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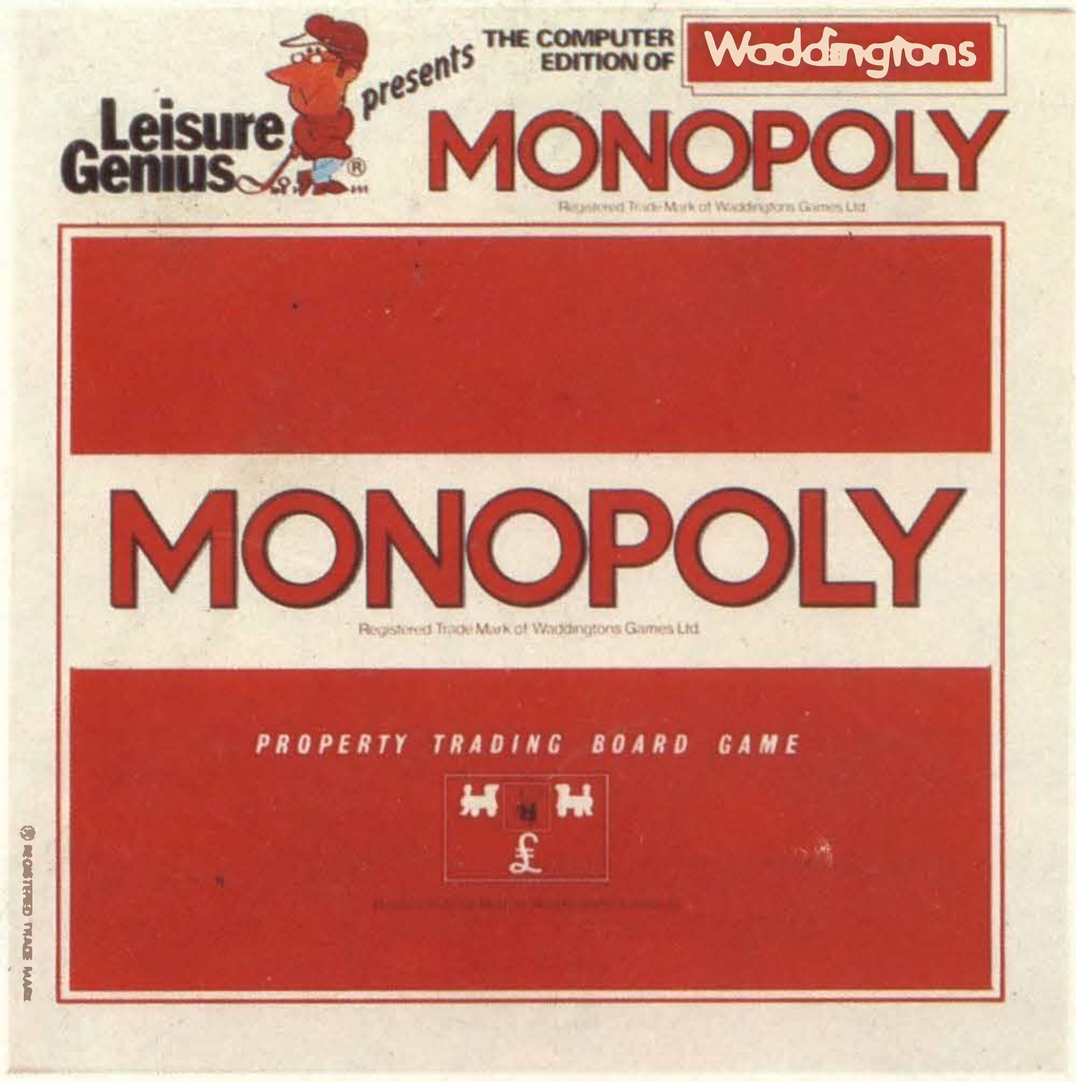

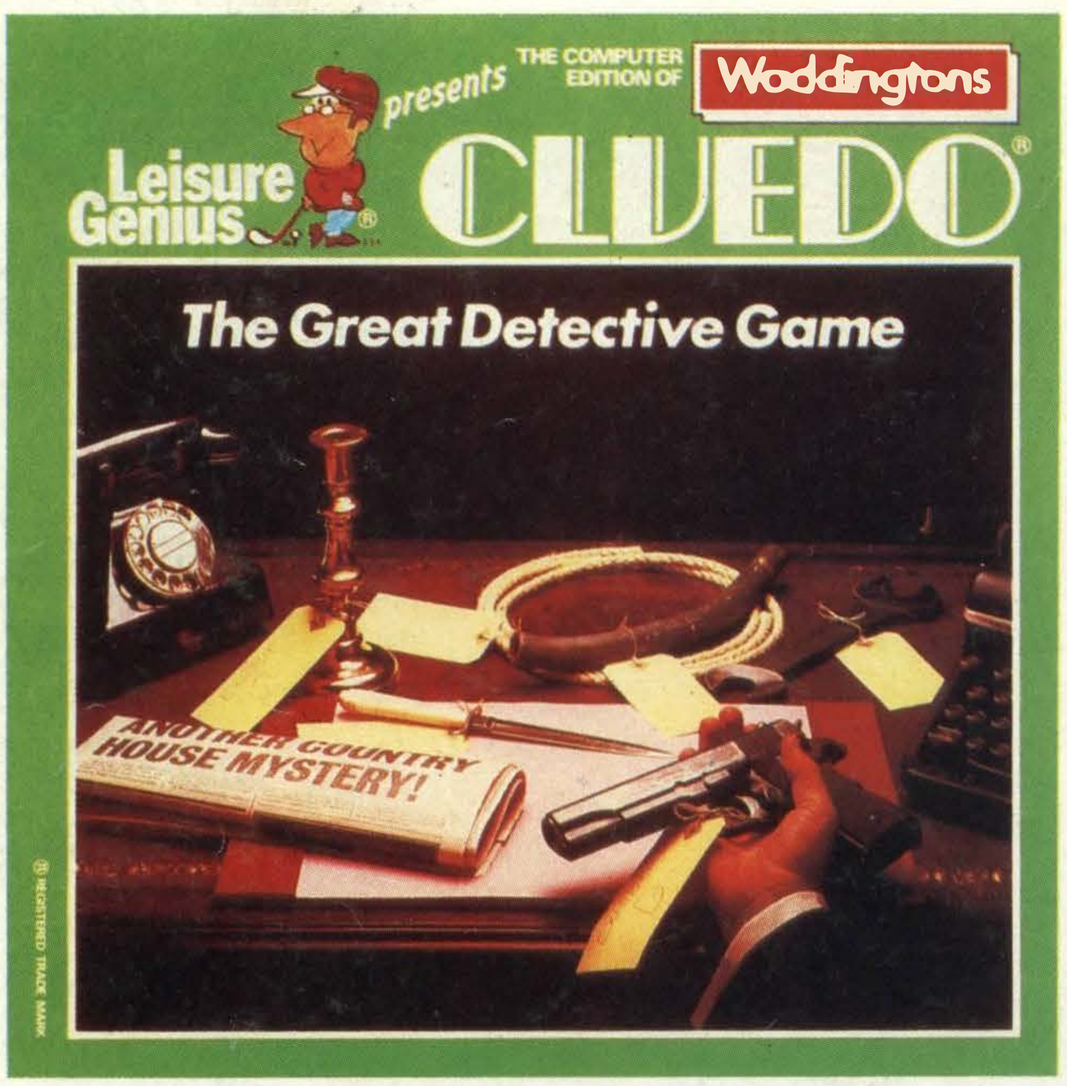

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MSX COMPUTING

AUGUST/SEPTEMBER 1986

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STAY IN TOUCH

One of the most interesting tasks on *MSX Computing* is looking through the letters you send us. Regular feedback from the readers is the only way we have of knowing what you want from the magazine and whether or not we are striking a fair balance between the different topics which interest you.

It is becoming clear that most of you fall into one of two main categories. Lots of you are experienced enthusiasts with two or three years of computing under your belts, including experience of machines other than MSX types. Another body of readers consists of relative newcomers, most of whom bought MSX micros as their first computer around last Christmas. Obviously there are difficulties in catering for both levels of experience, but we hope we can continue to come up with an acceptable compromise.

Whatever you think, we would like you to give us your thoughts on the way the magazine might develop. Over the next month we'll be keeping a special watch on the mailbag, and your opinions will play a significant role on the shape of future issues. Please write rather than telephoning — a written record of everyone's comments helps us get a better overall picture, and besides, we could easily end up so busy answering the phone that we have no time left over for producing the next issue.

Naturally, any changes you ask for will be more likely to happen if they are reasonably practical — we can't add more software reviews, for example, unless software houses bring out more titles. Sadly, there are limits on the number of pages we can put in each issue, so if you suggest more coverage in one area, try to suggest something you think we should cut down on.

Leaving aside your comments on the magazine for a moment, we also get a lot of letters asking for help with various problems. Unfortunately we can't guarantee a personal reply to these queries, though we do make every effort to write back or to answer through the letters pages when we are able to help. Inevitably our first priority must be to bring the next *MSX Computing* out on time, otherwise we would really see some complaints from MSX users!

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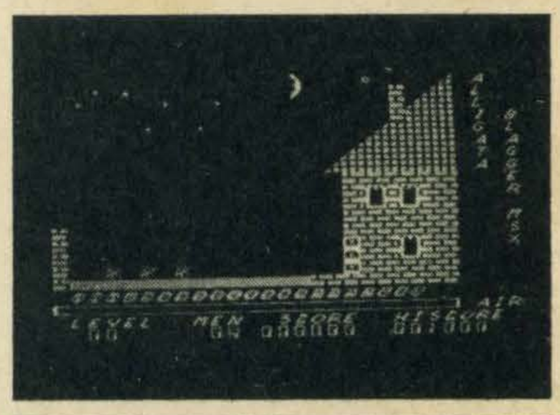

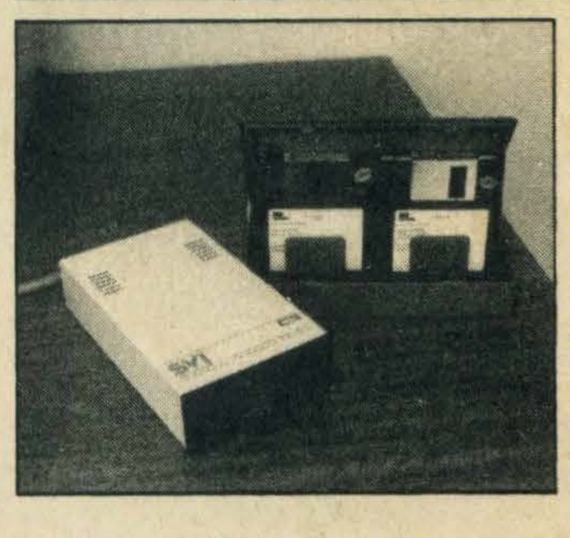

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NEWS

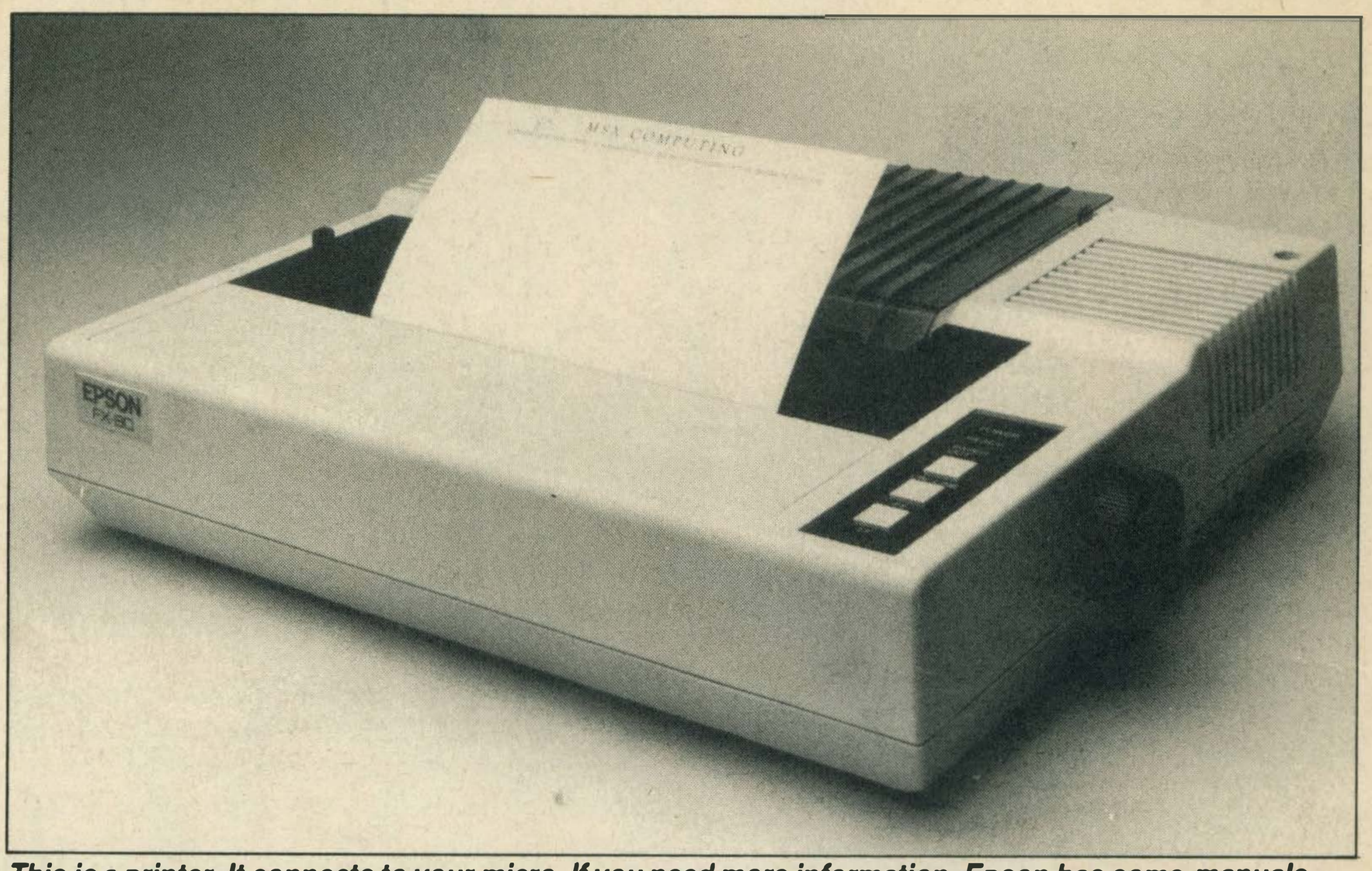
Less money for more software

Two trends in software marketing are currently sweeping the industry. One is to bundle lots of games on to one tape and sell it for a substantial price, and the other is to reduce costs to a minimum and bring out budget-priced titles. The latest recruit to the latter way of doing business is Blue Ribbon Software, which has just knocked down all its prices to a nice affordable £1.99.

Hitherto Blue Ribbon has produced a bunch of games for boring machines like the Atari and Electron, but now the company has decided to exhibit a bit of taste and come up with an MSX range. Goodies included are a completely new game called *M-Droid*, and conversions of their existing titles *Astro Plumber, Diamond Mine II* and *Darts*.

According to the press information, the MSX range will be released on 30 July, so even allowing for last-minute hitches the games should be in the shops by the time you read this.

Blue Ribbon's new address is CDS House, Beckett Road, Doncaster, S. Yorkshire, so direct any enquiries there.



This is a printer. It connects to your micro. If you need more information, Epson has some manuals

If all else fails, there's the manual

Having problems with your Epson printer? Don't panic – help is at hand.

Instead of trying to telephone Epson's technical support desk for some sympathy and a verbal diagnosis, for £12 you can buy one of the company's technical support manuals and sort out the problem yourself.

All this is in addition to the ordinary user manual you get when you buy your printer in the first place (and which Epson does better than most printer manufacturers). In fact, you won't often get this kind of technical information at such a low price.

The manual is written by Epson's technical services department and is aimed at supplying end users with detailed product information which previously the company was only prepared to give out over the telephone.

So instead of hanging on the end of a telephone waiting for a response why not nip down to your local Epson dealer and read up how to make the most of your printer.

More information can be obtained from Jane Farrow at Epson UK on 01-902 8892.

Great little upgrade

MSX owners on the look out for a dot matrix printer below the £200 mark will be interested in the latest from Centronics.

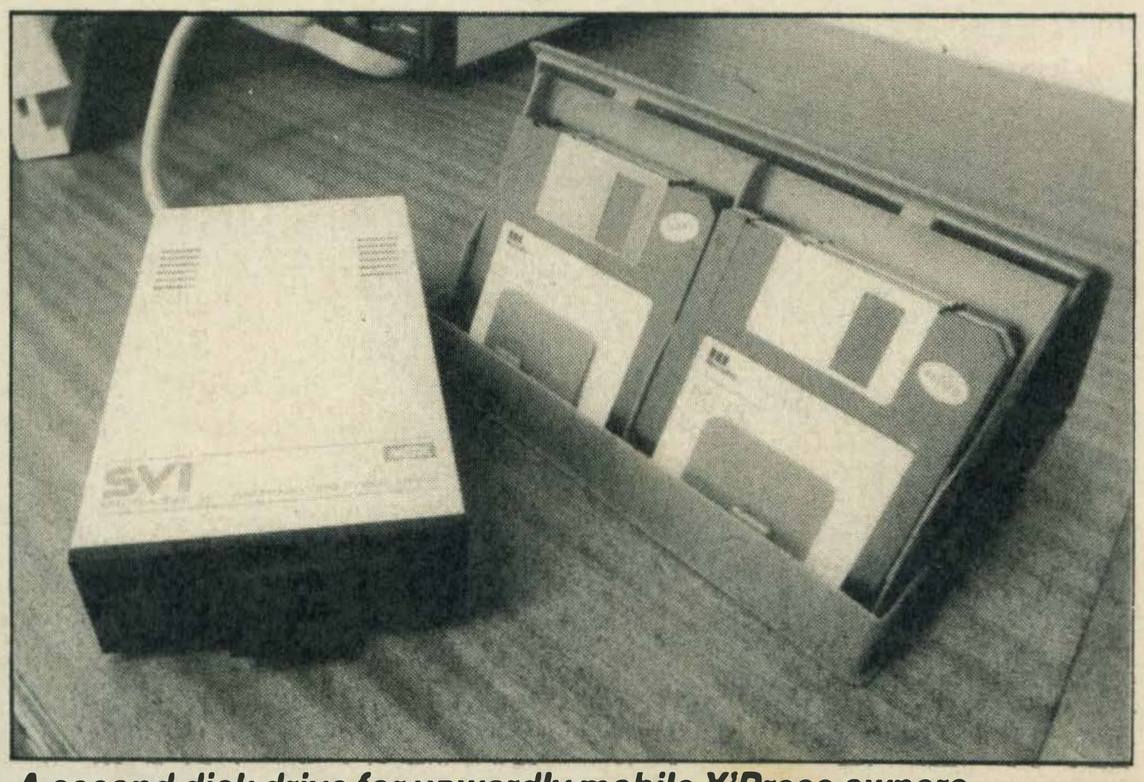
The company has just upgraded its Great Little Printer but has kept the price at £199.

