shoulders above the rest.

★ So many people turned up for the first-ever Amstrad Show in October that entry had to be restricted and lengthy queues formed outside. Not this time! We've almost doubled the floor area – so you'll be able to move around with ease.

★ Every stand was taken at the October show, and many potential exhibitors had to be turned away. This time they've booked well in advance! Well over a hundred exhibitors will be there – with just about every piece of hardware and software that has yet been produced for the Amstrad range.

★ And that means lots more products – and lots more bargains! One of the features of the October show was the way exhibitors entered into the spirit of excitement that pervaded the show and slashed their prices. This time many thousand more visitors will be going home with some really worthwhile bargains!

★ One thing you'll get for nothing – and lots of it – is advice! Waiting to talk to you, and answer any problems you may have about Amstrad computing, are some of Britain's top Amstrad experts. They'll all be there!

Advance ticket order

AMSTRAD COMPUTER SHOW

Admission at door: £3 (adults), £2 (under 16s)

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CPM SOFTWHERE?

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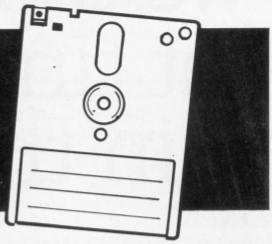

Yes, thanks to Amstrad's new CPM Plus systems with a whopping great big 61k of TPA, all those lovely CPM classics will now run without compromise. In fact, you'll find the classics have more space for data, since most CPM80 programs only expect to find around 55k of TPA. Sorcim's SuperCalc 2 becomes SupremeCalc2, MicroPro's WordStar becomes WordGalaxy and dBase II thrives.

Less well known but functionally superior products also sparkle on Amstrad CPM Plus. The ultimate 8bit (Wordstar compatible plus) wordprocessor with built-in mailmerge, NewWord complements the ultimate 8bit spell checker: Oasis Systems Word Plus in an unbeatable £69 package.

You don't need a calculator to work out that Software Technology's Cracker Plus spreadsheet and mathematical modeller at £49 is an absolute bargain for Amstrad CPM Plus users.

Aha, but where can you get them on a 3 inch disc?

Simple, call New Star Software Ltd., specialists in Amstrad CPM Plus installations. We will supply your program custom installed for your Amstrad 3 inch system, state the model when ordering.

There's also a number of classics available for Amstrad CPM2.2: Caxton's Cardbox, Touch 'n Go and Brainstorm for example.

Our catalogue (which is also being shipped on the issue 12 UserSoft listings Disc as an ASCII textfile) indicates availability.

An Evening with LOCOSCRIPT

A combination of two C90 audio cassettes a plastic laminated 'quick reference' guide to Locoscript accompanying course notes. £9.99 VAT inclusive. Add £1 P&P.

Flexi-File

A comprehensive database with full screen text editor for creation of standard letters, mailing lists etc. £49.95

NewStar Software has been specifically set up in conjunction with the UK's leading trade software source to provide a retail mail order service to Amstrad CP/M users. Details of customer support services and on-line assistance are supplied with our catalogue.

Second edition catalogue now out! Phone or write for copy. Over 100 CP/M titles listed.

New Star Software Limited.,
22 Middleton Road,
Shenfield,
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0277 220573/213218. Overseas and trade enquiries welcome.

The complete Computer System now has the Complete Software System.

Nevada COBOL £39.95
Now available on 3 inch disc for Amstrad CP/M (2.2 and Plus)

We thought it was about time we put you in the picture.

When we introduced our AMX Mouse to BBC Micro users, the response was phenomenal.

And no wonder!

It was regarded as 'pushing the BBC to its limits' and hailed by the press as 'probably the best input device that has appeared recently'. The AMX Mouse brought to BBC Micro users the same sophisticated, positive control that had, until then, been the province of the more expensive computers, like the Macintosh.

Now we announce a new enhanced software package which, can be used with a traditional keyboard or joystick but truly comes into its own when used with the AMX Mouse.

AMX Super ROM and Super Art adds colour to the features of the original AMX ROM, on a new 16K ROM.

It dramatically extends the original AMX ROM facilities to include Pull Down Menus, over lapping colour windows, colour patterns and an extended Icon set in all graphic modes.

Specially written to be usable with the vast majority of BBC Systems including 2nd processors, the Aries RAM Board, the BBC + Shadow mode, tape, DFS and ADFS.

The kernel of the Super Art program is included in the 16K ROM, providing tape and disc users with a Mode 1 colour drawing program.

But Super Art really comes into its own when used on a disc based system; a host of additional facilities can be selected direct from the screen.

Colour pictures can be created in dot resolution up to A4 size by scrolling the screen window, over the picture.

Other facilities include colour pattern editing – use of icons, additional text styles, various copy facilities and a superb colour Zoom.

Pictures can be printed out in colour (Integrex) or shades of black and grey on Epson compatible printers.

The results can be astonishing! – you can even store your finished 'masterpieces'.

The AMX Icon Designer facility gives you further freedom to design and store your own custom icons for use in your own programs.

This fabulous new package costs only £89.95 – a price as remarkable as the package itself – and includes a fully illustrated operating manual.

If, however, you are afraid of mice, you can purchase just the software package plus the 16K Super ROM for just £49.95.

You will still achieve some pretty remarkable results using your keyboard or joystick – not nearly as good as with the Mouse of course – but you can always add one later on for just £40.

Then you'll really be 'in the picture'.

AMX MOUSE

IMAGINATION AT YOUR FINGERTIPS.

BOTH THESE EXCITING PACKAGES ALONG WITH OUR SUPERB RANGE OF AMX ROM AND SUPER ROM COMPATIBLE SOFTWARE ARE AVAILABLE FROM ALL GOOD COMPUTER DEALERS OR BY SENDING CHEQUE OR P.O. TO FREEPOST ADVANCED MEMORY SYSTEMS LTD., GREEN LANE, APPLETON, WARRINGTON, WA4 5NG.

FOR INSTANT ACCESS OR VISA ORDERS, RING (0925) 602959/602690.

BINARY TRAINER

BINARY Trainer was written with newcomers to machine code in mind and is designed to test and help their knowledge of binary and hexadecimal numbers.

The program first of all displays a menu of six options. The first three allow you to choose to practice either decimal, hexadecimal or binary numbers.

A series of numbers will then be displayed in the two number systems not chosen. You have to give their equivalent in the system you wish to practise.

The fourth demonstration option prints all numbers from 1 to 255 in all three forms so that you can compare them. At any time the sequence can be paused or abandoned altogether.

Option five, the quiz, chooses numbers at random and then prints them out in two of the formats leaving you to work out the third.

The last option, quit, allows you to leave the program neatly.