Known as the GLP II the printer offers draft print at 100 characters per second and near letter quality at 25 cps.

Other features include 12 international character sets and a variety of print modes including condensed, superscript and underline.

For more detailed information contact Centronics Data Computers, Petersham House, Harrington Road, London SW7 3HA.

Spectravideo goes for another drive



A second disk drive for upwardly mobile X'Press owners

Spectravideo X'Press owners who find that one disk drive just isn't enough now have help in the shape of an additional drive.

The SVI 787 is a single-sided 3.5 inch drive, giving a formatted capacity of 360k. Well, so much for the boring stuff. The important details are that it is small, neat and plugs straight into the back of your X'Press.

Even more important is the fact that you will need to part with 259.95 folding green beer vouchers to get a dealer to part with one of these invaluable devices.

While on the subject of Spectravideo, we hear with regret that the company is to drop its Voice Modulator. This gas-mask-like device 'transforms the wearer's speech into one of three robotic utterances.' We know some people who must have these fitted internally.

Unfortunately there was not enough interest to make it worthwhile. What has this to do with computing? Absolutely nothing, but we all need a break sometime.

For details about the disk drive write to Spectravideo, 165 Garth Road, Morden, Surrey SM4 4LH.

A fistful of joysticks for hot shots

Getting a grip on games has been made slightly easier thanks to three new marvels of joystick technology.

Palan Electronics has released two products. The modestly titled Fantastic II comes complete with a streamlined and contoured base, dual electronic firing buttons (what did you expect — steam driven?) and eight positional sensors.

The second model is the Quickshot II Plus (where have we heard that name before?). It has the edge on the previous model in the form of an autofire capability and an ergonomic design to stop your trusty trigger finger slipping at the crucial moment.

The Joysticks cost £6.95 and £12.95 respectively, and more details are available from Graham Cook, Palan electronics, Unit 10, Brunswick Industrial Park, Waterfall Road, London N11.

Not to be outdone, the leading joystick producer, Spectravideo, has brought out a model for all those who aspire to Porsches and consider a joystick an essential fashion accessory.

The Quickshot 2 Turbo retains the handgrip design which has made the Quickshot range the top seller in the joystick world.

In common with its predecessor, the Turbo has an autofire switch and two fire buttons. But more important is the fiery red colour scheme and black, studded handgrips which mean it won't look out of place on the parcel shelf of your sportscar.

The new Quickshot Turbo. But what happened to the Ghia?

The Turbo is quite a bit cheaper than a Porsche, at £13.95, and should help Spectravideo retain its lead as joystick champ.

Pirates put up their hands

The amnesty offered by MicroPro, allowing people to legitimise pirated copies of the *WordStar* word processor program, has met with a fairly large response.

The offer was made in November of last year. Anyone with a pirated disk could send it to MicroPro with a cheque for £46, and the copy would be suitably marked and registered as legal — no questions asked, no names given.

About 750 disks were sent in, which a quick fling on the abacus tells us represents an income of around £34,500 for MicroPro. That will presumably make software pirates and MicroPro accountants sleep easier at night.

It didn't all go smoothly. One person sent his cheque stapled to the disk. Another threatened to sue MicroPro when his one-and-only disk was corrupted in the post.

On the whole, however, it has to be seen as a success. The company has recouped at least some of the revenue lost through illegal copying.

The amnesty may well have achieved one of its secondary aims of raising the general awareness of the copyright laws. But whether it will stop people copying is doubtful while prices of professional software remain high.

MSX speaks many tongues

Nicholas Overfield's plea for an MSX Cobol compiler in the last issue raised an amazing response from readers across the world.

Guido Vergult of the Sony Service Centre (Europe) in Belgium has kindly supplied the titles and Sony reference numbers of four disk-based packages for MSX: *BDS-C* (HBJ-S050D), *Fortran* (HBJ-S051D), *Cobol* (HBJ-S052D) and *Pascal* (HBJ-S053D). Overseas readers should contact their local Sony headquarters for prices and further details.

A card from G. J. Lichtenveld in Amsterdam reveals a Dutch source for Nevada Fortran on MSX disk: Brandsteder electronics BV, Jan avn Gentstraat 119, 1171 GK Badhoevedorp, Netherlands.

Meanwhile on the home front, Adam Denning of Software Toolshop rang to say that he can supply most languages for MSX-DOS systems by exploiting the compatibility of MSX-DOS with many CP/M programs. Apart from Hisoft's cassette-based Pascal, you will need a disk system to use these languages. Adam can be reached on 0525 718271 and will happily advise you on which version of C, Pascal or whatever fits in best with your computing needs and budget.

Meanwhile we humble magazine people are wondering what people actually do with all these languages. Sure, Pascal and C are both great languages for writing games and utilities. Even Fortran has its friends. But Cobol? Great for writing commercial payroll programs, but if that's your intention you might just be looking at the wrong computer.

No doubt thousands of enraged Cobol fans will now write in to explain why their favourite language is the finest thing since striped toothpaste, in which case we will be happy to air their views in the next issue of *MSX Computing*.

A new low for Star printer prices

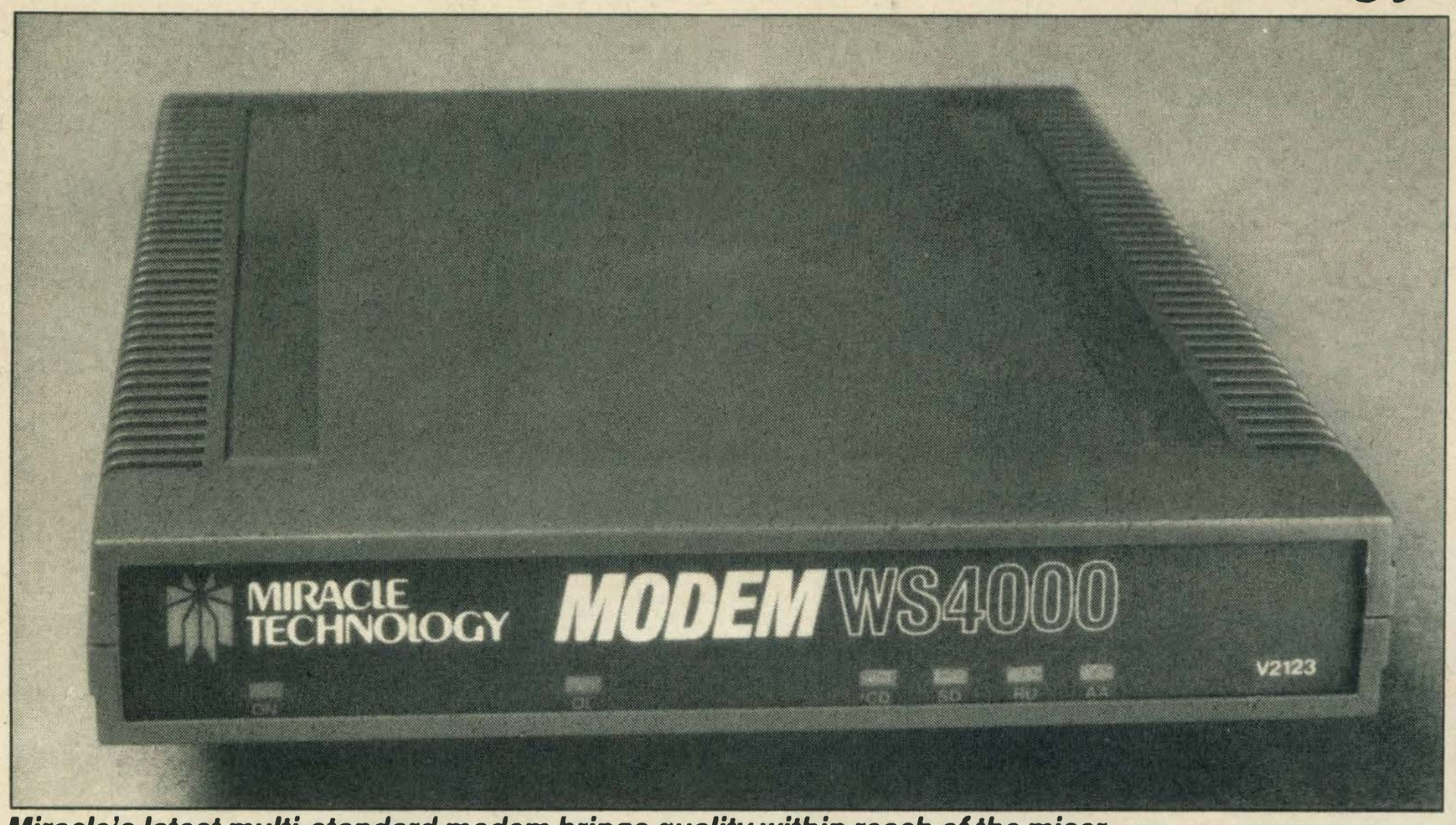
Printer bargains are on offer from Star Micronics to tempt home computer users.

The company has reduced the price of its 18 characters per second Power Type daisy-wheel printer from £349 to £229.

Star's STX-80 thermal printer has also been reduced from £149 to £79.

Star Micronics can be contacted at Craven House, 40 Uxbridge Road, Ealing, London W5 or telephone 01-840 1800.

Another minor miracle in modem technology



Miracle's latest multi-standard modem brings quality within reach of the miser

Miracle Technology has released a cheaper version of its state of the art WS3000 series modems. The new WS4000 has all the features we've come to expect from modern modems — autodial, autoanswer, and multiple baud rates. It is compatible with Hayes protocols which an increasing number of software packages are adopting.

The standard baud rates offered are 300 and 1200/75 full duplex, and 600 and 1200 half duplex. Upgrades are offered for 1200 and 2400 full duplex to take advantage of the new high speed data lines coming into use on systems like Prestel.

Other upgrades include tone dialling and Bell tones, although they're not much use in this country. The price tag of the basic modem is £149.95.

According to our trusty press release, Miracle's sales and marketing manager, David Baxter, believes that 'The WS4000 brings the world of data communications within the reach of everyone and is the ultimate in modem flexibility.'

Micro owners in the club

If you like the idea of MSX user clubs but not using lo-tech snail mail to get in touch, why not use your micro instead?

VR Wyland is running a few pages in the Gallery section on Prestel aimed at MSX micro owners who want to get in touch with each other, for whatever reason. He's especially interested in hearing from more conventional clubs who might want their details posted on this electronic bulletin board.

The idea is that people can read the details about a club and make up their minds which one they want to join before actually getting in contact. It's also a good way of finding out if there's a club opening near you.

If you really do like using the post, why not drop Mr Wyland a letter telling him about your club, whether it's running or simply a twinkle in your eye. Write to 35 Beechway, Maghull, Merseyside L31 1HP.

Don't suffer little children

There is no truth in the rumour that computing makes you blind

If you're one of those trendy types who likes to wear sunglasses indoors, this is the product for you.

Alerted to the dangers of eye fatigue, Bolle produced special glasses to cut out tiring blue light. Now the company has come up with the junior version, called the Comput-Irex Junior and selling for £21.95 plus VAT. That's £25.25 to you.

The secret is in the special amber tinted lenses which filter out the harmful blue light. We have no information about the young person seen modelling the new specs other than that she has found a way of cutting eyestrain even further — you simply don't look at the screen.

Now the monitor problem is solved, what we need is a TV version that will selectively filter out *Crossroads, Knightrider* and *The Price is Right*.

Club details showing on a TV near you

User clubs are springing up all over the place. News has come in of clubs in Denmark, Australia, and even Spalding. Admit it, you're impressed.

The Danish club has evolved from a Spectravideo user group, and now covers both types of computer. The club publishes a magazine which goes out ten times a year to members in Denmark, Sweden and Norway.

The emphasis in the magazine is on improving programming skills, both in Basic and machine code, and getting the most out of MSX machines. Contact Richard Foersom, NJ Fjords alle 20,3, 1957 Frederiksberg C, Denmark.

Meanwhile, down under in South Australia a bunch of like-minded cobbers have got together to form an Aussie user group. It's nice to know they're interested in more than sheep (just kidding guys!).

If you want to give the didgeridoo a rest, contact Mauro Sagginelli the club president, at 5 Ealing Street, Salisbury Downs, South Australia 5108, Australia.

In the more exotic parts of the world, David Webb of Spalding in Lincolnshire has just started up his own club for MSX users who live within a 20 mile radius of his home town.

Membership costs are being kept to a minimum — in fact, it will cost you a mere £1 to join. For that you get a regular newsletter with information on new machines, programs and peripherals.

If you live in Spalding — and why not? — write to David Webb, enclosing a stamped addressed envelope, at 11 Ayscough Avenue, Spalding, Lincolnshire PE11 2QB.

If you live in Wales, however, Spalding is probably a bit too far to travel for club meetings. You would be better off getting in touch with G Lecrass. In spite of the handicap of only having an initial for a first name, Mr Lecrass has started MSX Contact. He's based at 23 Glyncoli Road, Treorci, Rhondda, Mid Glamorgan CF42 6SA.

MSX WARNING

SOFTWARE SHORTAGE THROUGHOUT UK

Despite MSX recently being the largest selling machine in the UK MSX Software has been very difficult to obtain in most areas (in some areas — impossible).

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Game Controller not Joystick

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SIGNED *Ray Reedham.*
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EDDY II (CART)	£24.95
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TRACKER BALL (incl MP606C or MP607C)	£79.95

KUMA

SUPER CHESS	£7.50
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LETTERS

Expansion

Could you please answer a few queries?

Firstly can I get a cartridge with additional RAM for my Sony Hit-Bit?

Several hardware shops tell me that MSX systems use non-standard joysticks; is this true?

How do I go about making back-up copies of my valuable hard-to-come-by software?

Lieutenant B. Halls
HMS Liverpool

Both Spectravideo and Yamaha supply RAM packs but they are expensive and likely to set you back around £100.

As for the joysticks MSX micros can be used with some non-MSX joysticks but not all. Before you buy try it out in the shop first.

Direct tape-to-tape copying is usually successful, but copies must not be sold or lent to other users.

Shedding some light

I am the owner of a JVC HC-7 and very pleased with it. But I am very puzzled by the green light at the side of the CODE key. It doesn't light up and as far as I can make out serves no useful purpose at all.

I would be grateful if you would enlighten me — no pun intended — of the purpose of the light and the key.

P. Jackson
Sheffield

The CODE keys on MSX computers are used for putting accents and umlauts above letters.

The CODE key is used for placing accents above letters

POST BAG

Here's your chance to have a say. Have you been let down by a supplier lately? Or pleasantly surprised by the service you've received? Or perhaps you're just plain stuck on level 1,001 of your favourite arcade action mega-game?

Whether it's a word of praise, a moan, programming tips or a word of advice, we want to hear from you. It's your page, so put pen to paper — now.

The light simply indicates whether the CODE key or the 'dead' key is being used.

Having said that, ours doesn't light up either. We are told by JVC that on Japanese models it indicates that the Kanji keyboard is in use.

Fault finding

Firstly may I congratulate you on an excellent magazine. The program listings are great and the list of software stockists very useful.

Now down to business! Please could you tell me whether there is any software available to diagnose faults in MSX computers?

Also, I am thinking of starting an MSX club for south west London so if anyone is interested and has a few ideas I'd very much like to hear from them.

Ray Gardener
Fulham

We know of no diagnostic software commercially available for MSX micros. We do know that Toshiba supplied most of its dealers with a test ROM.

If you think you have a fault with your computer your dealer should be able to help out.

Learning to code

My son is eager to learn machine code and assembly language and generally get the best out of his computer.

He is currently thinking of buying Tom Sato's *The Complete MSX Programmer's Guide*. As you know it is fairly expensive so could you please advise as to whether it is suitable for an intelligent 13 year old.

D. Wilson
Wolverhampton

Tom Sato's book is really a reference guide and although it is expensive it is extremely well written and well worth buying.

The programmer's bible

To get your son started, Ian Sinclair's book *Introducing MSX Assembly Language and Machine Code* (£8.95 published by Collins) or Alan Toothill and David Barrow's book *Z80 Machine Code for Humans* (£7.95 Granada) would be sound investments.

Designs on designing

I would very much like to design my own peripherals and hardware add-ons for my MSX system and program in machine code.

Can you advise me what books I can read in order to obtain information about the system hardware.

Also, are you able to advise on a suitable assembler. I am familiar with both the Z80 and other assemblers so the technical level of any information you can recommend holds no fears.

R Banister
Chorley

You really need to lay your hands on a copy of MSX's hardware specification

which you should be able to obtain from Microsoft, Piper House, Hatch Lane, Windsor, Berkshire (telephone Windsor 5007541).

As for a book on machine code the best place to start is with R A Penfold's book *An Introduction to Z80 Machine Code.* It is published by Bernard Babani (telephone 01-603 2581) and costs £2.95.

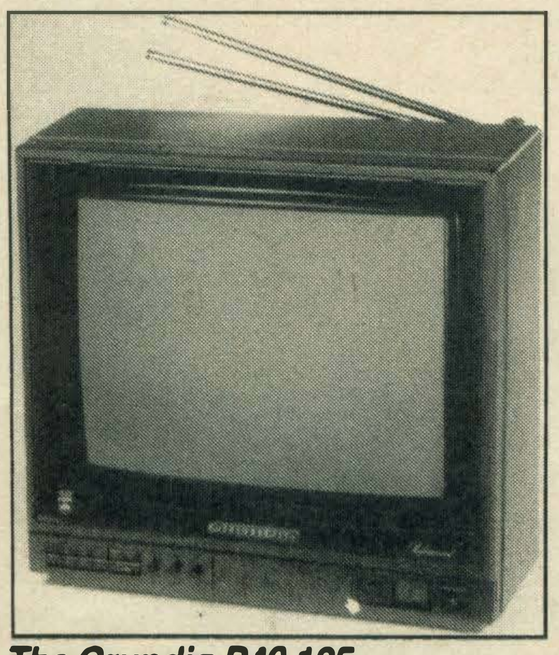
MSX — out of fashion?

Is it true that MSX computers are not being manufactured any more? I have been to several computer shops and they have all told me that software isn't being produced either.