STEPHEN BARNES

lifts the Hex on binary for machine code beginners

VARIABLES

count	Counter used throughout the program.
option$	Option for the menu.
ky$	Key pressed in menu.
option	Option selected by user in the range 1-6.
number$	Total of numbers to be converted.
number	The count for number conversion.
number.too.long	Flag saying that the number input was over 255.
binary$	Contains the variable *number* but in binary. It is used for printing the number in binary format.
hx$	As above but in hexadecimal.
dc$	Used to input a number in decimal.
delay	Counter used for creating a delay.
correct	Number correct in the quiz section.
wrong	Number wrong.
question	Counter for the quiz.
type	Type of number to be input – decimal, binary or hex.
answer	Answer to the question (in decimal).

```
10 REM ****************************
20 REM *      Binary Trainer      *
30 REM *                          *
40 REM *    By Stephen Barnes     *
50 REM *                          *
60 REM ****************************
70 REM(c)Computing with the Amstrad
80 REM Initialise Screen
90 REM ****************************
100 MODE 1
110 WINDOW 1,40,1,3
120 PAPER 3:CLS
130 PRINT
140 PEN 0:PRINT " **********";
150 PEN 1:PRINT "  Binary Trainer";
160 PEN 0:PRINT "  **********"
170 WINDOW 1,40,4,25
180 PAPER 0:PEN 2:CLS
190 WINDOW 1,40,6,25
200 REM ****************************
210 REM Print menu
220 REM ****************************
230 CLS
240 RESTORE 360
250 LOCATE 15,1
260 PEN 3:PRINT "Options"
270 PRINT:PRINT
280 FOR count = 1 TO 6
290 READ option$
300 PEN 1:PRINT "[";
310 PEN 2:PRINT count;
320 PEN 1:PRINT "]....";
330 PEN 2:PRINT option$
340 PRINT
350 NEXT count
360 DATA "Input decimal numbers"
361 DATA "Input binary numbers"
370 DATA "Input hexadecimal numbers"
371 DATA "Demonstration"
380 DATA "Quiz","Quit"
390 REM ****************************
400 REM Input option and take action
410 REM ****************************
420 ky$ = INKEY$
430 IF ky$ > "6" OR ky$ < "1" THEN GO
TO 420
440 option = VAL (ky$)
450 GOSUB 740
460 IF option = 6 THEN MODE 1:PRINT "
BYE!":PRINT:PRINT:END
470 IF option = 5 THEN GOSUB 2020:GOT
O 230
480 IF option = 4 THEN GOSUB 1770:GOT
O 230
```

```
490 REM ****************************
500 REM Input numbers for conversion
510 REM ****************************
520 CLS #1:CLS #2
530 PRINT #1,"How many numbers?"
540 LINE INPUT #2,numbers$
550 IF LEN (numbers$) > 2 OR LEN (num
bers$) = 0 THEN GOTO 520
560 IF VAL (numbers$) > 99 OR VAL (nu
mbers$) < 1 THEN GOTO 520
570 FOR number% = 1 TO VAL (numbers$)
610 ON option GOSUB 1360,1450,1590
620 IF number.too.big THEN number.too
.big = 0:GOTO 610
630 CLS #1:CLS #2
640 GOSUB 1100
650 GOSUB 1190
660 GOSUB 1280
670 IF option = 4 THEN 690
680 NEXT number%
690 GOSUB 1300
700 GOTO 230
710 REM ****************************
720 REM Set up display screen
730 REM ****************************
740 CLS
750 WINDOW #1,1,40,23,25
760 PAPER #1,2
770 PEN #1,3
780 CLS #1
790 WINDOW #1,1,25,24,24
800 WINDOW #2,30,40,24,24
810 PEN #2,0
820 PAPER #2,2
830 CLS #2
840 WINDOW #3,16,23,11,11
850 PAPER #3,3
860 PEN #3,1
870 CLS #3
880 PEN #3,0
890 WINDOW #4,16,23,14,14
900 PAPER #4,3
910 PEN #4,1
920 CLS #4
930 WINDOW #5,16,23,8,8
940 PAPER #5,3
950 PEN #5,1
960 CLS #5
970 LOCATE 7,3:PRINT "Decimal.."
980 LOCATE 7,9:PRINT "Hex....."
990 LOCATE 7,6:PRINT "Binary..."
1000 MOVE 240,224:DRAWR 32,-32
1010 DRAWR 32,32:DRAWR 32,-32
1020 DRAWR 32,32
1030 FOR count = 1 TO 8
1040 PRINT #3,CHR$(233);
1050 NEXT count
1060 RETURN
1070 REM ****************************
1080 REM Print binary number
1090 REM ****************************
1100 binary$ = BIN$(number,8)
1110 FOR count = 1 TO 8
1120 IF MID$ (binary$,count,1) = "1"
THEN PEN #3,1 ELSE PEN #3,0
1130 LOCATE #3,count,1:PRINT #3,CHR$(
233);
1140 NEXT count
1150 RETURN
1160 REM ****************************
1170 REM Print Hexadecimal number
1180 REM ****************************
1190 hx$ = HEX$ (number)
1200 IF LEN (hx$) = 1 THEN hx$ = "0"+
hx$
1210 LOCATE #4,3,1:PRINT #4,LEFT$(hx$
,1)
1220 LOCATE #4,6,1:PRINT #4,RIGHT$(hx
$,1)
1230 number$ = STR$ (number)
1240 RETURN
1250 REM ****************************
1260 REM Print decimal number
1270 REM ****************************
1280 LOCATE #5,2,1:PRINT #5,number;"
"
1290 RETURN
1300 PRINT #1,"Press a key"
1310 WHILE INKEY$ = "":WEND
1320 RETURN
1330 REM ****************************
1340 REM Input decimal number
1350 REM ****************************
1360 CLS #1
1370 PRINT #1,"Input number in decima
l"
1380 LINE INPUT #2,dc$
1390 IF VAL (dc$) >255 OR VAL (dc$) <
 0 THEN 1380
1400 number = VAL (dc$)
1410 RETURN
1420 REM ****************************
1430 REM Input binary number
1440 REM ****************************
1450 CLS #1
1460 PRINT #1,"Input number in binary
"
1470 LINE INPUT #2,binary$
1480 IF LEN (binary$) = 0 THEN GOTO 1
470
1490 FOR count = 1 TO LEN (binary$)
1500 IF MID$ (binary$,count,1) > "1"
OR MID$ (binary$,count,1) < "0" THEN
GOTO 1470
1510 NEXT count
1520 IF LEN (binary$) > 8 THEN GOTO 1
930
1530 binary$ = "&x"+binary$
1540 number = VAL (binary$)
1550 RETURN
1560 REM ****************************
1570 REM Input hex number
1580 REM ****************************
1590 CLS #1
1600 PRINT #1,"Input number in hex"
1610 LINE INPUT #2,hx$
1620 hx$ = UPPER$ (hx$)
1630 IF LEN (hx$) = 0 THEN GOTO 1610
1640 FOR count = 1 TO LEN (hx$)
1650 IF MID$ (hx$,count,1) > "F" OR M
ID$(hx$,count,1) < "0" THEN GOTO 1610
1660 NEXT count
1670 FOR count = 1 TO LEN (hx$)
1680 IF MID$ (hx$,count,1) > "9" AND
MID$ (hx$,count,1) < "A" THEN GOTO 16
10
1690 NEXT count
1700 IF LEN (hx$) > 2 THEN GOTO 1930

1710 hx$ = "&"+hx$
1720 number = VAL (hx$)
1730 RETURN
1740 REM ****************************
1750 REM Demonstration routine
1760 REM ****************************
1770 WINDOW #1,1,40,22,25
1780 KEY DEF 68,1,255
1790 CLS #1:PRINT #1,"Press any key t
o stop"
1800 PEN #1,0
1810 PRINT #1:PRINT #1,"TAB to abort"
1820 PEN #1,3
1830 FOR number = 1 TO 254
1840 GOSUB 1100
1850 GOSUB 1190
1860 GOSUB 1280
1870 FOR delay = 1 TO 30
1880 IF INKEY (68) <> -1 THEN RETURN
1890 IF INKEY$ <> "" THEN LOCATE #1,1
8,1:PRINT #1,"restart":WHILE INKEY$ =
 "":WEND:LOCATE #1,18,1:PRINT #1,"sto
p  "
1900 NEXT delay
1910 NEXT number
1920 RETURN
1930 CLS #1:CLS#2
1940 number.too.big = 1
1950 PRINT #1,"Number too big!"
1960 FOR delay = 1 TO 2000
1970 NEXT delay:answer=-1
1980 RETURN
1990 REM ****************************
2000 REM Quiz routine
2010 REM ****************************
```

```
2020 CLS #1:CLS #2
2030 PRINT #1,"Test on numbers"
2040 FOR delay = 1 TO 2000
2050 NEXT delay
2060 correct = 0:wrong = 0
2070 PRINT #1,"How many numbers?"
2080 LINE INPUT #2,number$
2090 IF LEN (number$) > 2 OR LEN (num
ber$) = 0 THEN GOTO 2070
2100 FOR count = 1 TO LEN (number$)
2110 IF MID$ (number$,count,1) > "9"
OR MID$ (number$,count,1) < "0" THEN
GOTO 2070
2120 NEXT count
2130 numbers = VAL (number$)
2140 IF numbers < 3 THEN GOTO 2510
2150 FOR question = 1 TO numbers
2160 REM Choose type of number
2170 type = INT (RND*3)+1
2180 number = 0
2190 GOSUB 1100
2200 CLS #4:CLS #5
2210 number = INT (RND*255)
2220 answer = number
2230 IF type <> 1 THEN GOSUB 1100
2240 IF type <> 2 THEN GOSUB 1190
2250 IF type <> 3 THEN GOSUB 1280
2260 ON type GOSUB 1450,1590,1360
2270 IF number = answer THEN GOTO 232
0
2280 SOUND 1,100,50:SOUND 1,1000,60
2290 PRINT #1,"Wrong!":FOR delay=1 TO
 2000:NEXT delay
2300 wrong = wrong+1
2310 GOTO 2420
2320 FOR count = 200 TO 100 STEP -2
2330 SOUND 1,count,3
2340 SOUND 2,count*1.01,3
2350 SOUND 4,count/1.01,3
2360 NEXT count
2370 CLS #1:CLS #2:PRINT#1,"Correct!"
2380 PRINT #1,"Correct!"
2390 FOR delay = 1 TO 2000
2400 NEXT delay
2410 correct = correct+1
2420 NEXT question
2430 CLS #1:CLS #2
2440 PRINT #1,"Correct";
2450 PEN #1,0:PRINT #1,correct;
2460 PEN #1,3:PRINT #1,"Wrong";
2470 PEN #1,0:PRINT #1,wrong
2480 FOR delay = 1 TO 2000
2490 NEXT delay
2500 RETURN
2510 PRINT #1,"It's not worth the eff
ort!"
2520 CLS #2
2530 FOR delay = 1 TO 2000
2540 NEXT delay
2550 GOTO 2070
```

Give your fingers a rest . . .

All the listings from this month's issue are available on cassette.

See our special offer on Page 93.

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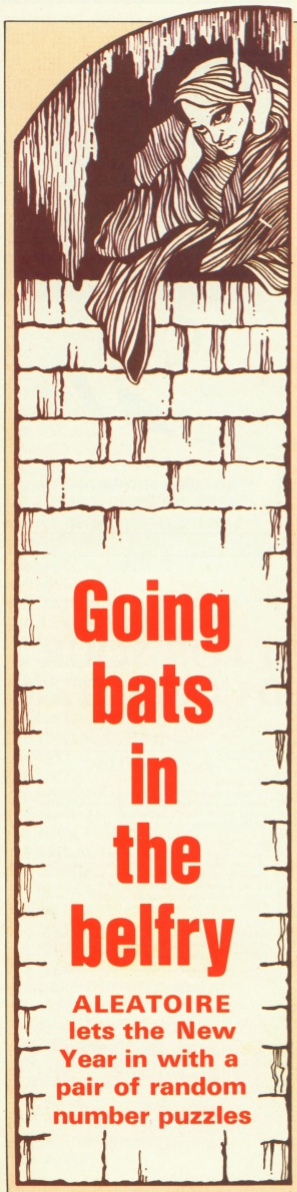
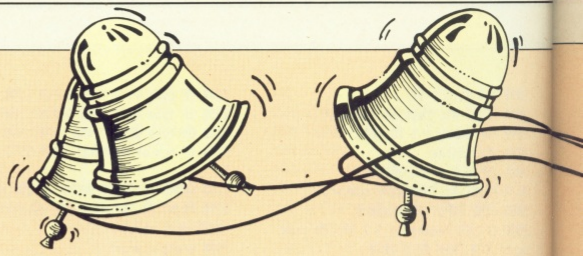


Going bats in the belfry

ALEATOIRE lets the New Year in with a pair of random number puzzles



LET'S get the New Year off to a good start with two puzzles, both based on random numbers. These require the player to understand and apply an algorithm (method of solution) in order to unravel the millions of possibilities.

First, a tangled tale. The bells of Notre Dame have had a Christmas clean and must now be reconnected to their ropes.

Unfortunately no one can remember which rope in the belfry is which rope in the vestry, least of all Quasimodo who never used the ropes anyway and, suspecting redundancy, now refuses to let anyone visit his belfry more than twice.

Surprisingly, I hope, it is possible to solve this problem for any number of ropes other than two by simply trying the ropes in pairs in one room and then checking the connections by pulling, in the other room.

To learn how to do this trick type in Listing I in Mode 2 and tell it you wish to solve a seven rope problem.

From now on you need only use the four commands: tie, pull, up and down.

To give you an idea of the technique, here's the solution. The program will start you in the belfry with seven ropes lying on the floor. Tie ropes 2 and 3 then ropes 4 and 5 then ropes 6 and 7.

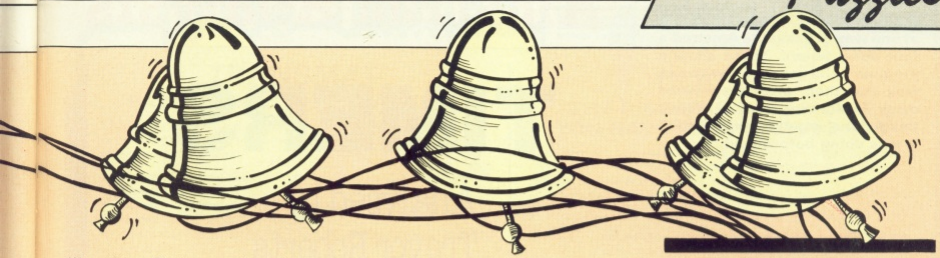
Go down to the vestry and identify rope 1 – nothing happens when you pull it – call it X and label the other three pairs A1 A2, B1 B2, C1 C2.

Now tie them X A1, A2 B1, B2 C1 and return (up) to the belfry.

You can now identify all the ropes

```
10 ON ERROR GOTO 150
15 DIM a(99),b(99),d(99),u(99)
20 a=0:b=0
30 INPUT"How many ropes ";n
60 FOR i=1 TO n
70  e=INT(RND*n+1)
80  IF a(e)>0 THEN 70
90  a(e)=i
100 b(i)=e
110 NEXT i
140 GOTO 290
150 PRINT"You cant do that"
160 INPUT"What now? ";v$
170 v$=LEFT$(v$,1)
180 IF v$<>"d" THEN 270
190 IF f=0 THEN 150 ELSE a=a+1
200 IF a=3 THEN PRINT"Quasimodo ties
the ";n;" ropes to the ";n;" bells"
210 PRINT"You are in the vestry. ";n;
" ropes hang from the ceiling"
220 f=0
230 FOR i=1 TO n:d(i)=0:NEXT i:GOTO 1
60
270 IF v$<>"u" THEN 350
280 IF f=1 OR a=3 THEN 150 ELSE a=a+1
290 PRINT"You are in the belfry. ";n;
" ropes lie on the floor"
300 f=1
310 FOR i=1 TO n:u(i)=0:NEXT i:GOTO 1
60
350 IF v$<>"t" THEN 440
360 INPUT"Tie which 2 ropes ";r1,r2
370 IF f=0 THEN 410
380 u(a(r1))=a(r2):u(a(r2))=a(r1):GOT
O 160
410 d(b(r1))=b(r2):d(b(r2))=b(r1):GOT
O 160
440 IF v$<>"p" THEN 150
450 INPUT"Pull which rope ";r
460 IF a=3 THEN 510
470 IF f=1 THEN x=d(r):d$="down" ELSE
 x=u(r):d$="up"
490 IF x=0 THEN PRINT"Nothing happens
" ELSE PRINT"Rope ";x;" moves ";d$
500 GOTO 160
510 FOR i=1 TO b(r):PRINT"Bong!":NEXT
 i
540 b=b+1
550 IF b(r)<>b THEN PRINT"Quasimodo k
nocks 7 bells out of you!":END
560 IF b<n THEN 160 ELSE PRINT"Quasim
odo gives you a gold ring"
```

Listing I



like this: Pull rope 1 and you therefore know which rope here is A1 downstairs. And you can identify A2 also – you tied it to A1 at the start.

Pull A2 and you immediately know which rope is B1 downstairs, so you can also identify B2 – you tied it to B1 at the start – and so on.

With a bit of practice it should become obvious that the method can solve any number of odd ropes.

Now consider eight ropes – or any even number greater than 2, the only unsolvable case. Tie the ropes as before. Down in the vestry you will now find three pairs, as before, plus two free ropes which are ropes 1 and 8 in the belfry. You can't tell which is which yet, so label them X and Y.

Tie the ropes as before X A1, A2 B1, B2 C1, and up. Rope 1 or rope 8 is still unconnected, so you know which ropes are X and Y in the vestry. The remaining ropes are then identified as before.

Note that on your final trip down to the vestry Quasimodo connects the bells so he can check out your solution. Pull them in the correct order to convince him.

Now it's one thing to "know" the solution but quite another to apply it quickly and correctly. I recommend that you actually start with just three ropes to get a feel for the puzzle and also check that your program is working correctly.

Once you have learnt the ropes you should be able to solve 10 ropes – 3,628,000 possibilities – in less than a minute.

Now for the second puzzle: Modulo Safe. The User Manual barely mentions MOD, so this trick might help clarify this useful operator.

Ask a friend to think of an integer less than 1000 and then divide it by 7, 11 and 13 giving you the three respective remainders only. You then tell him which number he originally chose.

If you haven't got a friend or he/she is useless at mental arithmetic, let your Amstrad help to do the trick – illustrating at the same time an unusual type of combination safe that actually does exist, albeit in a much more complex form.

What our simple example safe does is to select its own combination in the range 000-999. We'll call it

```
10 ON ERROR GOTO 110
30 t=0
40 xxx=INT(RND*1000)
50 FOR i=1 TO 3
60 INPUT n
70 t=t+n
80 IF t<0 OR t>31 THEN 110
90 PRINT"xxx mod ";n;"=";xxx MOD n
100 NEXT i
110 INPUT"xxx=";a
120 IF xxx=a THEN PRINT"Right!"
130 PRINT xxx
140 GOTO 30
```

Listing II

XXX. To open it you enter three numbers whose total must *not* exceed 31 and it tells you what:

XXX MOD N

is for each number, that is the integer remainder after dividing XXX by N. You use these to calculate the combination.

To see how it works type in Listing II and then enter the three co-prime numbers 7, 11 and 13. To find the combination multiply the Amstrad's answers by the "magic numbers" 715, 364 and 924 respectively, add them all together (=T) and then calculate T MOD 1001, that is the remainder when T is divided by 1001. This number is the combination.

For example, if the responses were 5, 6 and 3 then:

715*5 = 3575
364*6 = 2184
924*3 = 2772 +
so **XXX = 8531 MOD 1001**
= 523

But where, you may ask, do these magic numbers come from? Their derivation requires some advanced maths beyond the scope of this article, but note that:

1001 = 7*11*13
715 = 5* (11*13)
364 = 4* (7*13)
and **924 = 12* (7*11)**

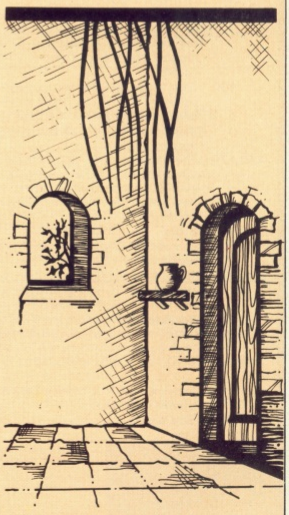
So the question is really – why the numbers 5, 4 and 12?

If you can solve that then you may like to try to solve the general case, that is you have to find the N smallest integers which can uniquely identify an N digit combination.

Obviously if N=1 then you need the single digit 9 and if N=2 then the digits 9 and 11 (total 20) are a solution.

But, as shown above, N=3 is quite tricky and I have never seen a solution for N>=4.

Still, there's a whole new year ahead of you to try and find it in . . .



TIMERS

Analysed by Trevor Roberts

THIS month we'll be taking a look at one way of using the Amstrad's four delay timers. These allow a program to be getting on with one task and then, after a specified delay, performing another. When this is done, it gets on with the job it was doing beforehand.

10,20 The usual REMs, giving a hint as to what the program does and who was responsible for it.

30 Selects Mode 2. This makes the screen tidier and the text clearer.

40 Sets the numeric variables *sum*, *routine*, and *flag* to zero. This isn't strictly necessary as the Amstrad assumes that they are zero until they're assigned another value. It is, however, good programming practice.

50 This line uses the command AFTER to tell the micro to go and perform the subroutine at line 190, but only after a delay. In the meantime it can be doing something else. The delay is set by the first figure following the AFTER, the units being 1/50th of a second. Here the delay is to be 250 of these units, in other words 5 seconds. The 0 following the 250 tells the Amstrad which of its four timers, numbered 0 to 3, to use.