Can you tell me, is MSX going out of style? So many people have told me MSX is on its last legs but I hope not as I have only had my computer for eight months. If this is the case then I have made a bad investment.

Lee Williams
Bournemouth

Absolutely not. JVC is planning to bring out its MSX 2 machine in the Autumn, Spectravideo is actively selling its X'Press, Toshiba's HX-22 is also available and Yamaha is launching its CX-5M Mark II. Need we say more?



The Grundig P40 125

Wire wrangles

Having recently purchased a Sony MSX I am seeking a good quality TV/monitor.

From various sources I have determined that the Grundig P40 125 is the 'best buy' and I note from a previous issue of *MSX Computing* that it is compatible.

However, as you are aware the Sony has a 21-pin analogue RGB outlet port, while the Grundig has a SCART input.

My local supplier says that if he knew which of the 21-pins on the Sony were wired and how, he could wire up a SCART input plug.

As Sony has already ignored two of my letters should I write again in Japanese?

J A Street
South Glamorgan

We recommend that you contact Sony's customer relations division at Sony House, South Street, Staines, Middlesex TW18 4PF. Or you can telephone them on Staines 61688.

What does it mean?

Please can you help me? I have gone through the manuals with my MSX micro and all the literature that came with my data recorder but I still haven't been able to find out what ALC means.

Matthew Durkin
Selby

Automatic Level Control

Authors at fault

I am afraid I have a complaint. Many of the programs I have obtained from various introductory books for MSX take a lengthy period to enter. I don't mind that, but it is very annoying when they fail to run because of errors that are not of my own making.

Computing is a costly and time consuming hobby and it is most annoying to find that both time effort and money has been wasted due to incorrect information.

Denise Shepherd
Barton-Le-Dey

We couldn't agree more, we too have suffered to our cost. Authors please take note!

Unimpressed

I am writing to show my displeasure in the shortage of MSX software. I am sure your offices must be inundated with letters like mine.

Why is there so little software and why is it not advertised more?

Recent issues of MSX Computing have mentioned MSX 2 — I suppose there will be a shortage of software for that machine too.

Andrew Goodwin
Manchester

Unfortunately yes we do get a lot of letters and telephone calls complaining about the lack of software and software distributors.

It is really a Catch 22 situation. Unless companies tell us that they exist and supply software and unless they advertise their products we have no way of knowing that they are in business and neither do you.

There are plenty of dealers and distributors around and many can be found in our list of software stockists.

Toshiba's HX-22 was one of the first second generation machines to appear

Printing problems

I have an MSX Goldstar computer and a Seikosha GP 500 dot matrix printer.

Please can you tell me how to use the machine to print full copies of programs as and when required.

At the moment I have only had success when putting LPRINT at the start of each line. I have tried all sorts of formulae with no success.

G. Cawthraw
Bingley

Try LLIST.

Pokes in demand

Why don't you have a POKE page so readers can cheat on their favourite games?

I am sure plenty of readers would send in POKEs they have designed themselves then you could lay aside a special page for them all.

Kevin Gorey
Carshalton Beeches

If readers want to send us their POKEs, we will be happy to print them. They don't come out of thin air!

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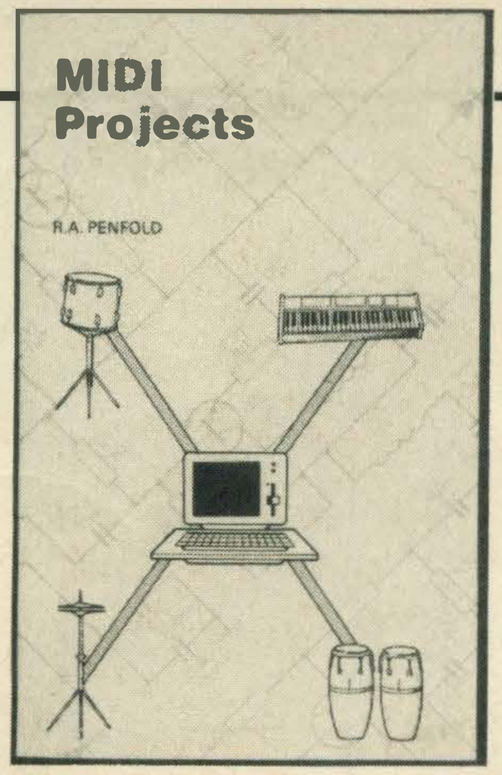


MIDI Projects

by R A Penfold
Bernard Babani 01-683 2581
£2.95

Over the last few months *MSX Computing* has reviewed at great length MSX's musical capabilities, has tried out several musical packages and given Yamaha's CX-5M a run for its money.

We have also featured the MSX's MIDI interfaces and provided helpful hints and useful ideas. However we have not been able to do MIDI justice but, by reading R A Penfold's latest title for Babani you should be able to plug many of the gaps.

MIDI Projects not only explains exactly what MIDI is but also how to interface home computers such as Amstrad, BBC B, Commodore and MSX micros to MIDI systems.

Like all the Babani books *MIDI Projects* is wafer thin but crammed with a wealth of useful information.

There are only three chapters so if you have an aversion to reading it won't take you long to work your way through it.

The first chapter is sub-headed MIDI Basics and as the title suggests it runs through all the nitty gritty such as computer control, serial data, control bytes and the three common MIDI operating modes which were originally called Omni, Poly and Mono, but have now been replaced with the numbers 1,2 and 4 respectively.

Once you've grasped the three channels you're ready to get to grips with the actual interfacing which is explained in the following chapter.

The ability to control one instrument from another via their MIDI interfaces is a very useful feature but greater possibilities are open to you using computer control and this is explored in great depth in this chapter.

Also included in this chapter are a variety of projects that you can set up and try out.

MIDI interfacing enables any so equipped instruments regardless of the manufacturer, to be easily connected together and used as a sophisticated system. With a few MIDI instruments, a MIDI interface and your MSX micro you could end up with a programmable orchestra in your dining room!

Micro Interfacing Circuits Book 1

by R A Penfold
Bernard Babani 01-683 2581
£2.25

We regularly receive letters from DIY enthusiasts informing us that they build their own interfaces and add-ons for their MSX micros. This is all very well if you have a background in elementary electronics but for those of you that haven't help is at hand.

The aim of *Micro Interfacing Circuits Book 1* is to guide you through the plethora of unfamiliar terms and equally unfamiliar devices and equip you with the basic principles of interfacing circuits to microprocessor equipment.

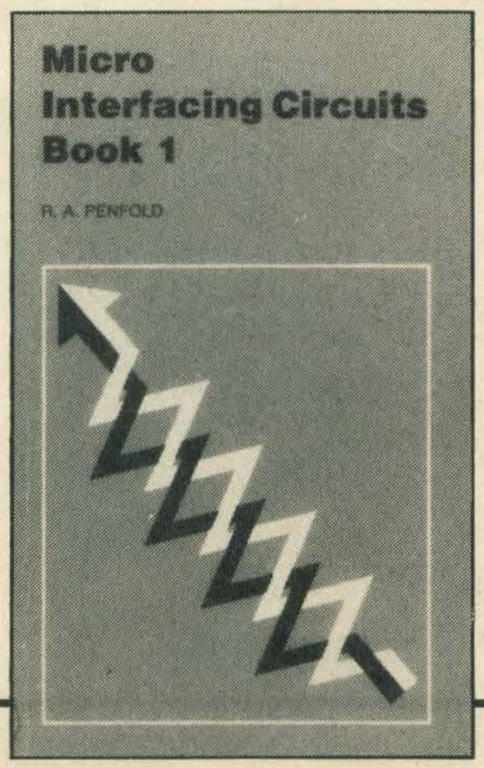
Speaking as one with as much knowledge of electronics as you probably have about neuro-surgery, the book seems to do the job.

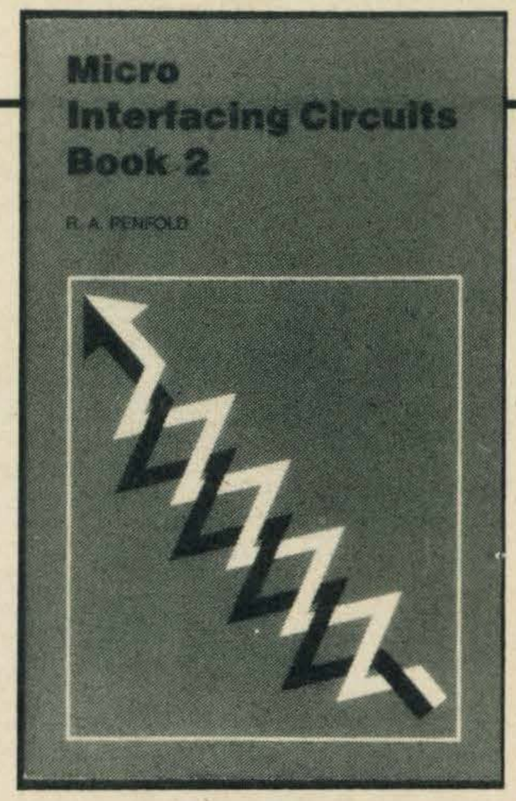
The first chapter supplies a rough outline of how a microcomputer works and includes a block diagram just to ram the points home.

Following chapters cover address decoding, parallel and serial interfacing analogue to digital and digital to analogue converters and multiplexing.

This isn't an easy book to follow and can hardly be described as light reading. But then it isn't meant to be and will only appeal to the real enthusiast who has a craving to exploit his micro to its full potential.

If that sounds like you then this is a title you should seriously consider buying. You might also glance at the follow-up title.





Micro Interfacing Circuits Book 2

by R A Penfold
Bernard Babani 01-683 2581
£2.25

As the title suggests this book is a follow on from *Micro Interfacing Circuits Book 1* and assumes that you have read that title before opening the pages of this one. (If you haven't your going to be utterly lost!).

Book 2 goes way beyond the basics and tackles 'real' world interfacing including such topics as speech generators, optical sensors and motor controllers.

And as in Book 1 the subject is not broached in a purely theoretical way. Practical circuits using real devices are provided with plenty of circuit descriptions so that anyone with reasonable common sense and logic should have little difficulty in using the circuits for their own individual applications.

The first chapter takes an in-depth look at audio interface circuits which can vary from a fairly simple sound generator with a single tone channel (as in most home micros) to a multi-channel sound generator which can be used to generate fairly sophisticated sound effects and computer music.

However as home computers including MSX tend not to fall into the latter category the chapter tends to concentrate on adding a programmable sound generator or speech synthesiser to a home micro.

Interfacing opto-electric devices such as LED displays and a variety of other devices. LED displays can be quite useful if for example you are required to work in a computerised darkroom and the light generated by a monitor or television is unacceptable.

Again like the preceding title this book isn't light reading and if you're to gain any benefits from it then concentration is required. Skimming through the pages will not only be a waste of time but you may well overlook important information.

I read it twice before getting to grips with some of the topics covered and as it's less than a hundred pages took no time at all, and it rammed home some of the points I had missed first time round.

Getting the Most from Your Printer

BY R A Penfold
Bernard Babani 01-683 2581
£2.95

Did you know that over 80% of dot matrix printer users only ever use 20% of the features available? I certainly didn't and according to R A Penfold this is largely because 'printer manuals are not in general the most reader-friendly of documents'.

Such facts prompted Penfold to write an easy to read (and understand) text that helps users to realise more of the capabilities of their printers. Having read the book and inwardly digested the information I can say with hand on my heart that he has succeeded where many other manuals have failed miserably.

The first chapter explains the ASCII code and then follows this up with a brief run down on the control codes and what they are used for. This chapter is then rounded off with an explanation of how to send the codes to your printer.

Chapter two is quite lengthy and this is not surprising as the author runs everything from printing mode controls and page lengths to tab settings and combined print modes. You name it, Penfold covers it and includes plenty of examples just in case you're prone to confusion.

The most useful chapter is the final one as it is dedicated to dot graphics modes and is likely to appeal as it explains screen dumps: in other words how the contents of your vdu screen are sent to your printer in such a way that a printout is obtained.

Writing screen dumps can be a very complex affair as in many cases it involves reading screen memory and bit manipulation so Penfold only dwells on the topic briefly before committing the rest of the chapter to explaining how the graphics modes work and what can be done with them.

Getting the Most from Your Printer is a useful guide to have and is invaluable.

Like all the other titles published by Babani it is incredibly cheap. Even the thriftiest computer user will find it difficult to begrudge forking out £2.95.

Concise Encyclopedia of Information Technology

By Adrian V Stokes
Tower Publishing Company (0253) 331551
£7.95

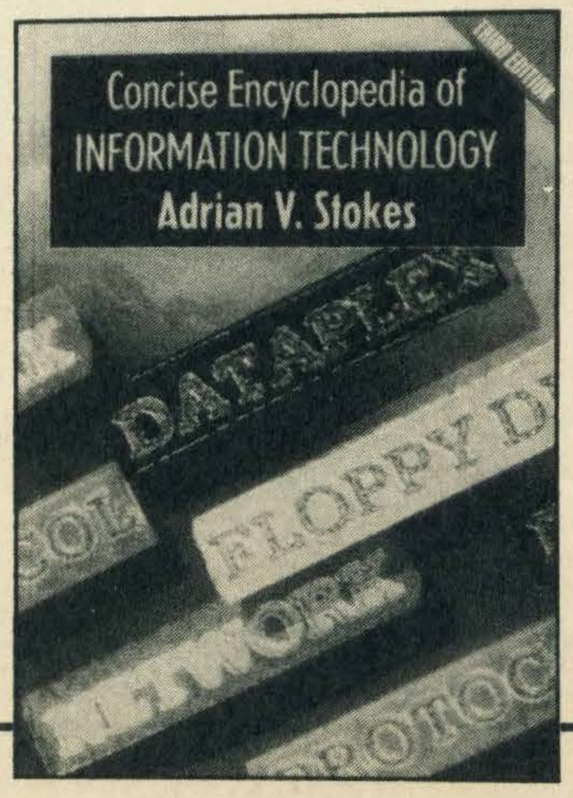
At long last one of the most authoritative texts on information technology has been printed in paperback at a price that is within the reach of most pockets. Previously this title was only available in hardback at a somewhat more inflated price: that tended to put a lot of readers off.

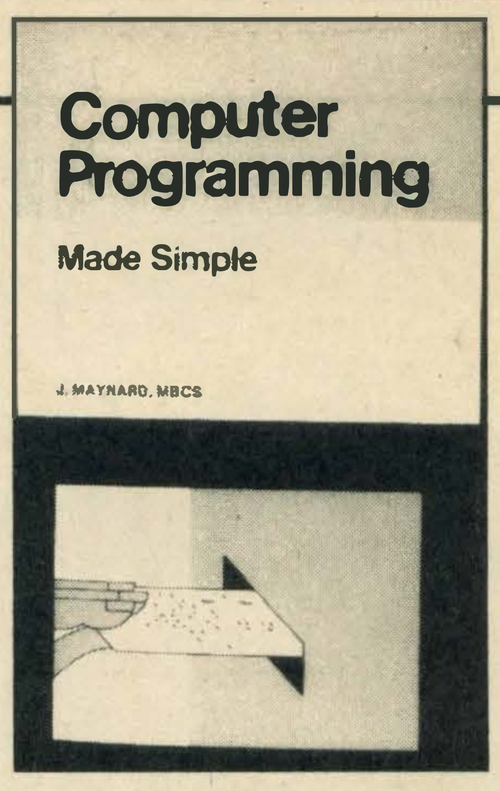
The book is as the title indicates an encyclopedia and the book defines well over 2,500 computer terms and incorporates many of the new products and terms that have recently been generated.

Everything is included from a definition of the abacus and dvorak (no, not the composer) to report program generator and xerography. each is defined as briefly as possible but if a more detailed explanation is necessary then this too is supplied.

Also included is a listing of the most commonly used acronyms and abbreviations so if you have problems remembering what PROM and RAM stands for this section will be invaluable.

At £7.95 this book is a bargain as it's crammed with an abundance of information that most computer users need to refer to on a regular basis. It is also a useful reference guide for the layman who wants to keep abreast of technology and understand the jargon that's often (and wrongly) used.





Computer Programming Made Simple

by J Maynard
Heinemann 01-580 9130
£3.50

There aren't many titles we review that are readily available in your local high street bookshop but this one is and it is one in a series of 'made simple' books published by Heinemann Educational Books and can be found in most good bookshops including Smiths.

Right from the start we knew this book would appeal as the author starts off by saying that he wrote the book not only for the aspiring programmer, the engineer who likes to use a computer as a problem-solving tool and for the man in the street who wants to satisfy his curiosity about micros without becoming bogged down in high falutin' technical jargon.

The book is divided up into five sections covering everything from the structure of a computer to an introductory course on Cobol, Basic and Fortran. And when you consider that the text is over 300 pages the author certainly doesn't skimp on any of the topics he covers.

The first section is split up into nine chapters and runs through input and output devices, magnetic tape and disk devices, flowcharts, operating systems and number systems. Each chapter explains the topics in simple terms and diagrams are supplied where there is a chance the reader might get lost or confused.

The second section is entirely dedicated to the Cobol programming language and by the time you've worked your way through it should be able to write at the very least an elementary program.

Sections three and four are very much in the same vein but go through the Fortran and Basic languages. Again, by the end of the sections you should have grasped enough information to write a simple program.

Computer Programming Made Simple is a very concise book crammed full of essential information and is first rate reading for anyone remotely interested in computing or computers.

ADDING COLOUR WITH F

MSX function keys are often neglected. Tim Markes opens up some possibilities

I wonder how many MSX owners have got round to using the function keys (F1-F10) in the last year? They must be there for some reason surely? This month we're going to discover that these keys have more colourful potential than their traditionally grey appearance would indicate!

The list of five words at the bottom of your MSX screen shows what character strings will be generated when you press the function keys 1-5. I have my doubts about whether these MSX standard settings are going to dramatically improve my efficiency at the keyboard, but let's see what's on offer.

'Color' reminds me that Americans can do without U. 'Auto' will automatically generate line numbers for me. 'Goto', 'list' and 'run' are self explanatory.

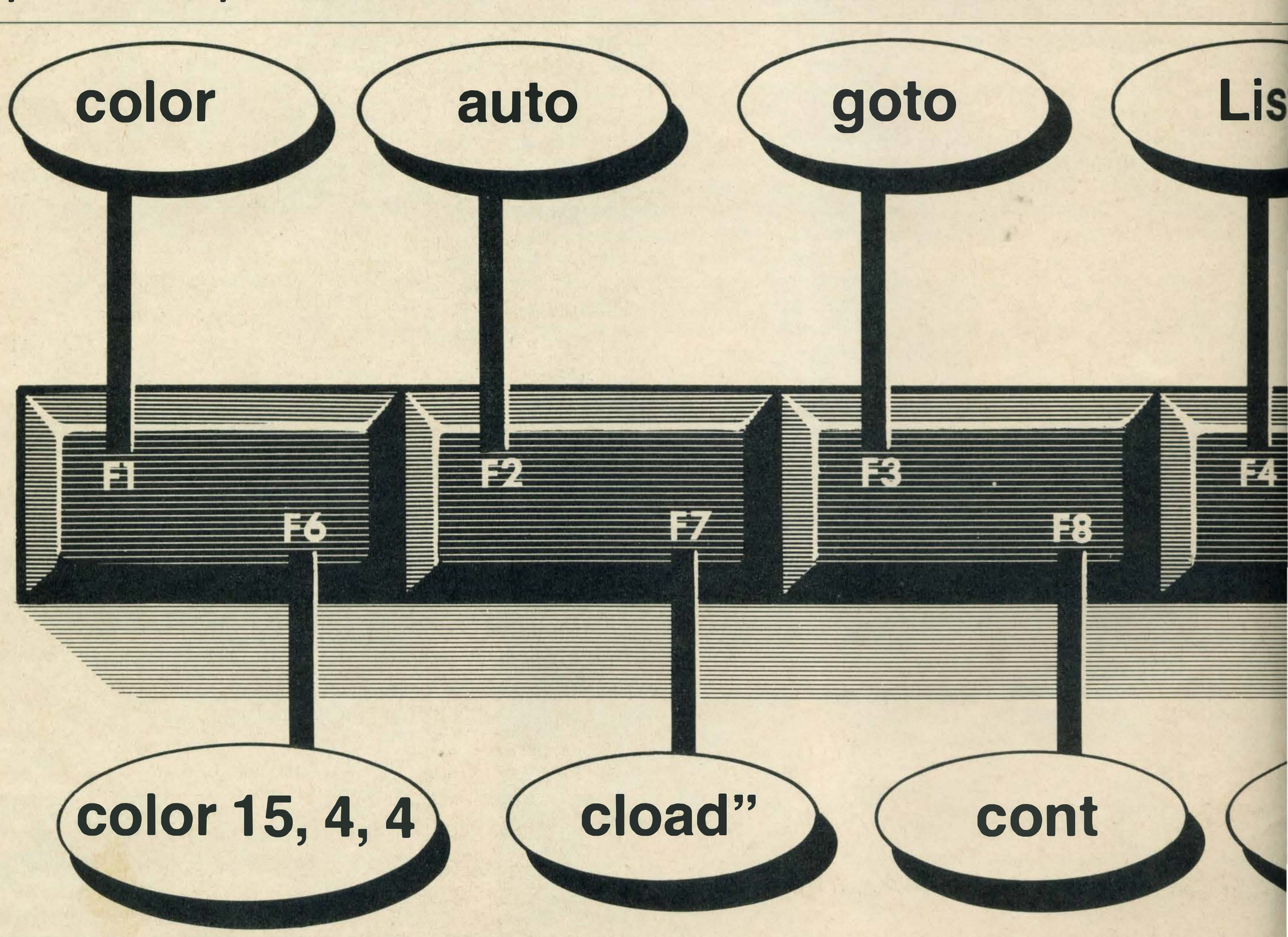
Press the SHIFT key and the words at the bottom of the screen will change to display what will be generated when you press the F6-10 keys (F1-5 + SHIFT). The most useful of this collection seems to be F9 (list.) which will print out the current program line — in my case this is usually the one which has just been courteously flagged as an error.

The display at the bottom of the screen will give the first 6 characters only of the 15 character maximum function key setting. Check F6 (F1+SHIFT) and you will find that it actually generates:

COLOR 15,4,4 (+RETURN)

This is useful if you are experimenting with different colour combinations and want to get back to the original white (15) foreground against a dark blue (4) background. The last parameter defines the colour of the screen border — which is only displayed using SCREEN 1 (which also has bigger characters).

Rather than use the manufacturers ideas, why not create your own function key settings — they might be a lot more interesting too! If you want to



set up a function key 'N' with a line of Basic, for example, it would look like this:

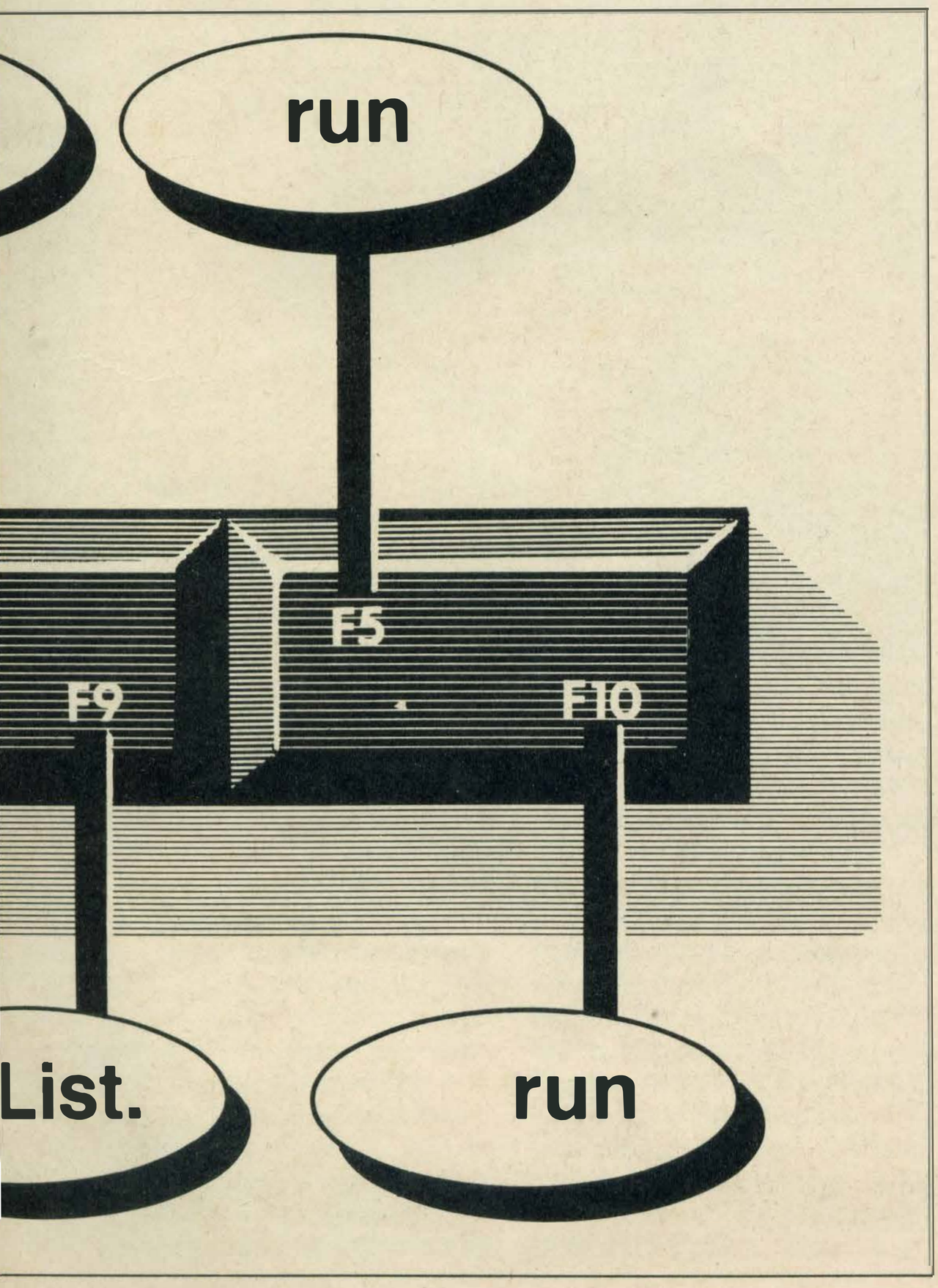
KEY N, 'Basic Program line'

So, to set up an alternative black and white colour scheme, which you can call up with function key 4, say — try this:

KEY 4, "COLOR 1,15"

Notice that you will have to supply the RETURN in order to action the command, whereas the default F6 setting seems to have a built in RETURN somehow — is this easy to fix? Well if you have been following this series, you may know or know how to check, using a mini program, the ASCII code for any of the computer keys. Unfortunately there were typesetting errors in the two lines in question in last month's issue, however, so here goes once more:

```
05'ASCII checker
10 K$=INKEY$:IF
K$=""THEN10
20 PRINT ASC(K$) : GOTO10
```



This will confirm that the RETURN key has an ASCII value of 13 and, while you're about it, check the cursor keys too (28-31). Now we can add a RETURN character to the Function Key setting like this:

KEY 4, "COLOR 1,15"+CHR$(13)

There's no reason why any F key shouldn't be set up to generate more than one instruction either — providing it doesn't exceed that 15 character limit. This setting, for example, will allow you to cycle through the full background colour range using F3 only:

KEY 3, "B=B+:COLOR,B" +CHR$(13)

This little program goes illegal of course when the value of B hits 16, which is beyond the range of the 15 colour codes — so just set B=0 to recycle. Perhaps the simplest method of cycling continuously round a range of numbers, without writing FOR . . . TO . . . NEXT loops, is by using MOD. All that survives in fact, after such an integer division, is the remainder. I think the process is best illustrated like this:

KEY 5, "B=BMOD15+1: ?B"+CHR$(13)

Press F5 and see the numbers cycle between 1 and 15. Remember that ? is interpreted as PRINT which is particularly helpful when we want to save keystrokes or (in this case) character space. Having checked that 30 is the ASCII code for 'upward arrow' — cursor up one line — here's how you might set up F keys to switch both foreground and background colours through the whole range without shifting the position of anything displayed on the screen:

```
KEY2, "colorF,B"
+CHR$(13)+CHR$(30)
KEY3, "F=FMOD15+1"
+CHR$(30)+CHR$(30)
KEY4, "B=BMOD15+1"
+CHR$(13)+CHR$(30)
+CHR$(30)
```

Press F3 or F4 to change the ink or paper settings and then F2 to check the effect. If you like a particular combination, then type ?F,B to print out the colour codes for future reference.

These settings are greater than the 6 character display you will see at the foot of the screen and a quick way of checking the full contents of all the fuction keys is using KEYLIST — try it. Unless you make frequent use of the function keys and also have a very short memory, then, why not eliminate the display and gain an extra 'PRINT' line by using KEYOFF? You can easily restore the display with KEYON.

Now, suppose you want to change screen colours during the running of a program — using these special function key settings. Is this possible? Well not directly, but there is a much more powerful facility which enables any function key to interrupt your program at any point to run a SUBROUTINE sequence of your choice. Here's an example of how you might check different ink/paper colour combinations while your program is running:

```
10 'F key interrupts
20 KEY(2)ON:KEY(3)ON
30 ON KEY GOSUB,100,140
40 KEYOFF:'Display off
50 A=15:D=2:CLS
60 'Main "loop"
70 LOCATE A,D
80 PRINT"Color Check!"
90 GOTO70
100 'Foreground color
110 F=FMOD15+1
120 COLOR F
130 RETURN
140 'Background color
150 B=BMOD15+1
160 COLOR,B
170 RETURN
```

You can see how the interrupt facility is switched on for Function keys 2 and 3 (line 20). The subroutine sequence to be performed for each key is defined in line 30 — the parameter position of the specified line number indicates the key to which it corresponds.

Notice that KEYOFF (line 40) just clears the bottom line screen display without affecting the interrupt function. The main program loop (line 70-90) displays a title heading centre screen, but it will be interrupted at any point by F2 or 3 to perform the sequence at line 100 or 140. These subroutines will progressively change the ink or paper colours through a cycle of the 15 available — before RETURNing to the point from where the interrupt occurred. Using this technique you can interrrupt you program with function keys of your choice at random points to perform a (subroutine) sequence of any length.

Why not check your understanding by setting up F4 and 5 to vary the Across/Down position of the title on the screen (values of A and D)?
Just type:

KEY(4)ON: KEY(5)ON

Then write your own subroutines to adjust A and B and don't forget to include the

ON KEY GOSUB,,,x,y

line to point to your subroutine addresses.

Yet another application of the function key interrupt system is in the creation of program menus with instant switching between different optional processes. This is not quite as straight forward as you might expect, however.

Once again, though, this meal is finished, the manager has called time, and we will have to keep that particular dish cryogenically suspended.

X'PRESS SERVICE

Owner Andrew Emmerson assesses this dual-standard Spectravideo.

I can't prove it, but I have always suspected that the majority of people who buy yachting magazines never get to own a yacht. This doesn't stop them from reading about yachts, however, and I am sure they get a lot of pleasure reading about their dream machines and becoming very expert in the process, too.

With computers it is probably different — after all, home computers are a lot more affordable than yachts. All the same you may be undecided about upgrading and reading this magazine in the hope of finding an unbiased opinion about the merits of this or that machine.

Come to think about it, how often do you read a letter from a reader saying that so-and-so is a heap of rubbish and should be taken off the market?

Well, sorry to disappoint you, but this article is not non-stop criticism, nor is it 100 per cent fulsome in its praise. In short it's a no-holds-barred account by a fairly experienced home computer user of his change to MSX, the pleasures and the trials. If you are hovering on the brink, especially if you are thinking about the Spectravideo X'Press, read on!

Why MSX?

That's what my friends asked when I told them I was changing from a perfectly good BBC to MSX. The BBC is well-supported with software and books, why on earth change?

Well, I had read the publicity for MSX — new world standard for home computers, nice compact little disks with huge storage capacity compared with 40 track 5.25" floppies, disk compatibility with the IBM PC, a potential to mix computer graphics with home video, in short a new start. I must say I have not regretted the change but I never realised how much work it would involve.

Many of the claims made for MSX have turned out false and it has not become a world standard or anything like it. I am still a supporter, though, and you only have to go to Holland to see MSX a major force. In both Japan and the Netherlands MSX-2 has taken off very nicely and it is sad that the manufacturers have left us Brits last in the queue to have the upgrade. Never mind, I don't need MSX-2 . . .

The X'Press

One thing the Japanese have not quite mastered is a feel for British design. If you agree that the BBC Model B is a reasonably stylish computer you will also agree that most of the oriental home computers are rather lacking in visual style. The Spectravideo X'Press, from Hong Kong, appealed to me, however. I also liked the built-in disk drive and the capability to run CP/M and MSX-DOS as well as the normal Microsoft Basic. So I bought an X'Press — and I like it!

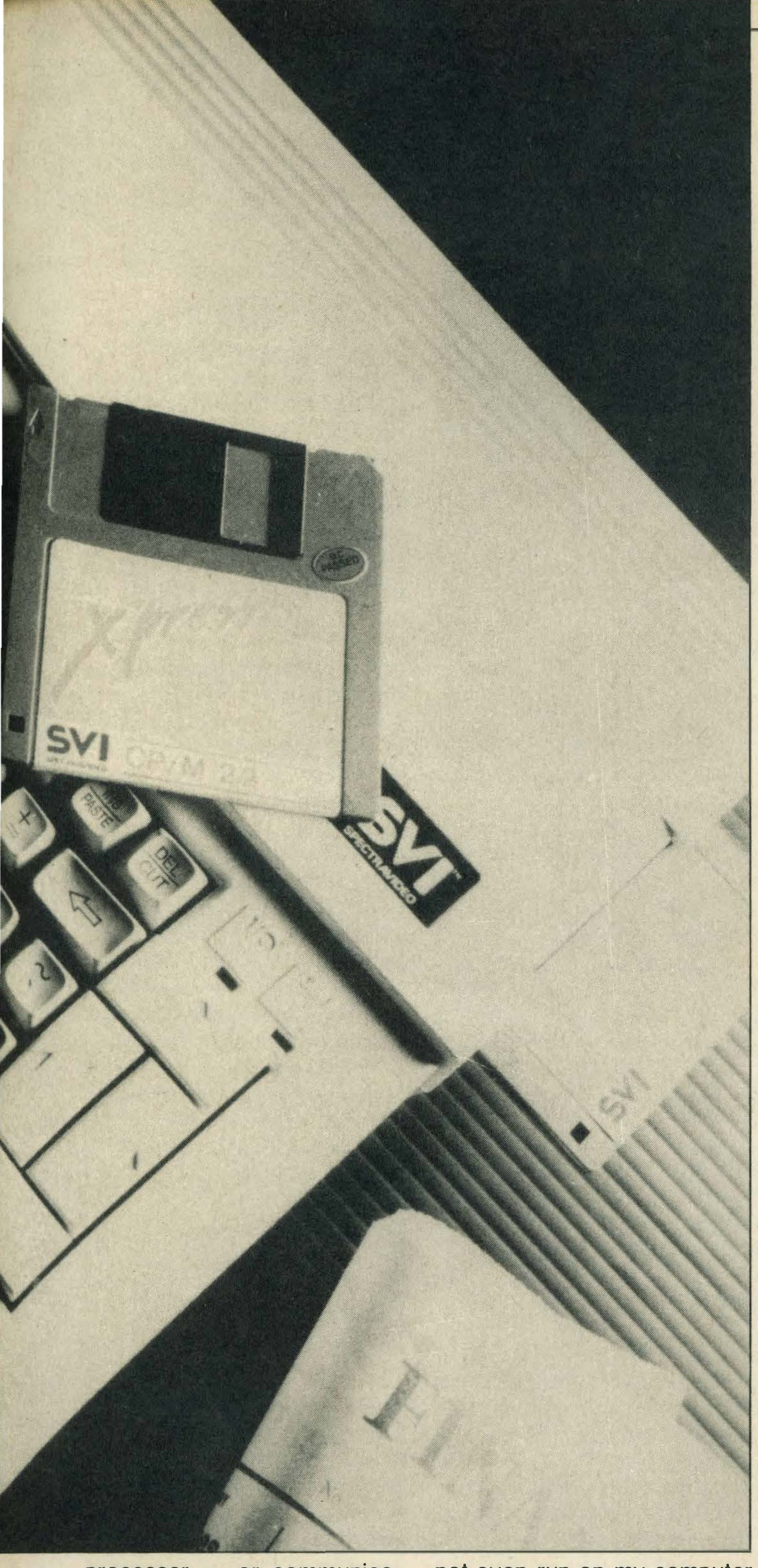
I like the 80 column display, which is essential for any serious word or figure processing. I like the carrying case and the bundled software you get with it. I like the comprehensive documentation you receive too, plus the ability to buy 'real' software such as *Wordstar* at what I must call Amstrad prices.

The machine does have a few bugs — the most obvious is that when you are in 80 column mode, making any error causes the 'beep' to sound continuously (until you hit control-stop).