60 This time the AFTER is followed by the figures 500 and 1. This means that before the subroutine at line 240 is called there will have been a delay of 10 seconds, measured on timer number 1.

70,80 Use timers 2 and 3 to call the subroutines at lines 290 and 340 after delays of 15 and 20 seconds respectively.

90,100 Inform the user of the result of the previous lines. All four timers are set and are ticking away. As each runs out the appropriate subroutine is called. Meanwhile the program carries on.

120-140 Form a WHILE . . . WEND loop which carries on cycling until the variable *flag*, previously set to 0, takes the value 1. This will only happen after the fourth subroutine has been called.

130 Each time round the loop *sum* is increased in value by 1. The loop keeps on going round, adding 1 to *sum* while in the background the timers are ticking away, awaiting their moment of glory.

160,170 The program only reaches these lines after the WHILE . . . WEND loop has stopped cycling. This happens after the fourth timer has called the final subroutine and it has set *flag* to 1.

180 Stops the program crashing into the subroutines. Try leaving it out and see what happens.

190-230 These form the first subroutine, called when timer 0 has counted out five seconds. When this happens the Amstrad interrupts what it is doing in the WHILE . . . WEND loop and performs this subroutine. It then takes up the main program from where it left off.

240-390 Make up the subroutines called by timers 1, 2 and 3. Each time the value of *routine* is increased by 1 and both *sum* and *routine* displayed.

380 Sets *flag* to 1, ending the WHILE . . . WEND loop.

```
10 REM AFTER ALL THIS TIME
20 REM TREVOR ROBERTS
30 MODE 2
40 sum=0:routine=0:flag=0
50 AFTER 250,0 GOSUB 190
60 AFTER 500,1 GOSUB 240
70 AFTER 750,2 GOSUB 290
80 AFTER 1000,3 GOSUB 340
90 PRINT "All four AFTERs are primed,
 ready to call their subroutines afte
r each delay."
100 PRINT "At the start, sum is ";sum
" while routine is ";routine
110 PRINT
120 WHILE flag<>1
130 sum=sum+1
140 WEND
150 PRINT
160 PRINT "All four subroutines have
now been triggered."
170 PRINT "sum is now ";sum
180 END
190 REM 1st AFTER subroutine
200 PRINT "This is the first AFTER"
210 routine=routine+1
220 PRINT "sum is now ";sum " while r
outine is now ";routine
230 RETURN
240 REM 2nd AFTER subroutine
250 PRINT "This is the second AFTER"
260 routine=routine+1
270 PRINT "sum is now ";sum " while r
outine is now ";routine
280 RETURN
290 REM 3rd AFTER subroutine
300 PRINT "This is the third AFTER"
310 routine=routine+1
320 PRINT "sum is now ";sum " while r
outine is now ";routine
330 RETURN
340 REM 4th AFTER subroutine
350 PRINT "This is the fourth AFTER"
360 routine=routine+1
370 PRINT "sum is now ";sum " while r
outine is now ";routine
380 flag=1
390 RETURN
```

Usual REMs

Initialises variables

Set all Four timers

Start-up messages

Loop cycles until flag=1

Sum increased by 1 each time round loop

Leave out at your peril

Subroutine called after 5 seconds

Called after 10 seconds

Called after 15 seconds

Called after 20 seconds

Sets flag to 1. This ends the WHILE...WEND loop

pride utilities

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A BRIEF SUMMARY OF NEW COMMANDS

I CAPOFF	Turn off caps shift within program
I CAPON	Turn on caps shift within program
I CIRCLE	Draw circle or oval
I CUROFF	Turn off text cursor
I CURON	Turn on text cursor
I DEPRO	Deprotect a BASIC program
I DPEEK	Two byte peek
I DPOKE	Two byte poke
I DSCREEN	Move whole screen down one line
I FILL	Fill any area with a colour
I FLUSH	Clear input buffer
I FRAME	Wait for frame flyback pulse
I GETCHAR	Get a character from the screen
I GETKEY	Get a character from the keyboard
I GPEN	Set the graphic pen to an ink
I GOVER	Turn on the graphics XOR function
I HELP	List the SYSTEM X commands
I INVIS	Make the screen invisible
I INVERSE	Swop pen and paper
I LSCREEN	Move whole screen left
I MOTOR	Turn cassette relay on/off
I PRON	Echo screen printing to printer
I PROFF	Turn off echo to printer
I PROTEC	Protect a BASIC program
I RPEEK	Peek into a ROM
I R	Reset pens, inks, border and mode to default
I RESET	Reset pens, inks, border and mode to default
I RSCREEN	Move whole screen right
I SHIFT	Shift a block of memory
I USCREEN	Move whole screen up one line
I VIS	Make screen visible after I INVIS
I ZIP	1000-4000 baud, cassette saving speeds

Instructions include more detail plus examples for you to type in.

Price: £9.95 on tape, £13.45 on disc, or "ROM" for only £19.95 inc.

SYSTEM X voted into the Serious Programs Top Ten by Amstrad Action Oct. '85

SYSTEM X "Very impressive". *Home Computing Weekly 24th Sept.*

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Fit double glazing to your programs!

Program development is made much clearer when you can see two related sections at the same time. ROBIN NIXON shows how to go about it.

ONE snag in developing long programs without the use of a printer is the difficulty in comparing one part of a program with another since it is only possible to see a limited number of program lines at once.

It makes programs far easier to follow if you can see a GOSUB and where it goes to on the screen at the same time. This is where Windows can become very useful. It works by defining a number of text windows which can be called into use by pressing a single key.

Windows gives you 10 functions. The first four allow you to change text output to any of the four windows. The next four functions are:

* **CLS** clears the current window.
* **LIST** lists a program from the start.
* **LIST n** lists a program between numbers you specify in the usual way.
* **RUN** runs a program.

The final two functions allow you to either program using Windows or go back to normal operation. The listing is small enough to tack on to the end of a program until development is complete.

To use Windows most efficiently type it in and save it. Then, whenever you need to use it in the future type:

```
MERGE "WINDOWS"
```

ensuring, of course, that the program you're merging with hasn't any line numbers past 65000.

To run the program type in:

```
GOTO 65000
```

PROGRAM STRUCTURE

65000-65090	Set up the function keys 0 to 9.
65100	Sets up the screen and puts window 0 in action.
65110	Data for the information printed at the top of the screen.
65120-65150	Set up the four windows.

```
10 REM WINDOWS
20 REM By Robin Nixon
30 REM (c) Computing with the Amstrad
40 REM
65000 KEY 128,"GOTO 65120"+CHR$(13)
65010 KEY 129,"GOTO 65130"+CHR$(13)
65020 KEY 130,"GOTO 65140"+CHR$(13)
65030 KEY 131,"GOTO 65150"+CHR$(13)
65040 KEY 132,"CLS"+CHR$(13)
65050 KEY 133,"LIST"+CHR$(13)
65060 KEY 134,"LIST "
65070 KEY 135,"RUN"+CHR$(13)
65080 KEY 136,"CALL &BC02:MODE 1:CLS"
+CHR$(13)
65090 KEY 137,"GOTO 65000"+CHR$(13)
```

```
65100 MODE 2:BORDER 0:INK 0,0:INK 1,2
0:CLG 1:RESTORE 65110:FOR Z1%=1 TO 4:
READ Z2%,Z3%,Z4%,Z5%:WINDOW Z2%,Z3%,Z
4%,Z5%:CLS:NEXT:FOR Z%=2 TO 74 STEP 8
:WINDOW Z%,Z%+5,2,3:CLS:PRINT" ";(Z%-
2)/8:READ Z1$:PRINT Z1$;:NEXT:GOTO 65
120
65110 DATA 2,41,5,19,43,79,5,11,43,79
,13,19,2,79,21,24," W0"," W1"," W2
"," W3"," CLS"," LIST","LIST n"," RU
N"," NORM"," INIT"
65120 WINDOW 2,41,5,19:END
65130 WINDOW 43,79,5,11:END
65140 WINDOW 43,79,13,19:END
65150 WINDOW 2,79,21,24:END
```

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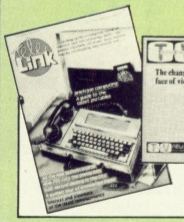

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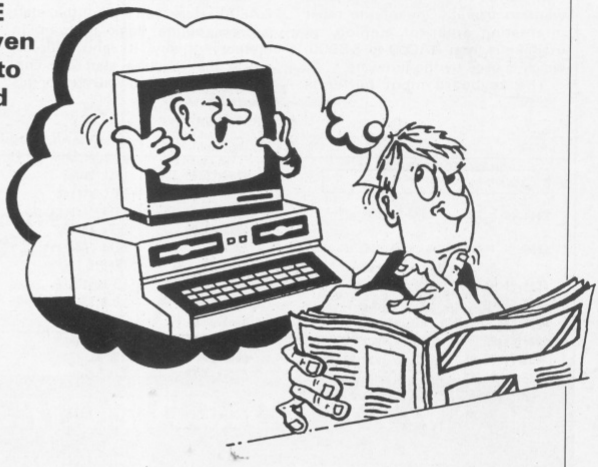
Mem Dump

ROLAND WADDILOVE offers an interrupt-driven machine code routine to persuade your Amstrad to give up its secrets



A MEMORY dump is a very useful tool for examining each byte of a micro's memory, allowing you to check the state of the variables, check that your machine code routines are working properly and so on.

The disassembler in the November issue of *Computing with the Amstrad* featured such a dump, enabling you to list any part of the Amstrad's memory map in hexadecimal and Ascii.

It produces a sort of snapshot of the memory. The contents displayed are what was there when the program was run.

If any of the memory locations have since changed it will not show up unless the memory is dumped again and two compared. And it might even happen that the locations you're interested in are themselves altered by the dump program.

Under most circumstances this is perfectly acceptable. However sometimes we need to be able to monitor locations to see how they change and what values they range over.

Some locations for instance, change quite rapidly, particularly those used by firmware for variable storage. In these cases what is needed is a dump utility which is fast and which corrupts the memory as little as possible. This is the purpose of MemDump – an interrupt-driven machine code routine which sits at &A000 in the memory.

Called 10 times per second, it prints the contents of 32 memory locations on the screen.

Since it is interrupt-driven it is possible to run another program at the same time, allowing you to monitor how the second program uses memory or the effect it has on the firmware variables.

The rate at which MemDump scans memory can be altered easily from as fast as 50 times a second to as slow as several seconds. This should be sufficient for most purposes.

To change the rate, alter the value loaded into the DE registers at &A08C to the number of fiftieths of a second required. At present this is set at 5/50ths of a second.

The routine adds three new commands using RSXs. The first, |ENABLE, changes to Mode 2, sets up a text window and enables the interrupt routine.

The second command |DISABLE, disables the routine and the third, |MONITOR, [numeric expression] sets the start address of the dump.

The window provides a neater display, the top two lines being used for the dump and the rest of the screen free. Using them will not do any harm though, it just produces a messy display.

Changing mode will make the display unreadable, as MemDump uses its own print routine designed specifically to print in Mode 2. The character definitions are grabbed straight out of the lower ROM and poked directly into the screen memory without using the firmware at all.

Why? Well, it would be impossible to print 32 memory locations 50 times a second using the firmware calls, they're just too slow.

Program I is an assembly listing of MemDump. If you haven't an

assembler *(shame on you – there was one in our July issue)* use Program II to enter the hex codes. You don't need to enter the first number, this is the address.

The machine code can be saved with:

```
SAVE "MEMDUMP",B,&A000,&170
```

Once you've got MemDump you'll want to use it. One of the most interesting areas of memory to examine is from &AC00 to &B900, which is used by the firmware.

The keyboard input buffer is around &ACA0. It may change on the different Amstrad models so you'll need to hunt around a bit. Use |MONITOR to scan through addresses close to &ACA0, pressing keys at random on the keyboard and looking for altered bytes – you'll soon spot the buffer.

Basic's variables are stored around &AE00. Here you'll find the start address of the Basic program in memory, if any, its end address, where the variables start and end, HIMEM and so on. If you monitor this area while a program is running you'll find two two-byte locations which contain the address of the line Basic is executing and the address of the statement it's currently executing.

This raises many possibilities for future experiments, such as interrupting Basic and changing the pointers so that it carries on executing somewhere else.

The Amstrad's memory is largely unexplored, particularly the newer models so you're on your own. Happy hunting!

Program I

```
Pass... 2               ORG &A000

A000:                   .chr=&A11C
                        initialise
A000:21 53 A1           LD HL,flags
A003:CB 4E              BIT 1,(HL)
A005:C0                 RET NZ
A006:CB CE              SET 1,(HL)
A008:01 33 A1           LD BC,jump_table
A00B:21 54 A1           LD HL,workspace
A00E:CD D1 BC           CALL &BCD1
A011:21 60 A1           LD HL,block
A014:06 81              LD B,129
A016:11 D6 A0           LD DE,event
A019:CD EF BC           CALL &BCEF
A01C:3E 32              LD A,48
A01E:CD A5 BB           CALL &BBA5
A021:22 1C A1           LD (chr),HL
A024:C9                 RET
                        Print string
A025:                   .string
A025:E1                 POP HL
A026:                   .sp1
A026:7E                 LD A,(HL)
A027:CD 5A BB           CALL &BB5A
A02A:23                 INC HL
A02B:B7                 OR  A
A02C:20 F8              JR NZ,sp1
A02E:E9                 JP (HL)
                        Error
A02F:                   .error
A02F:CD 25 A0           CALL string
A032:                   DEF$ 'Parameter?
A03C:00                 DEFB 0
A03D:C9                 RET
                        Enable event
A03E:                   .enable
A03E:21 53 A1           LD HL,flags
A041:CB 46              BIT 0,(HL)
A043:C0                 RET NZ
A044:CB C6              SET 0,(HL)
A046:3E 02              LD A,2
A048:CD 0E BC           CALL &BC0E
A04B:CD 25 A0           CALL string
A04E:                   DEF$ 'Address:'
A056:0D 0A              DEFW &0A0D
A058:                   DEF$ 'Address:'
A060:00                 DEFB 0
A061:21 A0 D0           LD HL,&D0A0
A064:06 50              LD B,80
A066:                   .su
A066:36 FF              LD (HL),&FF
A068:23                 INC HL
A069:10 FB              DJNZ su
A06B:3E 01              LD A,1
A06D:CD B4 BB           CALL &BBB4
A070:21 00 00           LD HL,&0000
A073:11 01 4F           LD DE;&4F01
A076:CD 66 BB           CALL &BB66
A079:AF                 XOR A
A07A:CD B4 BB           CALL &BBB4
A07D:21 03 00           LD HL,&0003
A080:11 18 4F           LD DE,&4F18
A083:CD 66 BB           CALL &BB66
A086:CD AF A0           CALL mon
A089:21 5A A1           LD HL,tick
A08C:11 05 00           LD DE,5
A08F:42                 LD B,D
A090:4B                 LD C,E
A091:C3 E9 BC           JP &BCE9
                        Disable event
A094:                   .disable
A094:21 53 A1           LD HL,flags
A097:CB 86              RES 0,(HL)
A099:21 5A A1           LD HL,tick
A09C:C3 EC BC           JP &BCEC
Set monitor address
A09F:                   .monitor
A09F:21 53 A1           LD HL,flags
A0A2:CB 46              BIT 0,(HL)
A0A4:C8                 RET Z
A0A5:3D                 DEC A
A0A6:C2 2F A0           JP NZ,error
A0A9:DD 5E 00           LD E,(IX+0)
A0AC:DD 56 01           LD D,(IX+1)
A0AF:                   .mon
A0AF:CD 06 B9           CALL &B906
A0B2:F5                 PUSH AF
A0B3:ED 53 D7 A0        LD (&A0D7),DE
A0B7:21 0B C0           LD HL,&C00B
A0BA:7A                 LD A,D
A0BB:CD F6 A0           CALL print
A0BE:7B                 LD A,E
A0BF:CD F6 A0           CALL print
A0C2:21 10 00           LD HL,16
A0C5:19                 ADD HL,DE
A0C6:EB                 EX DE,HL
A0C7:7A                 LD A,D
A0C8:21 5B C0           LD HL,&C05B
A0CB:CD F6 A0           CALL print
A0CE:7B                 LD A,E
A0CF:CD F6 A0           CALL print
A0D2:F1                 POP AF
A0D3:C3 09 B9           JP &B909
                        Event routine
A0D6:                   .event
A0D6:11 00 AE           LD DE,&AE00
A0D9:21 11 C0           LD HL,&C011
A0DC:0E 02              LD C,2
A0DE:                   .again
A0DE:06 10              LD B,16
A0E0:                   .eloop1
A0E0:1A                 LD A,(DE)
A0E1:CD F6 A0           CALL print
A0E4:13                 INC DE
A0E5:23                 INC HL
A0E6:3E 09              LD A,9
A0E8:B8                 CP  B
A0E9:20 01              JR NZ,nospace
A0EB:23                 INC HL
A0EC:                   .nospace
A0EC:10 F2              DJNZ eloop1
A0EE:21 61 C0           LD HL,&C061
A0F1:0D                 DEC C
A0F2:C2 DE A0           JP NZ,again
A0F5:C9                 RET
                        Print hex number
A0F6:                   .print
```

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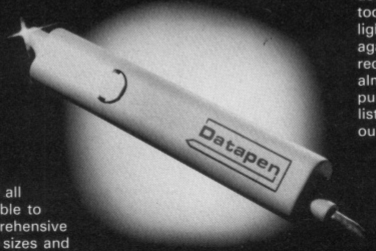

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```
A0F6:C5          PUSH BC
A0F7:D5          PUSH DE
A0F8:22 58 A1    LD (temp),HL
A0FB:F5          PUSH AF
A0FC:0F          RRCA
A0FD:0F          RRCA
A0FE:0F          RRCA
A0FF:0F          RRCA
A100:CD 0D A1    CALL printit
A103:F1          POP AF
A104:CD 0D A1    CALL printit
A107:2A 58 A1    LD HL,(temp)
A10A:D1          POP DE
A10B:C1          POP BC
A10C:C9          RET
A10D:            .printit
A10D:E6 0F       AND &0F
A10F:C6 90       ADD A,&90
A111:27          DAA
A112:CE 10       ADC A,&10
A114:27          DAA
A115:6F          LD L,A
A116:26 00       LD H,0
A118:29          ADD HL,HL
A119:29          ADD HL,HL
A11A:29          ADD HL,HL
A11B:11 00 00    LD DE,0
A11E:19          ADD HL,DE
A11F:EB          EX DE,HL
A120:01 08 00    LD BC,&0008
A123:2A 58 A1    LD HL,(temp)
A126:23          INC HL
A127:22 58 A1    LD (temp),HL
A12A:            .loop
A12A:1A          LD A,(DE)
A12B:77          LD (HL),A
A12C:13          INC DE
A12D:7C          LD A,H
A12E:81          ADD A,C
A12F:67          LD H,A
A130:10 F8       DJNZ loop
A132:C9          RET
                 Jump table
A133:            .jump_table
A133:3E A1       DEFW name_table
A135:C3 3E A0    JP enable
A138:C3 94 A0    JP disable
A13B:C3 9F A0    JP monitor
                 Name table
A13E:            .name_table
A13E:            DEF$ 'ENABL'
A143:C5          DEFB &C5
A144:            DEF$ 'DISABL'
A14A:C5          DEFB &C5
A14B:            DEF$ 'MONITO'
A151:D2          DEFB &D2
A152:00          DEFB 0
                 Flags
                 0=event on/off
                 1=RSX initialised
A153:            .flags
A153:00          DEFB 0
A154:            .workspace
A154:00 00       DEFW 0
A156:00 00       DEFW 0  ;for OS
A158:            .temp
A158:00 00       DEFW 0
A15A:            .tick
A15A:            DEFS 6
A160:            .block
A160:            DEFS 7
A167:            END
```

Program II