It also bugs me to know that you have an extremely detailed graphics capability without the information on how to address the screen. A superb graphics demo program accompanies the machine, but it's all in machine code. No way could you create these graphics in Basic! It is unfortunate that when the computer is in CP/M mode it formats and reads disks in a totally different method from MSX. Spectravideo does at least provide a translation program (but doesn't tell you it will only work on a twin-drive system and then only if the MSX disk is in drive A and the CP/M one in drive B).

Goofy software

If you too are a 'serious' MSX user you will also have come close to breakdown trying to find software that works. Correction — trying to find software at all . . . How many shops bother to stock any MSX software other than games? Where can you try out a decent word



processor — or communications program — or a 'disk doctor' utility? Nowhere in the UK, it would appear!

OK, there's always mail order, so I bought three word processors, *Aackotext, Wdpro* and *Intext*. None of these can be called professional, since none can display text as it will eventually appear. They are all confined to 40 column display, even though 80 column computers are now on the market. The *Aackotext* came closest to a real WP program and apparently an improved version is on the way. *Wdpro* would not even run on my computer and in fact it does not use genuine MSX-DOS but the homebrew Kuma-DOS. Save your money — go straight for *Wordstar*! It takes a bit longer to learn but it is a true professional program.

Communications programs? Well, I had to send off to Holland to get one that did the business, and I can wholeheartedly recommend *MT-Viditel* (the only problem is that you have to understand Dutch — which I do). *MT-Viditel* does everything — it gives full colour Prestel graphics, it lets you download programs (literally dozens of MSX programs on the Dutch Prestel system) and dump screens to the printer. Kuma's product does none of these! In fact it even overwrites the disk area so it cannot be used on a disk system, nor is the company prepared to adapt the program or refund money to people who find this unacceptable. Caveat emptor! The Computermates package is quite good by comparison, but lacks the ability to download software: this is promised for later development. (I couldn't wait!).

As for utilities — the only commercial one I would recommend is Hisoft's *Devpac80*, a superb piece of software. It does, however, need MSX-DOS or CP/M to work and not everyone can get hold of these. I now have a good collection of utilities for playing around with the contents of disks and to download NLQ (Near Letter Quality) fonts to a dot-matrix printer but none of these are available commercially (send me an SAE care of the editor if you would like details of these!).

Satisfaction at last!

I initially thought of calling this article 'self-help' because you feel as if you are on your own when you choose MSX. It is remarkable that MSX owners have no *national* user group in this country (yes, I know there are ripoff outfits which take £10 off you but send no newsletters). Help is at hand, though. There are three excellent books which should be on any serious MSX user's shelf; I have found all three very useful. They are *The Complete MSX Programmer's Guide* by Sato (Melbourne House), *The MSX Book* by Hoffman (Osborne/McGraw-Hill) and the *MSX Technical Guide* (direct from Microsoft UK in Reading). These books tell you (nearly) all the secrets.

Also, having CP/M gives you access to a huge selection of so-called public domain software. These are programs written by public-spirited folk who have decided to charge nothing for their labours, and most of the programs are good, some are even superb and a few turn out to be, well, a bit naff. By joining the Public Domain Software Interest Group (PDSIG for short) you can have access to hundreds of disks of software plus a good magazine every three months.

The fee for copying a disk of P.D. software is just £2 (you supply the disk) and the X'Press CP/M format is PDSIG no. 210 (the group can format and record disks in dozens and dozens of formats). It can also download programs from one format of disk to another, at a cost of around £7 a disk. The process does not transform one dialect of BASIC into another, though; this is left to you! It's a useful service if you are changing computers and need to convert a lot of text processing files, for instance.

Other wrinkles

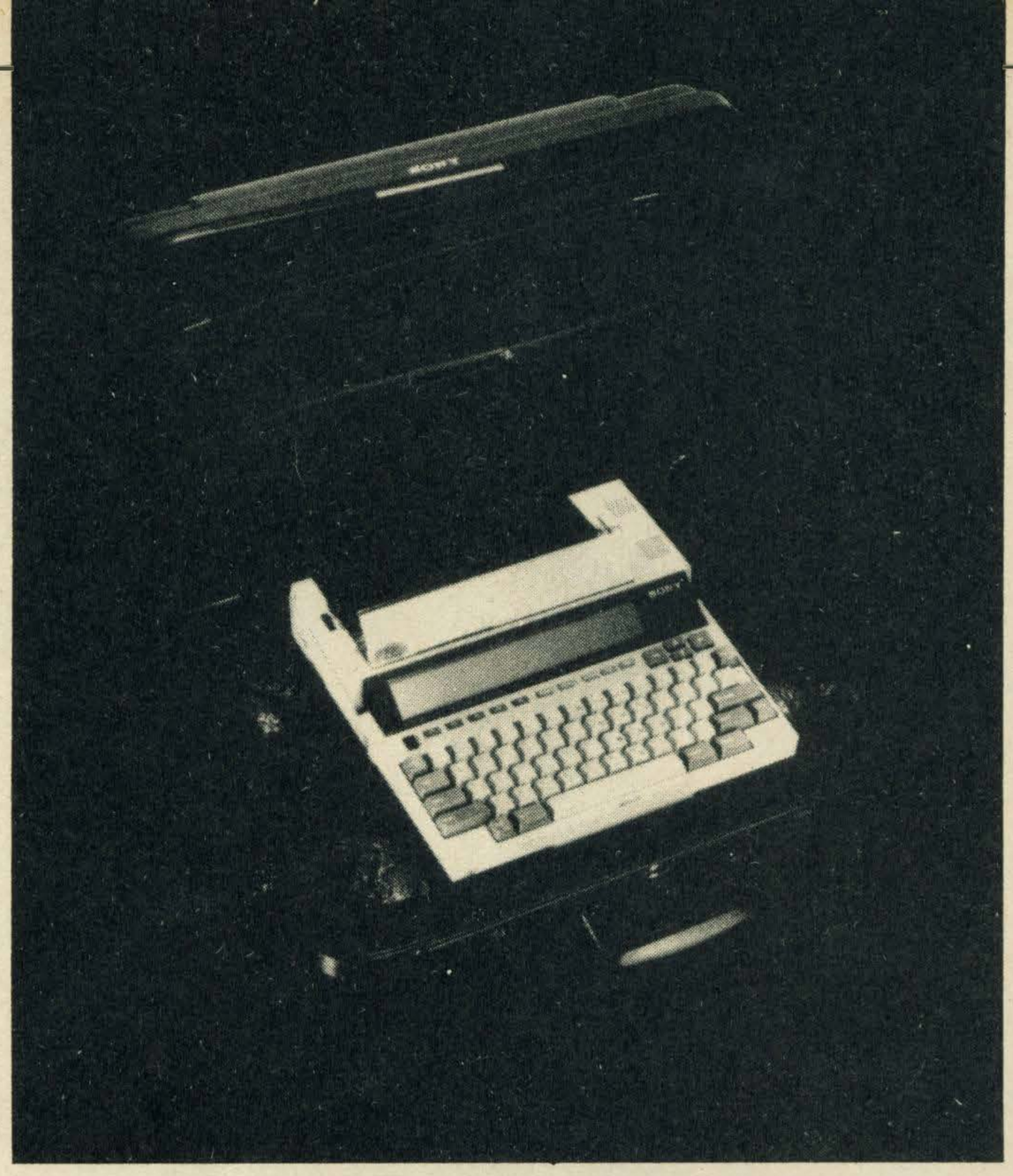
Having bought the X'Press you may well feel the need to rush out and buy lots of disks and a second disk drive. The prices will probably cure this desire but a twin-drive system is undeniably useful. So is a box full of micro-floppy disks. And here is my tip — shop around and experiment!

Several companies sell top quality Apricot disks for around £23 a box of 10 and other firms get close to this price if you buy by the box. A second drive can be yours for around £100, from somewhere like Viglen Computer Supplies. What you want is an 80 track single-sided drive. Don't get the cheaper 40 track sort.

This comes in a smart cream case (which matches the X'Press nicely) and you even get a utility disk. As it is meant for the BBC micro it won't do much for your MSX but you can use it as a blank. Then all you need is a 25-pin D plug from Tandy and you can plug it into your X'Press. If the editor allows (write in and pester) I'll publish the wire connections in a future issue. It's great having two drives! *No need to write and pester — it's coming in the next issue — Ed.*

Well there you are . . . it is possible to enjoy an MSX system, particularly if you choose the X'Press. If you want to get in touch with any of the organisations I have mentioned and recommended these are listed below — I have no connection with any of them except as a satisfied customer.

Microsoft Ltd., 49 De Montfort Road, Reading, Berks, RG1 8LP.
Public Domain Software Interest Group, 138 Holtye Road, East Grinstead, Sussex, RH19 3EA. (Send SAE for information sheets).



FELLOW TRAVELLER

The Sony SMC-T11 is not a true MSX micro, but could be a taste of things to come

Imagine a computer that will fit In your briefcase and runs off batteries. Imagine such a computer with its own liquid crystal display and built in software that includes a word processor, a spreadsheet, a diary, a communications package and BASIC. Imagine such a computer with a built in 80 column printer, a built In modem, a built in telephone and a built in clock. Imagine that computer Is able to run MSX programs. Name this Imaginary computer the Sony SMC-T11 and you have reality.

The SMC-T11 is having its first launch outside Japan in Australia, where MSX is getting up a good head of steam against entrenched rivals. It is available with a price tag of around £1,000.

It is not strictly an MSX computer. Lacking a 25 line colour display and joystick ports, it cannot hope to do all of the things computers such as the Sony Hit Bit do. The other major difference is that the resident Microsoft Basic is called HHX Basic, standing for Hand Held eXtended Basic. This is a mixture of MSX and MSX Disk Basics with some extra commands needed for features on the handheld machine.

Specifications

A quick run through the specifications gives an idea of what you get for your money. At the heart of the SMC-T11 is the tried and tested MSX engine, a Z80A microprocessor, running at 3.58MHz. There is 96K of ROM, in which the built in applications are stored. For program data, there is 32K RAM. There is also a clock to keep track of time and date.

The whole computer measures just 295 x 280 x 60mm, and weighs 3.6kg. Power comes from four D-sized alkaline cells, or an optional AC adaptor. A carry handle aids portability and the keyboard is protected by a removable lid. Several flaps protect all ports from damage in transit. The finish is in cream shock-resistant plastic.

The display is on a liquid crystal screen, 80 columns wide, eight columns deep. Maximum resolution is 480 x 64 pixels. Behind this is a near letter quality printer printing out on either thermal or conventional A4 paper, with an inked ribbon. The printer runs at 15 characters per second, with each character on a 24 dot matrix and has variable printing density.

Other ports provide for connection of an accessory telephone handset, an ordinary telephone, an MSX cassette player, an accessory 300 baud acoustic coupler, an Epson-compatible serial printer, an MSX disk drive, a RAM cartridge and possibly a whole range of other peripherals.

The keyboard is straight off an MSX computer, though compressed and rearranged to fit the dimensions of the machine. There are the programmable function keys, cursor control keys, shift, option and graph keys — everything you find on a desktop MSX.

Several storage options are presented. The Sony has enough RAM to store a medium-sized document, a small telephone directory and a range of diary entries. The spreadsheet, Microsoft's well known *Multiplan,* is supplied on a ROM cartridge that slots in the back of the casing. Its 32K overlays 32K of the 96K application ROM. Other applications could be written on ROM cartridges, by either Sony or third parties, making the SMC-T11 eminently suitable for vertical markets such as insurance companies.

Another option is to expand the RAM, with a 32K Static RAM, or SRAM cartridge. This gives almost instantaneous loading of data and the cartridges are extremely portable. They have a battery in them to keep the data intact. They plug into the disk drive port, and Sony is planning a box to allow several cartridges to be used at once.

The cassette port allows storage of programs or data on audio cassettes. Compatible MSX programs could be loaded this way, or data transferred from the portable Sony to a desktop MSX. Data transfer rate is 2400 baud.

A faster option is an MSX disc drive, plugging into a port on the side of the Sony. Any MSX-DOS program can be loaded or saved, and data switched from one machine to another by 13cm MSX-DOS disks. An unformatted disk holds 500K.

The built in software is comprehensive enough to make other programs almost unnecessary. When the Sony is switched on, by a button under the screen, the initial display shows the disk allocation, for up to five devices, the free memory, a directory of files and extensions, the currently selected file, with its size and when it was created if it is a user file, the current date and time, and what the function keys do.

At this stage, it is possible to alter the time and date, delete or rename files, copy from one file to another and to load a file from an external device. Follow the prompts and everything is easily done.

Having the built-in telephone is a very useful feature. All the telephone functions are available if an application called *Telecom* is run. The function keys initiate the various procedures and the Sony must be connected to a telephone socket.

Phone function

For a start, any keyed-in number can be dialled, or the last dialled number redialled. There is a built in microphone and speaker so the computer acts as a hands free telephone, with variable speaker volume. An accessory handset can also be connected for more private calls, and an extension phone used as a normal telephone.

A find option searches through a file called Phone Book, looking for a match to any name input at the prompt. It displays all matches to the search string, and the associated telephone numbers. You put all your commonly called numbers into this file and lock your phone book away.

Even if you aren't using Telecom, you can still use the telephone. Pressing Alt and a function key allows you to input

a number, call it, select handset or hands free operation, hang up the telephone and even mute incoming calls. This sort of usability was pioneered by ICL with its One Per Desk. The Sony does much the same, with a smaller computer and in an MSX environment.

Terminal mode

Within the Telecom program is a terminal mode, allowing you to contact bulletin boards or use electronic mail networks, using the built-in 300 baud modem. An external modem can be used too, as well as a Sony acoustic coupler, so the computer could link into databases through the handset of a public telephone.

In the terminal mode, the communications settings can be altered. There is a choice of baud rates from 110 to 19,200 baud, with five to eight data bits, one, 1.5 or two stop bits, any parity, at full or half duplex, with XON/XOFF, CTS/RTS or Xmodem protocols. Data can be viewed on the screen or sent to the printer. Files can be uploaded or downloaded. You have all you need to get into electronic communications.

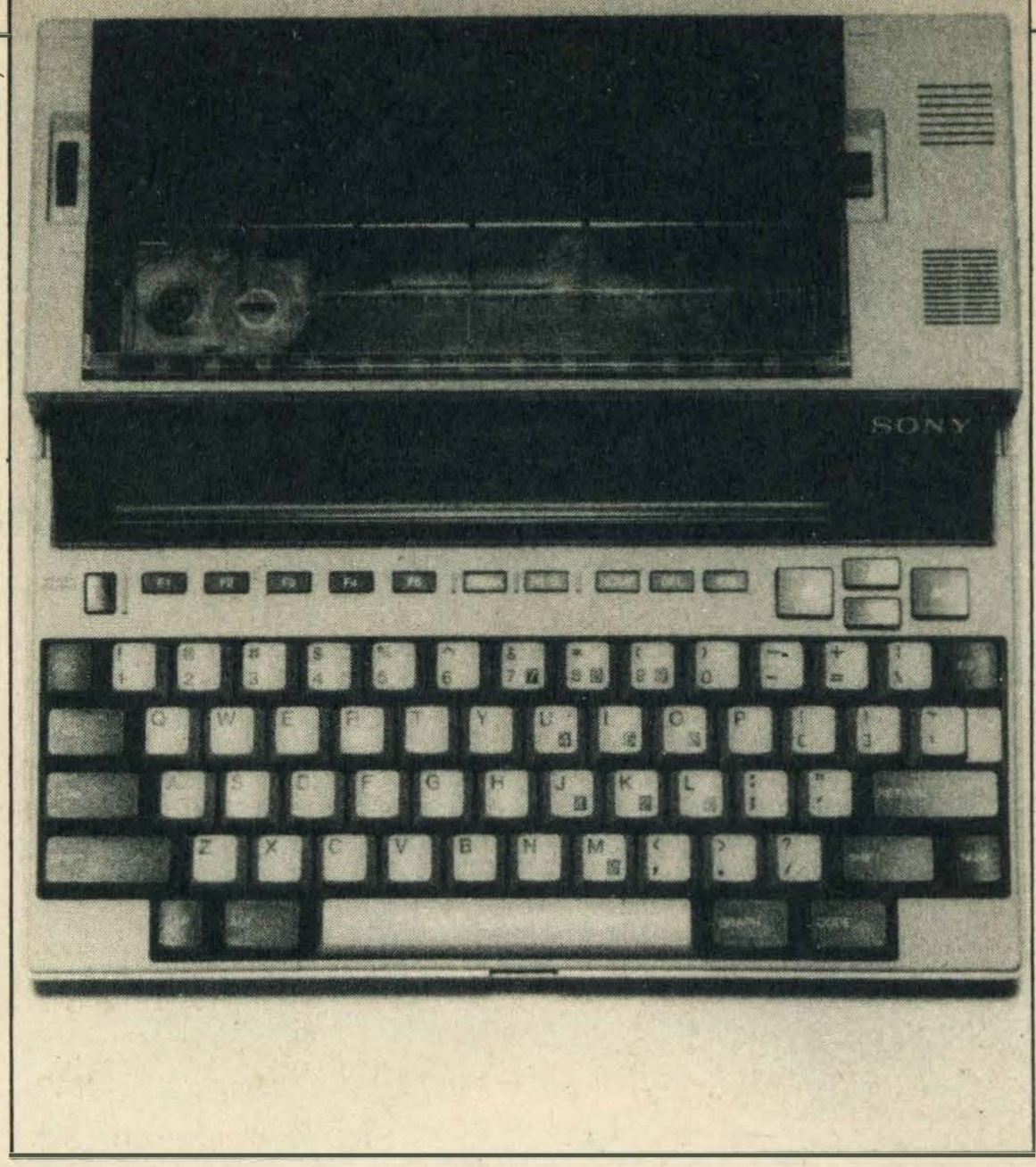
But there is more to the settings than that. The SMC-T11 can be set up to automatically answer an incoming call and to run a program at that stage. For instance, the Sony could be set up to run *Remote* whenever it receives a call.

The application called Remote turns the portable into a dumb terminal, and it can then be connected to almost any computer, big or small, and used to enter or receive data from that computer.

The *Schedule* program is designed to make a desk diary more than redundant. Appointments or alarms can be keyed in, displayed and printed out. An alarm setting will cause either an alarm to sound (even if the computer is turned off), with a message displayed, or a preset program to be run. For instance, you might program the Sony to wake you up and run a schedule, so you can see what you have lined up.

Another useful feature is that a name or other word can be searched for. If you aren't sure when you are meeting Mr. Smith for lunch, use this facility to find the relevant diary entry.

The word processor, called *Word*, is a simple, easy to use text editor. Text is typed in and saved to RAM. It can be printed out on the inbuilt printer, or an external printer. The inbuilt printer is very draining on the batteries, so is best only used for short letters. If you want to print out long documents, transfer the file to another MSX computer or use an external printer.



Cut and paste

Text can be edited with cut, copy and paste commands. A section of text is marked and that section can then be cut or copied. What has been cut or copied is then pasted to a new location.

When a printout is requested, the first thing that happens is that a miniature preview of what the final page will look like is shown on the LCD screen. This preview can be requested at any time, and is a great way of seeing how letters will look when printed.

Word allows a number of functions to be embedded in the text. These do things such as centring text, underlining characters and so on. So, Word is an excellent means of preparing and printing letters, or preparing documents for transmission with the modem to another computer. If you want to write a book, get another computer.

List is a very useful program accessed from the main menu. Its purpose is to search nominated files for specified strings. Follow the on screen prompts to use it. A target storage device is entered, followed by a file name. Then the string to be found is typed in. The file is rapidly searched and lines containing that string are displayed on the screen, with optional printout. List could be used to find, for instance, any document in which London was mentioned.

Multiplan is an old but powerful spreadsheet, for financial analysis. It has a wide range of commands for data entry and manipulation, and spreadsheets can be printed out on the printer. Alternatively, data could be transferred by the modem or on a disk to a second computer.

Turning off power when any application is being run is no disaster. When the Sony is turned back on, it remains at the stage it was before it was turned off. Low power warnings remind you of the need to change batteries.

The last program is Basic. HHX Basic is a hybrid of MSX Disk Basic and MSX Basic, with a few extra commands. These extra commands are to deal with the inbuilt telephone, and to allow values to be loaded to registers.

Missing are all the commands related to VDU output, such as COLOR, SPRITE and commands for devices such as joysticks. There is no point writing in commands for non-existent facilities. Still HHX Basic does have some graphic commands, such as CIRCLE, LINE, PRESET, POINT and LOCATE. Black and white graphics come up quite nicely on the LCD screen, and can, of course, be printed out.

Programmers used to MSX Basic will soon come to terms with HHX Basic. There is no full screen editor. Editing is done on a line by line basis. The function keys work in the same way as on an MSX micro, and can be programmed. There are all the useful commands such as AUTO, RENUM, TRON and DELETE. The major differences relate to the capabilities of the portable computer.

Some MSX Disk Basic commands are missing too, including the WHILE... WEND structure. But, if you have written a program in MSX Disk Basic, there is a very good chance that it will run on the Sony.

Compatibility

Similarly, an application written under MSX Basic that does not use the VDU facilities or joysticks, a program such as a text adventure, should run on the Sony too. It can even be loaded from cassette.

The SMC-T11 is totally compatible with MSX-DOS applications. Any data from an MSX-DOS program can be used, and data transferred under this operating system to other MSX computers, if a disk drive is attached.

Compatibility aside, the Sony's Basic is very good. In fact, a good programmer could probably write some excellent applications using the built in facilities of the computer. Certainly file handling routines could be written that are considerably better than the onboard routines. For instance, there is no batch processing of files or file merging possible, other than through Basic.

The SMC-T11 is an excellent example of the MSX philosophy in action. MSX computers are not just 64K desktops for the home. The MSX system is going to be applied, with slight modifications, to all types of computers. Sony is the first to apply MSX to the field of lapheld computers, and have come up with a device that is highly compatible with the standard, yet able to do many different things.

No doubt there will be other HHX computers to come. The Sony is a harbinger of the future, and yet another sign that when the MSX concept is all worked out, it will be as comprehensive a standard as anyone could wish.

INFO

READ ALL ABOUT IT

December 85/January 86
Make the most of your micro's memory and reach the parts you've never reached before
We show you how to load and save those programming masterpieces
Get more out of your Epson-compatible printer with the aid of control codes
Make music with Digital Music System's latest music cartridge
We put Toshiba's word processor, Bank Street Writer, through the mill

February/March 86
The Cat tested — a tracker ball to control games and serious applications.
Formatting the screen display for BASIC programmers with lots of text and numbers to handle.

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Just send your name and address plus a £1.45 cheque or postal order made payable to Haymarket Publishing Ltd, to MSX Computing Book Sales, 12-14 Ansdell Street, London W8 5TR, stating which issues you require.

Listed below are the currently available back issues with a brief description of the major features, tests and reviews in each. All issues carry software reviews and listings.

DECEMBER '85

FEBRUARY '86

APRIL '86

Exclusive Sorcery map shows you the way around Virgin's best-seller.
Mike Gerrard explores Level 9's Worm in Paradise.
Word processing and programming books reviewed.
The world's first MSX camera.

April/May 86
Learn how to read and write tape files from within a program with this months BASIC article by Tim Markes. Read our exclusive interview with the brains behind Aackosoft and find out what games are in the pipeline.
Stuck in the bathroom? Then follow our exclusive map of *Jet Set Willy II*.
We also managed to lay our hands on and test the first robotic arm for MSX courtesy of Spectravideo

EVENT QUEUE

The October/November edition of MSX Computing includes an exciting introduction to MUD, a multi-user adventure game which you play on a remote mainframe computer down the telephone line. You play it just like an ordinary test adventure, except that the other characters in the game are controlled by other home computer enthusiasts. The action takes place in real time, so you can't afford to take things easy. We examine the features and costs and look at the equipment you will need to play.

More conventional adventure players get more of their game problems solved, and there's the usual crop of reviews and listings. On sale Wednesday 8th October.

When a copy of *MSX Computing* comes out, newsagents' shelves are often emptied of stocks within days. If you aren't quick off the mark you might find yourself stuck without a copy.

One possible solution is to pop down to your local newsagent waving a very large axe, and suggest politely that he increases his order. But we recommend a second method — so much more civilised — your own personal postal subscription to *MSX Computing*.

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HOT STUFF!

Martin Banks suspects diabolical interference — his cassettes still won't load.

This time of the year it becomes very difficult to concentrate on anything ephemeral or intangible, like work, or road-testing computers or answering letters from the bank manager.

When I say 'this time' of course, I don't mean this 'this time' but that one, a 'this time' that is now irrevocably locked into the past, a that 'this time' if you like.

(What Banksie is trying to say here is that he's writing this in the last days of June, and Wimbledon is occupying most of his attention. Get on with it, Martin — Ed).

Having to sit in front of a computer and perform wonderful tricks with them to try and find out what they can do is all very well, but it is not my personal idea of fun when there is Wimbledon on the goggle-box. I find the likes of Martina Navratilova and Jimmy Connors much more interesting than your average spreadsheet. Indeed, at times like this, I find it more interesting than the average game program.

I have found one compensation however: that tennis program I told you about last issue. I have had great pleasure showing Jimmy Connors just where he went wrong by playing the game for him. To be fair to the computer, and for that matter the program, Connors (in the form of yours truly) still lost. We fought valiantly however, Connors and I.

It was a shame that Connors and I lost the rematch against the computer, because I could have tolerated playing the game for a considerable time in the interests of sport, scientific research and articles for *MSX Computing*. Having lost, however, I was left with nothing else to do but get on with some ordinary work.

To be more precise, I had little alternative but to carry on where I had left off last issue. For those with short memories, this was the point where I had failed completely to get the MSX machine I had to load in anything from cassette. This, I had decided, was something of an inconvenience but, in the context of a first article and a first attempt at cracking the problem, I didn't feel too aggrieved about it. After all, everyone has teething troubles with a new or different machine, don't they?

By the time this next article came round, thought I, the problem would have been solved and I could move to the next ideas I wanted to play around with. Murphy, the great law maker and breaker of strong wills, had decided otherwise, however.

Let me explain just a little. When Lord Editor Craven, esteemed spiritual guide of this august organ, read of my plight with the cassette, he took pity on me. Telephone jangling, he left word with my answering machine that he would offer some assistance. He suggested that he might come round 'soon' and check a few things out, not least of which being the computer itself. As I was already busy doing other things (and being terminally lazy to boot) I accepted this kind offer and promptly forgot about the problem.

With three things and four others, it was some time before the two of us got things together, and then it was a case of the good Lord Editor dropping off various bits and pieces, including a different computer, with a cheery "try that lot".

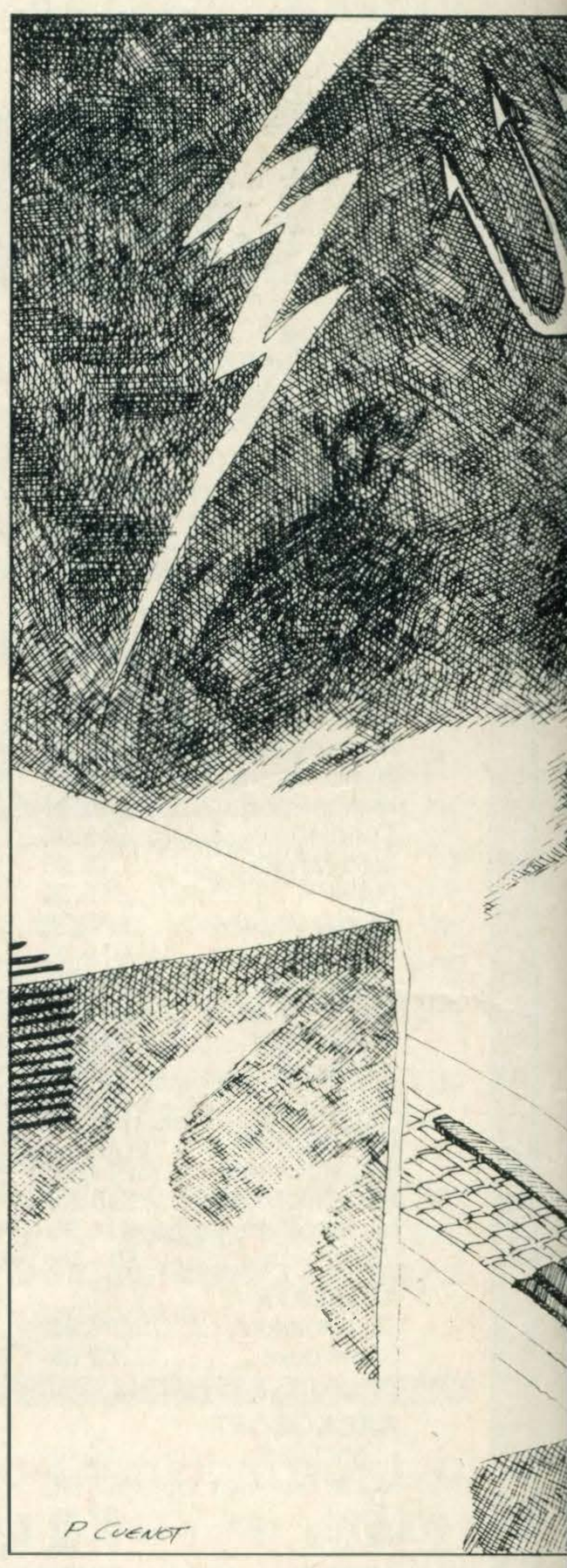
Well, to cut a tedious story short, I did. The end result makes me squirm with self-doubt, for I still cannot get anything to load from cassette. Have you ever felt persecuted? That is certainly what I am feeling just at present. I always end up wondering what it is about other people that lets them walk up to a totally strange computer system and, with the minimum of fuss, get it to do everything they want. Me, I just seem to put a curse on the accursed things.

Let us take the current example. Everything bar one element has been changed about my attempts to get a program loaded from cassette. The computer has been changed to an HC-7GB from JVC. This is a two-tone grey affair with a vented 'power bulge' along the back. This hides the power supply and gets quite warm after a while. Otherwise it seems to be a pretty viceless machine on my acquaintance so far.

As well as the computer, the cassette lead has been changed. These can sometimes be a weak link in getting data across from the cassette to the computer, so the good Lord Editor brought another one along.

Finally, the cassette player itself was changed. I had used my favourite hand-portable mono-recorder last time, the type that looks a bit like a personal stereo from a distance. This has worked before when connected to other personal computers, so its integrity has not been in real doubt, so far as I am concerned. Nonetheless, a larger player was also connected up to the system just to see what happened, but the results were exactly the same . . . nothing.

I tried running the recorder from a mains adaptor to see if it might be any problem with variable battery power, but that achieved nothing new. I even tried changing all the jack plugs around, just in case, but that got me nowhere fast. It was then that I realised the only element of this exercise that has, so far, not been changed or swapped for something else. That, not to put too fine a point on it, is me. I am beginning to assume that I



am the jinx on the whole thing.

One thing that still intrigues me is the fact that every program I have at present seems to have a different keystroke requirement to get it to load. One will tell me to key 'run CAS:' and that will be sufficient. Others tell me to key in 'load"{FILENAME}', R' and success will be mine. Still others say that the secret is to key in 'CLOAD"{FILENAME}".'

These variations are, to say the least, untidy. What is more important however is that, so far as I am concerned at least, not one them works on any program at any time, on either recorder, cassette lead or computer. It must be me.

If it is then we have a small problem, for one of the things that I wanted to look at in this series was getting to know the MSX machine so that it could become useful, not necessarily as a no-holds-barred business machine, but certainly as more than just a games player. There are a number of applications where a machine like the MSX tribe can prove its worth; where its ability to run a word proces-

Illustration By Patrick Cuenot

sing package, simple spreadsheet or a mailing list or small database can be of great interest and help to an individual. Such capabilities can help not only the individual but also those involved in running clubs or small organisations. I know: I belong to one small organisation where the secretary is a computer freak, and I get reams of totally organised information from his system every time I see him.

One fly in the ointment is that most of the software for such applications is to be found on tape, as this is a far more cost-effective way of selling programs than the cartridge, which is an expensive item to manufacture and requires a high volume production run to make it worthwhile.

At present, the only cartridge that I have that fits this 'useful' description is a copy of Bank Street Writer, a word processing package. So, with cartridge plugged in to its socket on the side of the JVC, the power was turned on and experimentation began.

There was an immediate little problem that showed itself at this point. Not being the best of tropysts . . . sorry, typists, the flowing prose that appears on screen is not always of the most coherent variety. I know what I want to write, but my fingers never seem to want to participate. With the JVC keyboard, however, the mistakes were coming thick and fast, faster than average on other machines, including the Sanyo I had before. There definitely seemed something wrong with the keyboard.

A little experimentation revealed the following interesting events, which explain at least some of my typing errors. If you take any MSX machine and type in the three character CBA, you get CBA up on the screen. But if you try the same thing without releasing the keys, after the first CBA, the auto-repeat takes over. This is all well and good, but the string which the machine auto-repeats is not CBA. It is miraculously transformed into ABC.

Try it for yourself in any program which takes text input — Basic, word processors or whatever you have. If you press down ten keys and hold them there, the first ten characters to appear will be those keys in the order you pressed the keys. The auto-repeat function will print the characters in alphabetical order — or, if non-alphabetic characters are included, in ascending order of ASCII values.

My current theory is that whenever you type two or more characters very quickly, indeed more quickly than the program or Basic can accept them, they go into a buffer and are rearranged into ascending ASCII value. Type 'THE' too quickly and you get 'TEH'.

If anyone has noticed the same effect, or thinks there is a more likely cause, dropping the magazien—sorry *magazine*—a line would be appreciated. If anyone has invented a fix, of course, it would be doubly welcome. Some of you veteran home computer junkies may possibly remember the Tandy TRS-80 Model 1 of the late 1970s, which had a vaguely similar keyboard problem called keybounce. Unless you were very careful your ttypiingg eennded uup likke thiss. Some unsung hero invented a little software fix, and I hope that something similar may be possible in this case. Indirectly however, at least this problem gave good grounds to test the editing capabilities of Bank Street Writer: there was plenty to edit.

This is where the experience of nearly any other word processing package can be a positive disadvantage, for Bank Street Writer goes about things like editing in a particularly cack-handed fashion. For example, there are two distinct modes of operation: writing and editing. Never, it would appear, do the twain meet.

This means that if you wish to correct a mistake while you are writing you have just two options. The first is to use the backspace key to delete everything you have just written, or you have to press the Escape key and move into the Edit Mode. This is not only tiresome, but the mode itself is also a pain. Finding and executing the particular command you want is difficult, and is not made easy by the simplest functions, such as erasing a word, involving the marking of the beginning and end of the 'block' to be erased. Having done all that you then have to answer a question on whether you really want to carry out the task.

After all the hassle of setting it up for a simple one-word erase, being asked if I was sure seemed pernickety in the extreme.

Having failed miserably with getting the cassette to work, I was more than a little concerned about connecting up my existing printer, an Epson RX-80. As it happened, the cable that came with the computer fitted (at both ends) the sockets expected of it.

Bank Street Writer, though it had no selection menu for different types of printer (and no mention that I saw in its odd little manual of what type of printer it was set up for) ended up driving the Epson perfectly well. This, indeed, was progress.

Getting Bank Street Writer to actually print, however, was more difficult than setting up the printer in the first place, requiring descent through three levels of hierarchical menu to get there. I will cover printing in more detail next time.

By then, I hope to have at last cracked the problem of the cassette, so that I can start trying to use the machine as more than a games player.

YOUR MSX NEEDS

GREMLIN

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Enter the world of Avenger, a Ninja warrior of unparalleled skills and deadly powers, as he battles the forces of evil in defence of his faith and protection of the weak.
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Experience the stunning effects of triple scrolling action as you master the techniques of Hand to Hand combat, Pole Fighting and the skills of the Samurai Sword.

BOUNDER

"10 levels of fun make this torture excellent value for money. Nova rating. Definitely one of those 'just another go' games. Game of the month February" – Computer Gamer
"The most compulsive game I've ever played. If you don't buy it you'll never know what you've missed." says Gary Penn, Zzap! 64. Gold Medal Award. 97% overall.

VALKYR

This is it men – 'Do or Die' time. If we fail to drive back those VALKRIAN sons-of-slimesnakes now, we never will. The problem is, they have cut off our Xeryllium supplies, making most of our weapons useless and we can't get through their defence shields without them! Our technical bods seem to think that they have an answer. We all know that the VALKRIANS use Xeryllium in their engines the same as us; well, Xeryllium is tough stuff. If you shoot at Droners you should be able to

JACK THE NIPPER

Jack was tired of all the wimps in his town, their boring games and goody goody ways sent him to sleep. So, Jack, being of a rather naughty disposition set about livening things up a bit, he picked up his trusty pea-shooter and scarpered off to cause some trouble.
This is where you come in to take on the role of Jack and use your imagination to be as naughty as possible doing the things you always wanted to do but dare not (YOU WIMP!!); Jump on things, pick them up and drop them, use your pea-shooter to create smashing effects and toot your horn at the cat.

COMPETITION

WRITE NOW!

Your chance to play the hard-bitten hack — write a software review and win this Yamaha

For this month's competition we have the superb Yamaha CX5MII to give away. This machine combines all the qualities of traditional MSX computers with specialised professional music-making hardware and 128K of RAM.