```
10 REM PROGRAM II
20 MEMORY &9FFF
30 a=&A000
40 INPUT a$
50 POKE a,VAL("&"+a$)
60 a=a+1
70 GOTO 40
```


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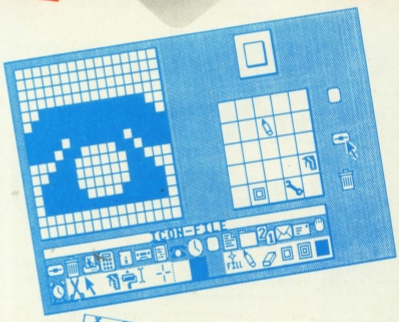

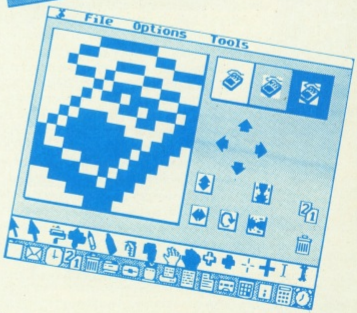

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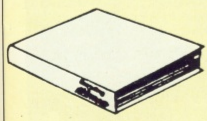

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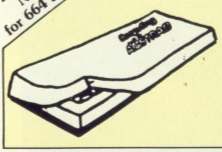

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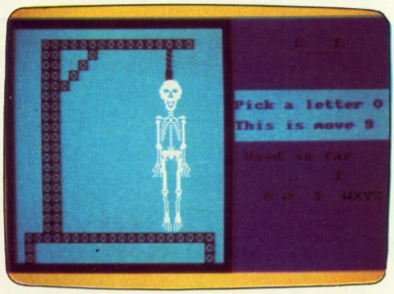

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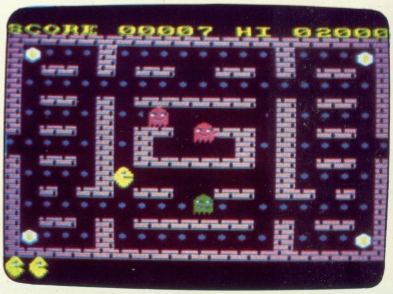

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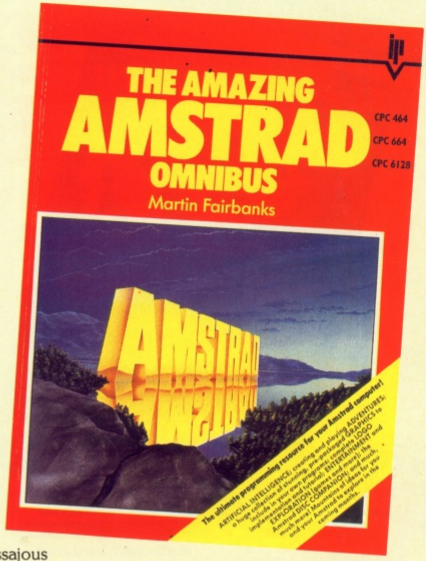

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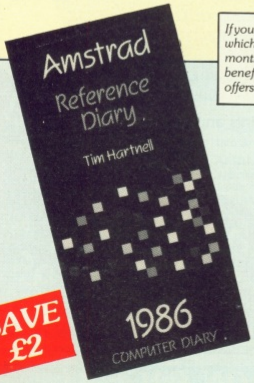

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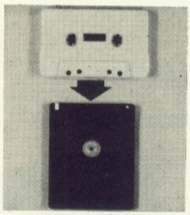

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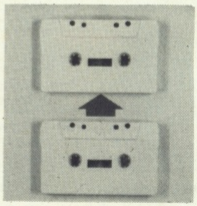

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Suppressing line feed on Amstrad

OCCASIONALLY people with printers used by more than one micro prefer to leave them with the dip switch set to give line feeds permanently.

Unfortunately when used with the Amstrad, because this provides a line feed of its own, a double line feed is generated unless certain modifications are carried out to the printer lead.

The following routine will suppress the Amstrad's line feed by intercepting the firmware jump to &BD2B and removing the appropriate code.

```
10 DATA &FE,&0A,&28,&07,&F5
,&3E,&1B,&CD,&0B,&BF,&F1,&C
F,&F2,&87
20 DATA &E5,&21,&2B,&BD,&36
,&C3,&23,&36,&00,&23,&36,&B
F,&E1,&C9
30 FOR x%=0 TO 27:READ y%:P
OKE &BF00+x%,y%:NEXT
40 CALL &BF00:END
```

Once the program is run it will be active until a full reset is performed. In this case it still remains in memory and can be re-activated by CALLing &BF0E in direct mode. – **Andre Berghmans, Diest, Belgium.**

Contact

I AM a sixteen-year-old boy in Norway who would like to get in contact with other Amstrad owners in England.

Maybe we could exchange games programs and tips by post?

I have got the CPC664. Why miss the chance to get in contact with a Norwegian boy? Everyone will get a reply. – **Lars ove Brenna, Steinspranget 5, 3340 A°mot, Modum, Norway.**

Egg Blitz scores

AFTER buying a few issues of your magazine, I was so impressed by it that I sent for all the back issues, and placed a regular order with my newsagent.

I promptly set about typing in all the listings, and have felt great satisfaction in getting them all to run.

I was interested to read an October letter concerning the Biorhythm Calendar program (July) from Lesley Tinker.

Lesley had a syntax error in 780, and I found exactly the same error when I ran my program.

I eventually found my typing error in 520, which when rectified resulted in the program running perfectly.

I get immense pleasure from typing your programs in, and have learned a fair bit.

By using the very useful REM lines I am able to find my way about the program, and I am now able to correct most of my errors quite quickly.

However, one program still has me puzzled. Egg Blitz (April), about which I have already read one letter from R. Holden of Pontefract.

The game itself runs OK and is in fact quite easy to play after a few tries.

High scores are possible, achieving up to about six screens where the scores are so high that the plane crashes almost as soon as it appears on the screen.

But it is the high score that is the problem.

My game only goes up to 99 just like Mr Holden's and then must start from one again.

I notice that the score starts at 01 and this leads me to believe that there is only provision for a two digit number in the score line.

If, as you insist, the program is correct, then I'm sure your experts could tell us where we might be likely to find our problem in the machine code jungle.

If however, as I suspect, the fault lies in the listing, then I would beg you to have a look at it, and tell us how to rectify it. – **S.J. Nimmo, Ormskirk.**

● You're right about the score in Egg Blitz, it's only a two digit number. We couldn't get past 50, so assumed that two digits would be enough. The machine code has been written accordingly. It would mean a complete re-write of the routines to achieve what you want.

We won't make the mistake of under-estimating our readers' skills again!

Logged

I WOULD like to point out to P.H. McPherson (Postbag, December) that the antilog, base 10 of a number is, by definition, 10 raised to the power of that number. In Basic, the antilog of x is simply antilog = 10↑x.

I must also observe that 2.30258509 is not the number "e" as Mr McPherson states. It is in fact the natural logarithm of 10. – **R.G. Strange, Coventry.**

Visual checksum

I HAVE read many letters on how to debug programs and how to type in accurate listings. My idea is simple, and from personal experience quite effective. It is basically a visual "checksum" for each program line.

☐ *Count the column width in number of characters (N) of the published listing. For example N=37.*

☐ *Make line 1 WINDOW 1,N,1,25:END*

☐ *Run this line before entering program.*

☐ *The listing, if entered correctly, should then appear on the screen in identical format to the printed page.*

☐ *Line lengths, and particular characters in a line can then be compared with previously entered lines and with the printed line.*

☐ *This doesn't eliminate or check for all mistakes but does detect many. Use PRINT when shown in the listing – don't abbreviate it to ?.*

☐ *When the program entry is complete, delete line 1 and SAVE it.*

I hope readers find this idea useful. – **Stephen Eastmead, Darlington, Co Durham.**

Memory savers

I WOULD like to say how much I enjoy Al's Beat.

I like the format and feel that many people will learn a lot from its style of entering programs in blocks and explaining them as you go along, rather than overfacing them with a complete listing and a long winded description.

Having said that, I hope that I won't upset Al too much by accusing him of not making the most of Amstrad Basic on occasions and also of sometimes using a sledgehammer to crack a nut.

Memory can be saved in a number of ways:

● *Excessively long variable names waste memory every time they are used.*

Some of the variables are not required at all. For example newboatx, oldboatx *could both be replaced by* boatx, *and* newbomby *shortened to* bomby.

These shorter names still convey the purpose of the variable.

● *Making full use of available commands saves memory as, when tokenised, they only use one byte.*

For example STRING$ used to replace the FOR/NEXT loops in the title to print the line of asterisks would save seven or eight bytes each time.

ERASE used to clear the array eliminates the need for line 500.

● *Repeated use of a par-*

ticular condition, as in lines 880-900