This is an above-average prize so we thought we would ask entrants to put in an above-average effort. Imagine that you work on MSX Computing, and write us a software review.

Your review can be of any piece of commercially available MSX software, no matter whether or not we have already reviewed in the magazine.

We are not necessarily looking for a review which echos our own opinions but factual accuracy is important. Your entry could be a rave review of a wonderful product, a constructive criticism of a bad one, or anything in between. The main thing is to include a clear description of what the program does and how well it succeeds — the information that a reader needs when he is deciding on his next purchase. Naturally, the more lively and interesting you make your review, the more likely it is to win.

The competition will be judged on how clear and informative the review is and how well it is written. Spelling and grammar do matter.

Writing for a magazine involves some strange disciplines not normally encountered in real life. These include the need to write to a specific word count. In this case we want between 420 and 435 words of body copy (the main section of the review). In addition you should supply the name and price of the program, its category and format, and the name of the supplier. We'll let you off the phone number.

Not everyone has access to a typewriter or computer printer, so clear handwriting is allowed, but entries should be double-spaced with wide margins, written on one side of the paper only.

Even if we have already reviewed the program in question — and it's a racing certainty — the winner can expect to see his efforts in print when we announce the results.

RULES

1. The judges' decision is final and no correspondence will be entered into.
2. No employees of Haymarket Publishing or Yamaha or their immediate families may enter. Entries from competitors deemed by the judges to be professional computer journalists will be ignored (hands off, Gerrard, Markes and the rest).
3. All entries must reach us on or before the closing date of Wednesday 15th October 1986.
4. Entries must be addressed to:

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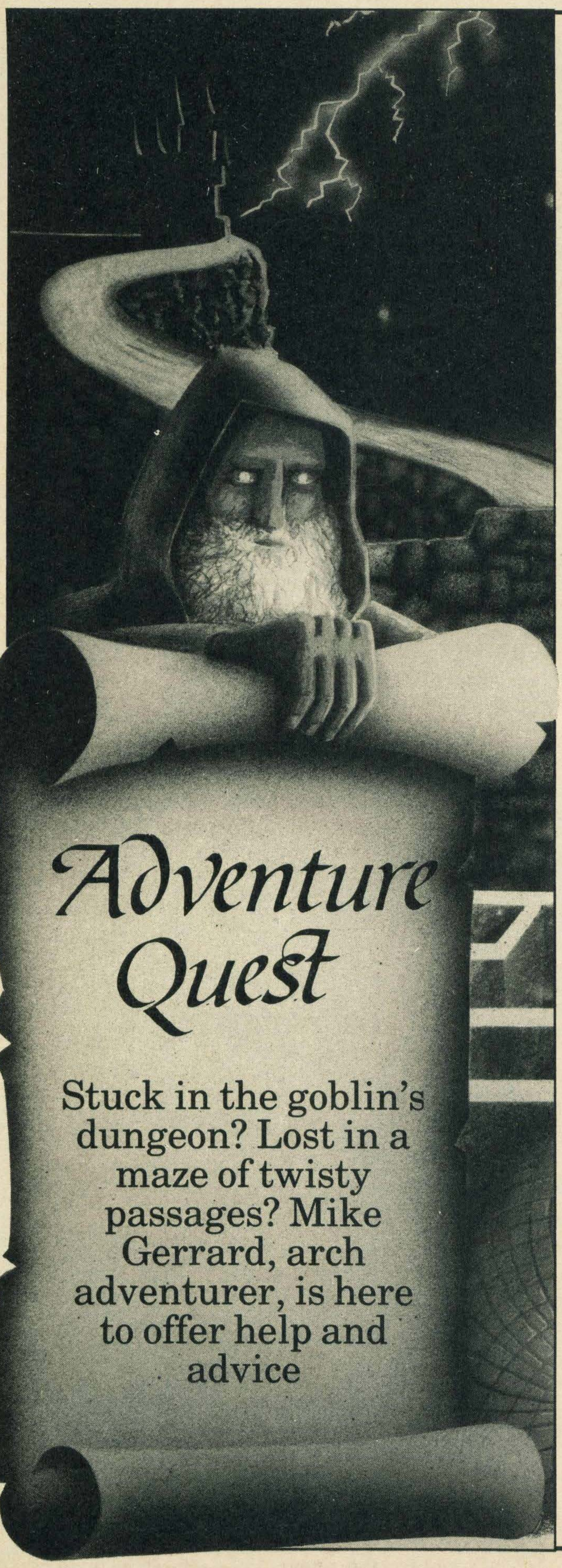
Haymarket Publishing Ltd
38-42 Hampton Road
Teddington
Middlesex TW11 0JE

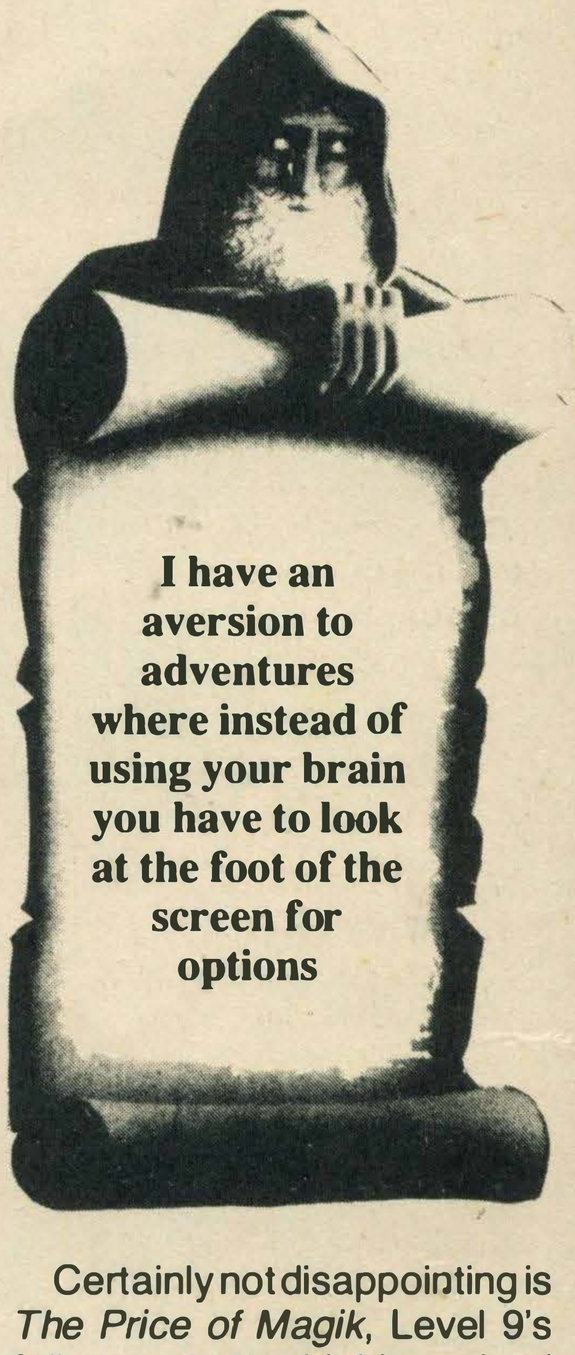


No time to waste this month as not only is the new release from Level 9 at last here, *The Price of Magik*, but Bug-Byte has also released nothing less than a four-part graphic adventure based on Jules Verne's *Journey to the Centre of the Earth*, and for the bargain price of £2.99. In the last column about ideas for adventure writing I mentioned the possibility of adapting books, including those of Jules Verne, and I particularly had this one in mind as it's always struck me as having potential for becoming a great adventure. Unfortunately this isn't really it, as although it looks impressive on paper, it isn't exactly the toughest game you'll ever play.

You begin in the hall of Professor Hardwigg's fine house in Hamburg, though you'll have to read the book to find out which character you're meant to be. On the left of the screen is a box in which is listed the items you hold, though this is zilch at the start, and on the right is a note of the exits available to you. Between the two is a simple graphics screen, with not all the locations being illustrated. Below that is the text description, with room for your input, and finally a list of possible commands at the bottom. These can be entered by single key-presses, such as L for Look, X for Examine, with the cursor keys used for movement. This does lead to a little confusion at first, as you type in E for East only to find 'Eat?' on the screen, or you enter E for Examine to be greeted with 'Eat Book?' Still, you soon get used to it.

I do have an aversion to those adventures where your possible courses of action are listed for you, as instead of using your brain you have to look instead at the foot of the screen to see what's open to you in a particular location. If you're at Altona Station and bide your time, a train pulls in. Right, what can we do with a train? Drink . . . Move . . . Buy . . . Sell? Ah, Take . . . TAKE TRAIN, yes, and there you are in Copenhagen, ready to catch — sorry, ready to take the ferry to Iceland. Professor Hardwigg is still with you, which is quite a surprise as you last saw him in his study in Hamburg. You mooch about in Copenhagen awhile (all of six locations) then off to Reykjavik to make your way to the earth's core. I'd made it this far in about five minutes of play, and I think even beginners will find it all rather obvious.

All but the first part of the adventure requires you to enter a code, and the cassette cover warns you that the machine will NEW if you get the code wrong, but in fact it doesn't, you can list the program and although the code is heavily disguised it shouldn't take too long to work it out, if you need to. Overall I found this adventure disappointing then, its main virtue being the price, and for three quid you can afford to try it for yourself in case you disagree with me.



Certainly not disappointing is *The Price of Magik*, Level 9's follow-up to the highly praised *Red Moon*. In that game you had to help restore the power of magic to the kingdom of Baskalosk by recovering the fabled Red Moon crystal. You did recover the crystal, didn't you? If not, no matter, you can still delve into the sequel. The crystal's most recent guardian, Myglar the sorceror, has done a bunk, having drained the crys-

The Price of Magik

Level 9 Computing

tal of much of its power in the hope of attaining eternal youth. Your task is to face up to Myglar, defeat him, and take his place as rightful guardian of the crystal.

For all these magical melodramatics, the game begins ordinarily enough with you outside a mansion where a few vines grow up round the front door to the roof, and off to one side is a woodshed and a pleasant sounding herb garden. How nice and relaxing. Not for long, as there's something nasty in the woodshed and the mandrake plant screams if you try to pluck it from the garden. Do you persist and risk killing it? Would this constitute herbicide?

Inside the front door, provided you can find a source of light (don't waste time looking for a switch), is a postcard explaining that deliveries have been suspended due to the mysterious disappearance of several postmen recently. Gulp!

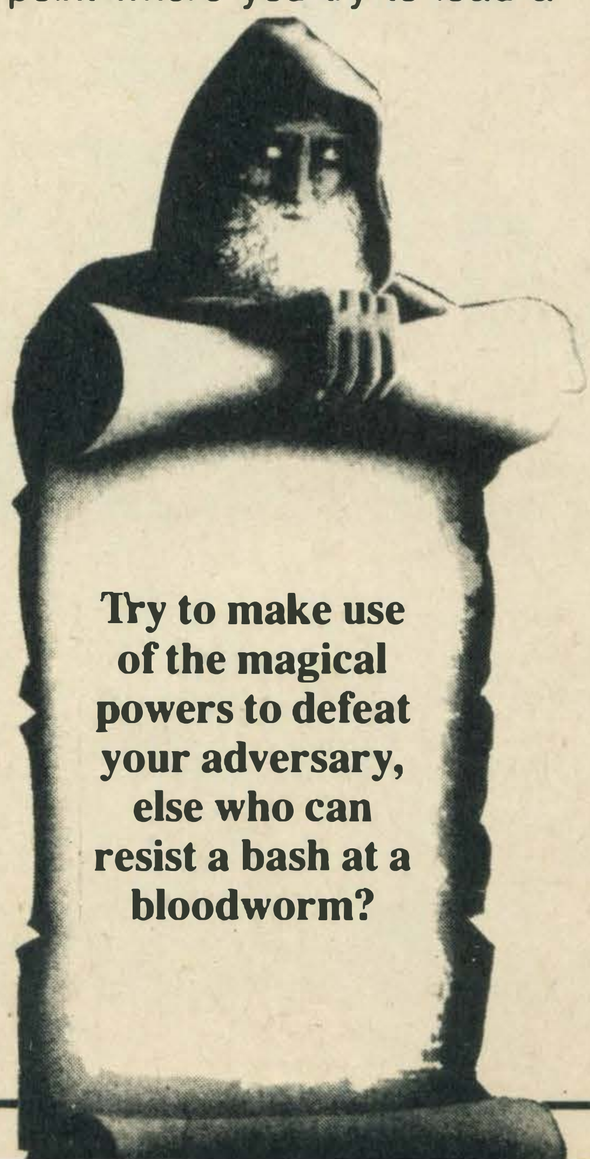
Like *Red Moon*, this adventure allows you to explore a vast number of locations without necessarily having to solve any problems, other than a few at the start. Going in through the front door makes life slightly more difficult, in that you're soon likely to encounter things you wouldn't want to encounter in a gloomy mansion, and a better bet is to make your way to the roof and gather goodies along the way. The baddies you'll encounter include skeletons, werewolves and other charmers, and you can choose your tactics against these. You could try a fight to the death, and hope it isn't yours. In *D&D* fashion you have strength points, as do your opponents, so let battle commence and may the stronger survive. An alternative is to try to make use of the magical powers of certain items, to see if you can defeat your adversaries that way — infinitely better in the long run, but who can resist a good straightforward bash at a bloodworm?

Magic can also be used to help you solve some of the problems, and reach otherwise unreachable objects, and as before you have to find the right object to work in conjunction with a particular spell — to give the most obvious example, which won't spoil it too much for anyone, the broom is linked to the FLY spell.

This is the type of vast adventure that Level 9 does best, and the structure of the adventure program has been improved in several ways. OOPS allows you to take back a move, if you suddenly find yourself facing a foe you'd rather not face just yet, or even if you find yourself dead, while RAMSAVE obviously saves your progress instantly into memory, also useful if faced with a potentially risky action, but don't forget to save your progress to tape from time to time as well. At one place in particular I found a combination of the OOPS and RAMSAVE commands essential — do a RAMSAVE as soon as you reach the Circular Room. From here some of the passages are one-way, and they build into a small maze, so try all the exits from each location and OOPS your way back each time, so enabling you to map the area out more efficiently.

The program also takes the multi-tasking approach that was introduced with *The Worm in Paradise*, so that you don't need to wait for the graphics to finish drawing before you enter your text command, and you can still switch the pictures off and on using WORDS and PICTURES if you wish. I soon preferred to play using WORDS, as, to be honest, the pictures are nothing to write home about — not that you could do that anyway with these disappearing delivery men.

A feature of the MSX version is Lenslok, something I could have well done without. This doesn't appear at the start of the game, as is usual, but for some reason I can't understand is placed at various stages in the adventure, including the point where you try to load a saved game. If this is meant as an anti-piracy device, why not just have it once at the start so no Lenslok means no play.



Try to make use of the magical powers to defeat your adversary, else who can resist a bash at a bloodworm?

Anyway, even with Lenslok you'll still want to buy this latest in the Level 9 line, at a price of £9.95. (Thinks: if the company called itself Level 8, would it then charge £8.85?).

Zakil Wood is dominating the postbag, in particular the wretched Path of Eternal Sleep, and some who have received my help sheet have written back to say that the solution to that problem doesn't work. All I can say is that it does work for me. As soon as you enter the path, type GET LEAVES, then travel NORTH, EAST, SOUTH, WEST, EAST and you'll be through. That information will help Terry Binns of Taunton and Allan Evans of Atherton — what an alliterative lot of readers we have. In the same game Robert Evans of Belfast asks how he can get past the cottage, which in fact you can't, but you can go into it to collect a few items (examine absolutely everything) then return across the river to negotiate the path.

In *Return to Eden*, Alex Mead from Swindon needs to know where to find the identity card: POHS, POC EHT NO. Last time reader R. Fitzgerald asked me about *Emerald Isle*, and what to do to the statue, to which I said: MRA STI LLUP. What I didn't explain was exactly how you did this. First you KCOLB EHT NO DNATS, and then you TI LLUP DNA MRA REVO EPOR GNOL WORHT. In the same game, has anyone mapped out the maze of stone passages? If so, let me hear from you.

In *Classic Adventure/Colossal Adventure*, Andrew Mooney from Gainsborough asks how he can finish the game with all the treasures intact when he has to give one of them up to the troll to get past it. The answer to that is that there is one treasure which you can somehow reclaim, this being SGGE NEDLOG EHT. To reclaim it you need to make a magic utterance, not unconnected with the room in which you find that treasure. But no magic utterances needed to make me return in the next issue, promise.

LITTLE BROTHER

It may look like a toy, but this printer combines high quality with low cost.

If you are used to the familiar bulk of an Epson or similar dot-matrix printer hogging your desk space, you might find it hard to take this little Brother seriously at first. It looks too insubstantial to some more obvious choices.

A closer inspection, however, reveals a very complete specification in a unit which occupies about one-third of the volume of more traditional printers.

Although Brother itself describes the 1109 as 'ideal for the smaller business user', it meets the needs of home computer users even better.

The price of £225 (VAT brings it up to an unwieldly-sounding £258.75) gets you many of the fixtures and fittings that come only as optional extras on most rivals. For this price the 1109 has both parallel and serial interfaces. MSX users will be interested mainly in the parallel interface, but those who operate more than one type of computer may find the RS232C serial interface a useful alternative.

Another feature for which you would normally expect to pay extra is the paper tractor mechanism. This lets you use continuous pin-fed paper, which is virtually essential for printing out program listings. On the other hand, if yo want to print out a letter on a single sheet of higher-quality paper, the tractor mechanism can be disconnected quickly and the platen roller engaged to feed the paper by friction.

The tractor mechanism itself is the source of our ony reservation. It is mainly plastic and slightly fussy about the way the paper is arranged. If you are using a particularly heavy stock of continuous stationery, it is worth stacking it close to the printer and ensuring that the printer does not have to lift it too far.

There are two main printing modes, draft and near letter quality (NLQ). The draft mode zips along at a claimed 100 characters per second giving clear enough results, and in this mode does a passable imitation of the familiar Epson MX/RX/FX family. Effects like bold, double strike, condensed, italic, enlaged, subscript and superscript printing are all available through various control codes.

For output which needs a bit more class, however, the NLQ mode greatly improves the print quality. As a sample of the print quality available in this mode, just look at the program listings section of this issue. These were printed on the Brother and reduced photographically to 81 per cent of their original size. The quality is not quite up to the best electric typewriter standards, but it is quite acceptable for most letter-writing purposes.

Graphics are catered for by a bit-image graphics mode, which is certainly an area in which the compatibility with Epson codes pays off, as screen dump programs designed for the Epson range will work with the Brother too.