```
IF newbomby>1.....
```

should be avoided, not only because it uses up memory, but because it slows the program down.

Lines 880-900 can easily be combined into one line which checks for that condition first and if so, tests for the other conditions.

● *In lines 1080-1100 where a variety of print options are all to be printed at the same place, it is better to use the LOCATE command only once, before testing the conditions.*

● *Multiple checking of the same condition is wasteful of memory and time, as in lines 1080-1100. All that is required is:*

```
IF sub=5 THEN PRINT #1,
"That's the lot!!" ELSE
PRINT #1, "You're out of
ammo!"
```

● *It is unnecessary to use #0, as the default screen is 0. This alone saves over 100 bytes.*

● *Don't over-dimension arrays. "Sea" is dimensioned to (19, 21), whereas it only needs to be dimensioned to (10, 12).*

Incidentally, before I forget, the flashing of the mine-sweeper is nothing to do with the screen flyback, merely a result of the WHILE/WEND loop repeatedly clearing and printing the minesweeper.

Solution – stop the loop by inserting:

```
635 WHILE INKEY$="":WEND
```

to wait for a key press and you can then remove the delay loop in line 670 as well.

I am sorry if this letter appears to be very critical, it's not meant to be.

It's just that, as a result of my teaching experiences, I find that people tend to take the things they read as gospel and never question them, which makes it all the more important to get things as near correct as possible.

As it is, the Spectrum, with its slightly weird Basic and limited looping abilities, has bred a generation of spaghetti programmers with GOTOs all over the place.

You can see it spreading into a lot of Amstrad programs as people upgrade, and I feel that anything that can be done to improve matters can only be to the good. – **David F. Foster, Kendal.**

● Even though we don't completely agree with you regarding the benefit to be gained from long variable names we are grateful for your efforts in coming to Al's aid on this one.

Once we managed to get him inside off the window ledge he accepted that your points were good ones and made the following comments:

"I imagine that many of your suggestions were noticed by my colleagues in the office, but if they had pulled me up about each one at the time, the game would have ceased to be mine.

"It would virtually have been written by the A Team, and A Team's Sub Hunt doesn't sound right.

"It's nice to know that readers appreciate what I'm trying to do, and I hope they learn something from your valuable contribution".

Computing with the Amstrad Postbag

WE welcome letters from readers – about your experiences using the Amstrad, about tips you would like to pass on to other users . . . and about what you would like to see in future issues.

The address to write to is:

Postbag Editor
Computing with the Amstrad
Europa House
68 Chester Road
Hazel Grove
Stockport SK7 5NY

No joy on Sorcery

DESPITE reading about some problems readers have had with Sorcery, I still went ahead and bought a copy.

When I tried to load it the datacorder kept stopping. I have now found out the reason for this, and it could be the reason why other people are having trouble.

If you load the program without the joystick plugged in the program loads without trouble – on my Amstrad that is.

I hope this proves helpful. I have finished Sorcery – well done Virgin for a great game, and Computing with the Amstrad *for a superb mag, and for Gandalf's pages.* – **Darren L. Stephens, Grovehurst.**

Storing screens

I HOPE you can solve a problem that has dogged me for some time now.

I recently wrote an RSX that would copy the screen image and then by a call would show the screen copy called earlier.

But I cannot find out how to store more than one screen copy at a time and hence view each different screen.

Every time I try to copy more than one screen image and then show these images again I keep getting the original only. – **G. Steel, Bootle.**

● The easiest way to do it is to copy the whole of memory from &C000 to &FFFF down to &4000.

When you want to show this, copy it back up to &C000.

As the screen takes up 16k of RAM it's only possible to have two present in the memory at the same time, one at &C000 and one at &4000.

Floating point perils

As a complete novice with machine code I found Mike Bibby's series excellent. I have also typed in Roland Waddilove's RAW assembler and the disassembler and find both very useful and instructive.

My problem is to call the real number (floating point) routines for addition and multiplication from machine code on the CPC464.

I know Basic must have them, but where are they?

Yes, I could eventually write my own, but I don't want to rediscover the wheel.

The reason I want the routines is to finish a program to draw fractals based on the Mandelbrot set (c.f. a recent article in Scientific American).

My current program, in Basic, takes 10 seconds on average to plot one pixel! – **David N. League, Cheltenham.**

● We don't know where the floating point routines are in the ROM.

Even if we did, we wouldn't recommend directly addressing them, as they can vary so much between machines.

Unlike the firmware routines, where there's a jumpblock, with arithmetic routines there's no guarantee.

In the time honoured tradition of "if I were going there I wouldn't start from here", we'd recommend you use a different algorithm and steer clear of floating point routines.

Redefining characters

MANY commercial games seem to redefine the entire Amstrad character set, and sometimes this makes quite a difference to the presentation.

I started to redefine the character set into a space age style with my own character definer.

I found this rather a long-winded process so I decided to try and write a simple Basic routine which

redefined the characters according to simple rules.

This was a much faster method and apart from a few characters which turned out pretty badly, was sufficient for my needs.

The program is really very simple, but being in Basic is rather slow.

Here are two examples, one for italic style and the other for bold style. – **Simon Holderness, Bourne, Lincs.**

```
10 REM Italics
20 MODE 1:BORDER 26:INK 0,2
6:INK 1,0
30 LOCATE 3,10:PRINT"Please
 wait!  Italic style charac
ter"
40 LOCATE 10,12:PRINT"set i
s being generated"
50 SYMBOL AFTER 32
60 FOR char=HIMEM-255+32*8
TO HIMEM-255+127*8+7 STEP 8
70 FOR part=0 TO 3
80 POKE char+part,VAL("&X"+
"0"+LEFT$(BIN$(PEEK(char+pa
rt),8),7))
90 NEXT part,char
```

```
10 REM Thick characters
20 MODE 1:BORDER 26:INK 0,2
6:INK 1,0
30 LOCATE 3,10:PRINT"Please
 wait!  Thick style charact
er"
40 LOCATE 10,12:PRINT"set i
s being generated"
50 SYMBOL AFTER 32
60 FOR char=HIMEM-255+32*8
TO HIMEM-255+127*8+7
70 IF PEEK(char)>127 THEN P
OKE char,PEEK(char)-128
80 IF (PEEK(char) AND 2)=2
AND (PEEK(char) AND 1)<>1 T
HEN POKE char,PEEK(char)+1
90 NEXT
```

Level 9 on 6128

YOUR readers might like to know that all Level 9 adventures work on the new Amstrad 6128. Instructions are the same as for the 664.

For Colossal Adventure, Adventure Quest, Dungeon Adventure, Snowball and Lords of Time adventures type:

```
!TAPE
MEMORY &2FFF
LOAD "ADVENTURE",&3000
```

Start the tape and press any key. When the tape has loaded type:

```
CALL &3000
```

followed, of course, by Return.

For Return to Eden, Emerald Isle, Red Moon and The Worm In Paradise adventures type:

```
!TAPE
RUN""
```

Press Return, start the tape and press any key whenever the computer asks you to. – **Margaret Austin, Manager, Level 9 Computing, High Wycombe.**

Anagrams to order

HAVE you any ideas about a program for the Amstrad (I have a 464 with disc drive) to either solve or set anagrams?

For instance, I would like one for my name to give me a pen name. But the possibilities run into thousands.

Could this be printed out as either set choices or complete lists?

Thank you in advance, as I am sure there is a genius there who knows how to do such simple things.

Good magazine, good binders, good listings. Keep up the good work. – **Graham Ash-Porter, Little Staughton.**

■ Here's a short simple program to produce an anagram of any word or sentence.

```
10 REM Anagrams
20 INPUT "Enter word";a$
30 PRINT "Anagram is ";
40 WHILE LEN(a$)>1
50 j=1+INT(RND*LEN(a$))
60 PRINT MID$(a$,j,1);
70 a$=LEFT$(a$,j-1)+MID$(a$
,j+1)
80 WEND
90 PRINT a$
```

Debugging Dedit

IN his letter in the October issue of Computing with the Amstrad *R.J. Taylor commented on the problem which could arise from the use of upper case in line 320 of Dedit:*

```
320 k$="READ".....
```

This causes disc corruption by writing instead of reading. He does not comment on the analogous problem in line 160:

```
160 IF ASC(S$)=237 THEN k$
="WRITE" ...
```

and so on. For similar reasons, this causes failure at line 520:

```
520 IF ASC(k$)=119 THEN
PRINT "Sector written
successfully";CHR$(7)
```

The use of upper case in line 160 gives ASC(k$) = ASC("W") = 87 so the screen message is not printed.

It is imperative that lower case is used for "read" and "write" in lines 320, 160 respectively.

I had considerable trouble in debugging this program after typing, mostly because of its acute dependency on spaces inside string quotes in, for instance, line 1120 which should be:

```
1120 ....WHILE S$<>" ".....
```

Note that this is " " not "". That is, there is a space between the quotes. In my listing a carriage return coincided with this gap making it difficult to see.

Failure to notice this causes the Help menu to shoot off the bottom of the page.

Although trivial, the inclusion of spaces before the end-of-string quotes in line 1230 after the words "sector" and "program" improves the legibility of the display:

```
1230 IF ASC(S$)=237 THEN k$
= "Save sector " ELSE "Quit
program "
```

As Mr Taylor says, the program works well once you get your typing debugged.

On the Amstrad disc the directory starts at sector 65, track 2 and 16 bytes are allocated to each file name.

Of these, the first byte is Ascii nul (&00) for a valid file and &E5 for an erased file. To reinstate an erased file it is necessary only to overwrite the &E5 with &00. – **Bruce F. Walker, Dundee.**

Bouquet for Amsoft

I'M the very pleased owner of a "Joyce" although I wish Amstrad was more original in the naming of its babies.

Being of an engineering bent, I actually prefer PCW8256, mouthful though it is.

As I was present at Dixons, Wigan while their first consignment of this model was delivered, I was probably the first person in the area to adopt one. And I'm sold on Locoscript.

There was only one bug that I was aware of – the page numbering feature didn't work. That is, the user couldn't put this feature into a document layout – the feature as included with the samples in the software did work fine.

So I rang Amsoft. They were aware of the bug, and told me that an upgraded version of the software would shortly be available, but no indication of date or cost was given.

I wasn't too upset. While page numbering is undoubtedly a useful feature, lack of it doesn't detract from the excellence of the package – at least for the time being.

I could cheerfully rabbit on at great length about it but the reviews have said it all, anyway and they were my guide to this purchase.

I am not disappointed. However, knowing Amstrad, I was prepared for a wait for the revised software.

The new disc arrived on our doormat two days later, compliments of Amsoft. So my

compliments to them. Fantastic service!

I'm new to computing. I bought my first micro last January – a CPC464 – which I intend to keep, because it's too useful to get rid of. In fact I'd like to complete the set with a CPC6128 if finances permit. At Amstrad prices, it's very tempting.

Of course the operating systems differ, so that transferring my existing programs to the PCW won't be easy for a novice like me. Mallard Basic is rather different, too and I'm looking forward to mastering it.

As I'm not yet capable of writing software suitable for the PCW, I hope it won't be long before software houses produce a mailmerge package.

If I understand correctly the titles of the system files "hidden" within the Locoscript files, the PCW is designed to accept this feature when it's made available, and some form of graphics capability for designing and printing professional letter headings incorporating logos would improve it out of sight.

A form designer wouldn't go amiss, either. I'm having limited success with the system as it stands. The underline feature gives me ruled lines, but vertical lines, for boxes and so on, are a problem.

The point of all this – apart from the fact that I enjoy using the PCW – is a query relating to the 464.

I'm working on an ambitious, for me, program that involves file handling. All fields are restricted to a maximum of 255 characters, and so far everything works well, except . . .

When I save a file using INPUT "FILENAME "@f$ followed by OPENOUT f$, with the save messages enabled, the resulting file name is gibberish culled at random from one of the files themselves.

I've been using "Dummy 1" and so on for testing purposes, but this isn't what the 464 returns.

However the file itself is saved intact, although this wasn't the case until I swapped from using PRINT#9 to using WRITE #9.

I had been getting complete garbage on occasions, which meant re-compiling my test file time and again.

As far as I can tell, my usage of the commands is correct – the original 'skeleton' program did, and still does, handle dummy files accurately – and I've cleaned the heads on the Datacorder at intervals. Any suggestions, please?

Finally, I'm an avid reader of Computing with the Amstrad. *You've provided me with a lot of enjoyably-presented and useful information since Issue 2. Looking forward to more of the same (including features on the PCW?). Long life to you!* – **Peter Greenwood, Wigan.**

● The only thing we can suggest is to put the following lines at the start of your program. Have any of our readers experienced similar problems?

```
OPENOUT "dummy"
MEMORY HIMEM-1
CLOSEOUT
```

Trace and disc drives

MY article and routines "Trace made useful" which you published in the November issue of Computing with the Amstrad *were written before I had a disc drive.*

Although the routines were re-assembled at your suggestion to an address where they avoided the memory used by the disc interface, I could not know – because there is no indication of it in the firmware manual – that the firmware call &BD37 used to re-set the jumpblock causes the machine to revert to cassette operation.

Cassette users are, of course, unaffected. Disc users should note that provided the routine has been turned off using CALL &A5DE a simple |DISC command will restore normal operation.

Unfortunately, short of re-writing the routines to restore the jumpblock by other means, there is no way that the routines can cope with any part of a program which expects to read from or write to disc.

Where this proves a problem it is usually easy temporarily to add the necessary calls to turn the routine off just before, and back on just after, the disc handling routines in the program being "traced".

Sorry for any difficulties you may encounter arising out of this. – **Keith Denham, Wimborne, Dorset.**

Help on tap

YOUR excellent magazine was one of the main spurs to my early purchase of a CPC664, and I don't think I'm the only person to turn to the letters page first.

I would like to suggest that you actively encourage those computing with Amstrads to communicate with each other by publishing the names and addresses of those willing to give and take advice.

I have found that most of the tricks-of-the-trade appear in your postbag pages, whereas the basic skills are taught in articles in the rest of the mag.

If one can combine the classic style of programming that you teach with the inspirational touches gleaned elsewhere it is possible to turn out some surprising programs.

May I offer this tip as a contribution. Often in a program using windows it may be desirable to clear a window and then re-print a large part of what existed.

It is possible to redefine the window before clearing the desired area, but that is long winded and unnecessary.

Simply type in LOCATE at the end of the text you wish to retain, and:

```
PRINT CHR$(20)
```

This will clear to the end of the window.

Finally, a complaint. With the price of a printer remaining almost as high as a decent computer, the insistence upon the provision of a listing when offering a program is a drastic restriction upon those wanting to tender ideas. Is anyone willing to help? – **W.E. Wilson, 67 Norfolk Crescent, Nuneaton CV10 8BY.**

● We never insist on a listing from anyone sending in something for publication.

If you read our 18 commandments in the March 1985 issue of *Computing with the Amstrad*, you will see that we ask for one "if possible".

Saving object code

I AM trying to grasp the elementary principles of machine code. One major difficulty I have at present is that I am unable to save and load object code.

Could you tell me how exactly I can achieve this? I am loath to type in lengthy machine code listings without some protections against crashes! – **H. Goodman, St. Austell.**

● To save object code you use the normal SAVE commands, but because the file is a binary one add the suffix b, followed by the start address and length of the file, as follows:

```
SAVE "filename",b,&8000,500
```

You can load it back again with:

```
LOAD "filename"
```

which will load it to where it was saved from.

You can force it to another address, say &9000, by using:

```
LOAD "filename",&9000
```

. . . and paper

I AM writing to let you know how valuable I find Roland Waddilove's Dump program which I have on the March cassette.

Many of my programs consists of, say, 10 to 15 lines and when I call &AA00 I feel rather like the Sorcerer's Apprentice!

The program dutifully goes on reading all the remaining lines on the screen and of course the printer runs on turning up blank paper until 25 lines have been completed.

Is there any command I can write in to instruct the printer to stop after "n" blank lines have been encountered? – **J. Humphreys, Dorking.**

● The screen dump was designed to dump all 25 lines of the screen. If you wanted to dump less the machine code would need to be re-written. Sorry, there's no simple way of doing it.

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Beebugsoft	30, 31	M.J.C. Supplies	94
Blaby Computers	102	Microbyte	102
Camel Micros	101	Newstar	69
Cascade	47	Northern Computers	102
Caxton Publishing	8	Optronics	40
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Cornix Software	94	Pride Utilities	77
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DK'Tronics	50, 51, 104	Qualsoft	60
Datastar	48	Red Arrows	6, 7
Digital Research	63, 65	Selec Systems	84
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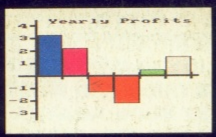

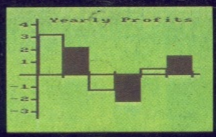

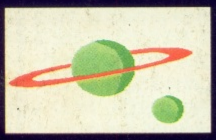

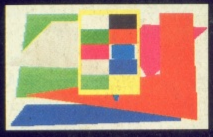

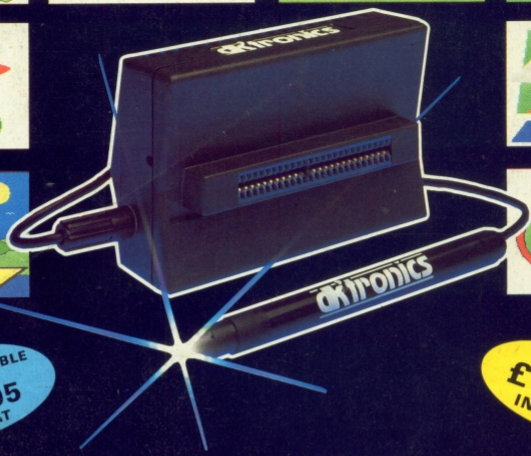

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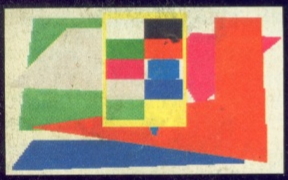

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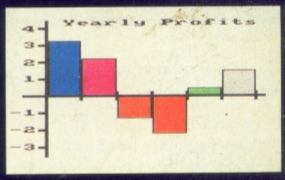

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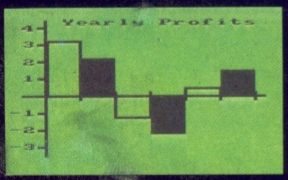

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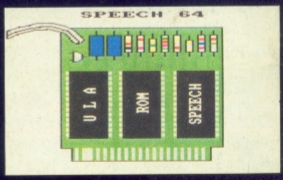

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