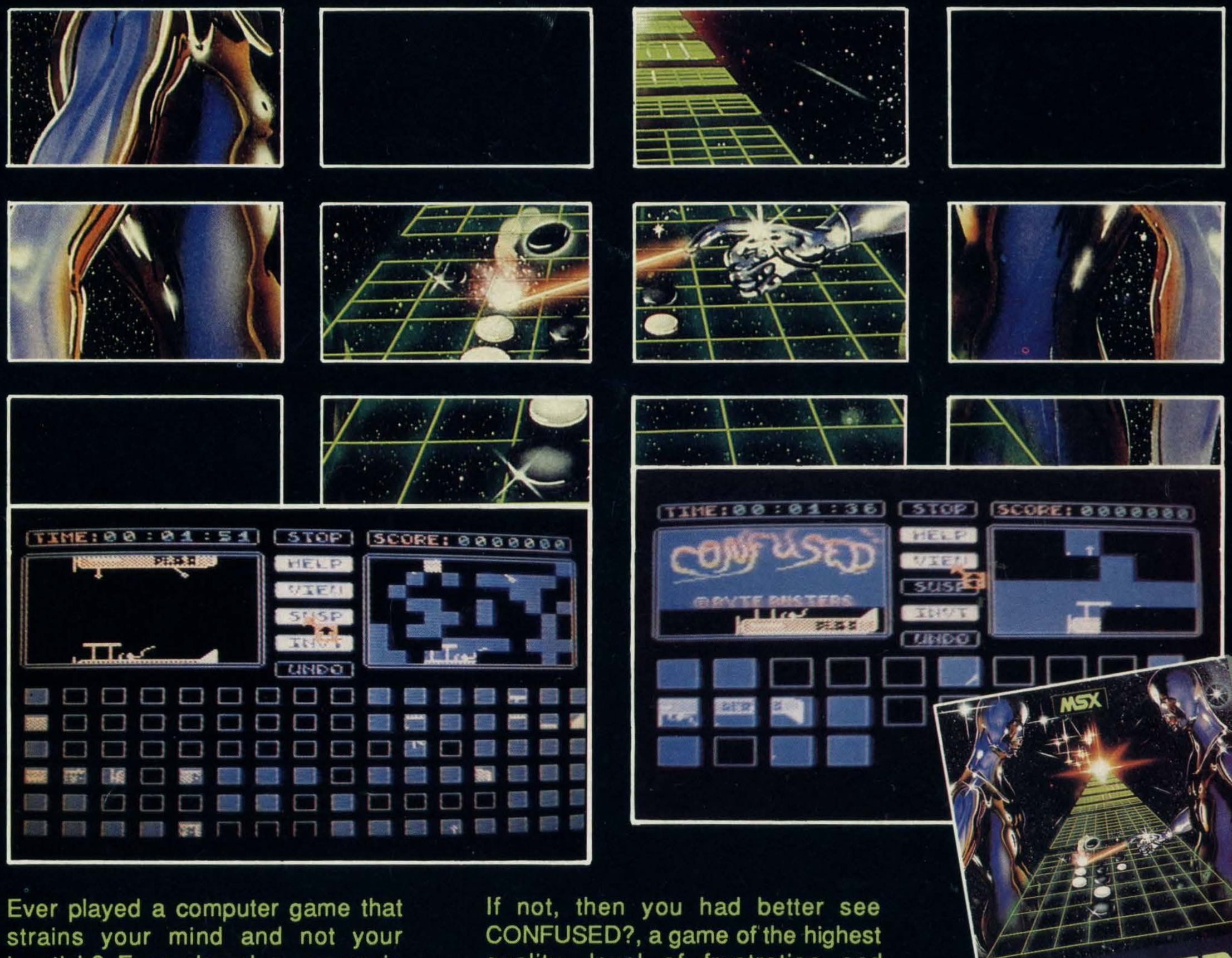
A 2K print buffer is incorporated into the printer. This speeds up many printing tasks, as use of the computer is returned to the user 2048 characters before the end of a printing task. If for any reason you don't want the buffer (perhaps because you want immediate printer control from the keyboard) it can be switched off using the internal DIP switches.

Mention of the DIP switches brings to mind the intelligent positioning of these important devices, used for selecting the settings which the printer used when switched on or reset. Some manufacturers make you get out your screwdriver and practically tear the unit to pieces just to alter a switch setting. On the 1109, all you do is remove the clip-on top cover and you are in business.

The Brother 1109 represents good value for money and with its compact dimensions should certainly be considered by MSX users.

CONFUSED?

THE MOVING PUZZLE GAME



Ever played a computer game that strains your mind and not your joystick? Ever played a game in which points can only be lost and never gained? Ever seen a moving jigsaw puzzle that plays music?

If not, then you had better see CONFUSED?, a game of the highest quality, level of frustration and addiction.
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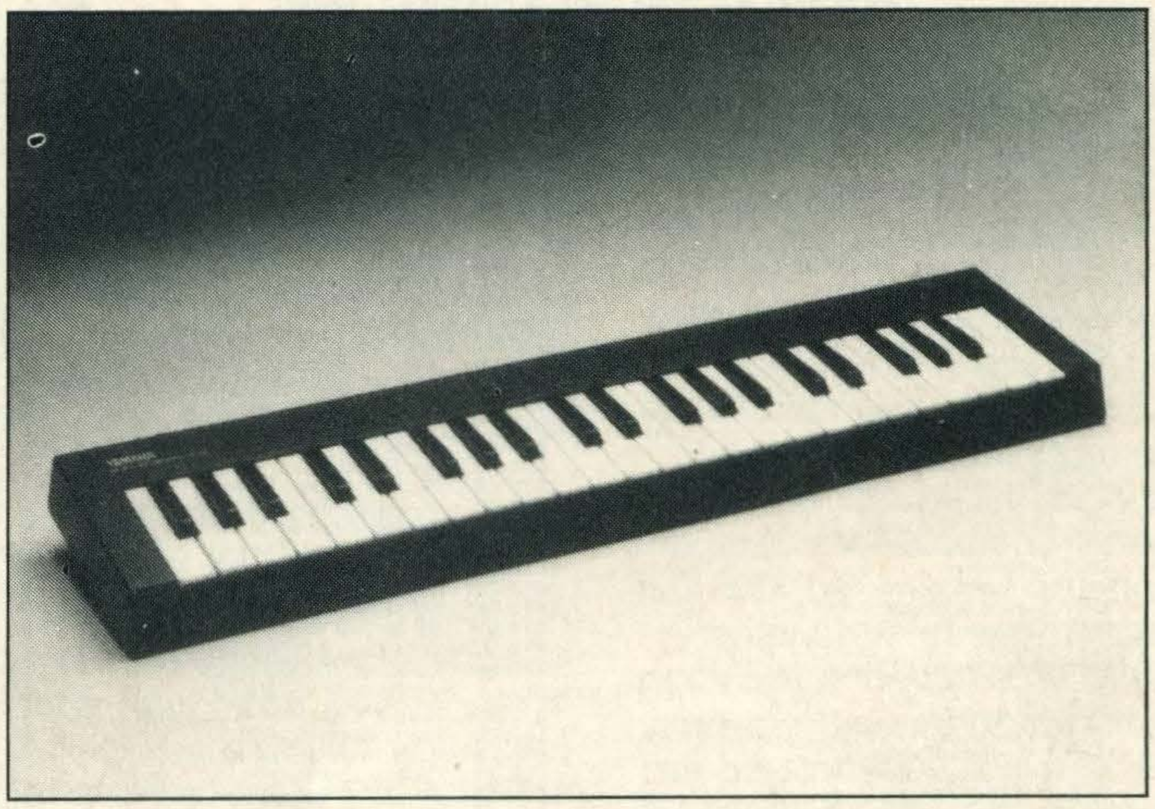
YAMAHA PLAYS ON!

New software for the CX5MII improves Yamaha's music package, says Ken Gillett

In 1983 Yamaha shook the music world with the introduction of its DX synthesisers using a hitherto unknown method of sound generation known as FM and incorporating MIDI.

One year later this was followed up with the introduction of a computer complying with the MSX standard. It incorporated an FM synthesiser module with apparently more features than their DX9 synth but at just over half the price — and you had a computer thrown in.

Software was available to access the voicing parameters of the synths, all shown on the monitor rather than one at a time on the DX's small LCD screen, making programming a lot easier. When connected to one of these synths, the optional music keyboard could play the internal voices *and* any voice selected on the external



synth. This is the way to obtain really rich and interesting sounds. But, and it was a big but, the CX5 voices could not be played from the external unit. The CX5 was not suitable for use as an expander module, as everyone hoped it would be.

The other major drawback was that the software cartridges would not use a disk as storage for the creations of the user, leaving time-consuming tape as the only alternative. Yamaha said that this was because the final specifications for disk use had not been finalised at the time of first production and when it was, it used some of the same memory space occupied by the Yamaha programs.

This has now largely been corrected by the introduction of a new sound module known as the SFG05 and new software cartridges that are disk compatible. The company has also adapted some to mouse control. In most cases the style of program lends itself to the use of this prolific rodent (I wish I could use the ones my cat brings in, but I can't seem to fit them in the joystick ports and when you want to use them, they've run off). Unfortunately the DX7 voicing program is yet to be updated for disk use which is a pity since it is a gem.

One irritating aspect of all this which is bound to annoy CX5 owners is that it will cost in the region of £200 to replace the old equipment with the new hardware and software, when arguably it should have been up to this specification in the first place.

When using new equipment for the first time, one should always consult the manual first. A quick perusal shows that the SFG05 manual is a much better offering than that provided for the SFG01, with plenty of diagrams, screen displays and explanations where necessary.

Anyone familiar with the old module should have no difficulty with this one, especially since the displays are much easier to use and more logically laid out. Many operations are carried out by moving the pointer and scrolling the display up and down the screen by the use of the up and down cursor keys.

The left and right cursor keys are then used to alter the settings and the shift key can also be used to increase the speed at which the change is made. In this way the right parameters available can be quickly displayed and set.

The most important improvement in this new module is the way the voices can be played by the CX5 music keyboard or by an external synth. The old module had the ability to play eight notes at once but only one voice at a time, whereas the new unit can play up to four voices at once if controlled from an external keyboard. This allows only two notes to be played at once but if only two voices are layered, then four notes can be played simultaneously.

When played from the CX5 music keyboard the maximum is two voices with four notes available for each, but there are many permutations and combinations in which this can be carried out.

The uses of the function keys are clearly labelled on screen

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and selecting the appropriate one switches the machine to the required mode.

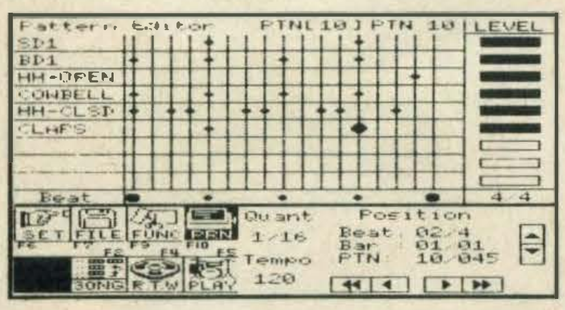
POLY is subdivided into three modes: single (one voice, up to eight notes); split (selectable split point with a different voice on either side), and dual, which gives two voices, up to four notes at once.

SOLO allows only one note at a time (monophonic) but two voices can now be used simultaneously. This mode can also be used with the auto accompaniment as was available on the previous unit. This is great fun for non-musicians who wants to feel they can make music. With automatic preset rhythms, bass accompaniment and one finger chords, even a beginner can make nice sounds.

Any keyboard playing can be recorded on the built in sequencer and now saved to tape or disk. Unfortunately, the sequencer will not loop the information and play again and again: one run through is all you get. This is a great pity since this feature can be used to create backing tracks, so for any serious work, extra software is required.

In VOICE, pressing F3 allows you to view all the voices available. There are 48 preset system voices, essentially the same as last year, and you can access user-created voices.

In FILE, any recording made with the sequencer can be saved to tape or disk and the user voices mentioned above are also loaded into the system using this mode.



Performance effects such as tremolo or simply volume are readily adjusted from within any playing mode. The overall impression of this unit is the vast improvement in its capabilities and ease of use over the previous one. With full MIDI implementation, this is now an acceptable stand alone synth or computer, or an excellent expander module for an external synth such as a Yamaha DX unit.

FOCUS ON FM SYNTHESIS

Anyone who listens to the radio has heard the expressions AM and FM. These stand for Amplitude Modulation and Frequency Modulation and the FM used when talking about sound synthesis is just about the same.

Modulation is the process of changing a signal. AM changes the volume of the wave, and FM changes the pitch.

Conventional synthesisers use oscillators which can only produce simple waveforms such as square waves, triangular waves and sine waves. These are then filtered to leave a waveform as close as possible to the original being copied. This is known as subtractive synthesis and is not a true representation of how natural sounds are created.

When a note is played on an acoustic instrument the sound created is a combination of many sine waves of different frequencies but within defined relationships known as harmonics. These sine waves modulate each other resulting in a very complex combined waveform the exact shape of which gives the listener the tone colour or timbre. As one wave is applied to another it modulates the frequency of that wave as well as altering the tone, and hence this is known as additive or FM synthesis.

This method would then seem to be a more natural one for the synthesis of acoustic instrument sounds and has been put to good effect in Yamaha's DX range of synths and of course the CX5 sound module, where several oscillator outputs are combined in a variety of user defined patterns known as algorithms. Since Yamaha owns the world rights to this process no-one is likely to copy them exactly.

The success of this formula is indicated by the presence of a DX7 in the hardware used by virtually every performing band in the UK, (just watch *Top of the Pops*) but as yet it fails to produce the raunchy synth sound easily produced by more conventional units. With the enormous number of combinations of settings available on these instruments, maybe it is simply that no one has yet come up with the right one.

FM Voicing Program II

This is the most difficult to use of all the programs now available from Yamaha, but it is essential if you want to create new voices for the sound module.

Loading is not automatic when booting up and the "call fmv" command must be used. This has certain advantages when this program is installed in the new CX5MII.

The major functional differences are that different printers (Epson compatible or MSX) can be used and voice data can now be saved to disk. The structure of the program has been improved, with more help menus and easier to understand commands. There are five command lists or help pages and two display screens.

EDIT shows all the voicing parameters for the voice selected or being created.

DIRECTORY lists all voices currently available for play or edit. This can be system voices or user created ones or a mixture of both.

With no other major differences this remains an improved but still relatively user-hostile program.

FM Music Composer

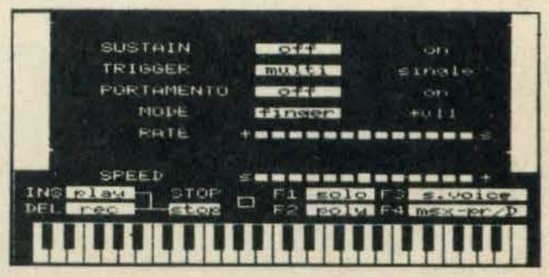
This was another program that suffered badly from lack of disk storage and has been upgraded to correct this as well as including mouse compatibility.

Those familiar with the music composer will know that it allows the user to enter notes on a staff displayed on screen and play back 8 separate parts simultaneously. This has not changed but the program now contains several new features.

Almost every function can be carried out using the mouse. This speeds up note entry and selection of some commands, but others are easier to set using the keyboard. There are two help/command menus from which the mouse can select the required function.

As in the earlier version, notes can be entered from the QWERTY or the music keyboard, but now an external synth can also be used with the data transmitted via MIDI.

Virtually all musical performance data such as tempo, note lengths, crescendo and repeat can still be entered but now portamento can be set for mono parts and if the new CX5MII is used the amount of data that can be stored is increased by the use of different memory banks.



Playback has also been given an update by allowing it to start from a selected point instead of always from the beginning, which was extremely tiresome when checking long pieces.

Another area of change is the printing facility which now allows for MSX or Epson compatible printers and three different types of printout: bold with full screen display on one line, the normal density version of above, and a third mode which is printed as displayed, with two lines on screen represented as two lines on the page. Unfortunately the first of these settings, with the MSX printer selected, tried to print double width and not double density which resulted in garbage. The MSX printer codes are evidently still unreliable. However, the second setting was quite satisfactory.

RX Editor

'Not for the fainthearted' sums up the program that interfaces with the Yamaha's RX range of digital drum machines. This is not for fooling around, but for the serious construction of rhythm tracks of sufficient quality for use in a professional recording studio.

Yamaha sells three drum machines with digitally sampled sounds, the RX21, RX15 and RX11 in ascending order of

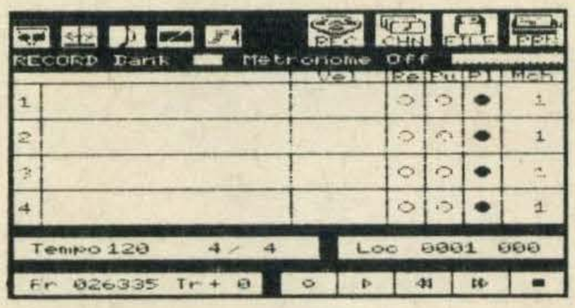
cost and features. The advertising leaflet indicates that the RX editor will function with all of these, but the RX 21 was not to be found on the internal list or in the enclosed manual.

Like the DX synths these drum machines have a small LCD on their top face which is extremely limited in the amount of information that it can display. This program puts it all together on the big screen and with excellent implementation of the mouse greatly simplifies the input of data.

Running the program is initiated from Basic by "call RX" and the MIDI Set Up must then be selected. There is a choice of two systems, with or without an external synth for the input of touch sensitive note data. Having chosen, it is time to have a bash.

First we must create a rhythm pattern using the available instruments as listed on screen and placing them exactly where required with mouse or keys. Patterns can also be created in real time by hitting the instrument keys on the RX itself in the required rhythm. Different patterns can then be linked into parts which join to form a song.

Moving about the program from screen to screen is simplicity itself by selecting the required icon with the mouse.



Data can be saved to tape, cartridge, disk or to the RX11 itself. Since the 15 and 21 were not listed, presumably they cannot be used as storage.

The editing features available, and the way the song can be replayed with repeats and variations in tempo, tone and volume make this an extremely comprehensive package and a must for anyone who wishes to program one of the RX machines.

Midi Recorder

This is another program for the dedicated musician and not to be trifled with. The layout and control of this package are very similar to the RX Editor. Once again the use of the mouse speeds up the process of entering data in the majority of cases, and experience will soon tell when it is faster to use the keyboard.

In the same way that the RX Editor has patterns and parts to make up a complete song, the MIDI Recorder has tracks and banks to chain together. The four tracks can be recorded individually by real time playing, or in step time and bounced together as on a multitrack tape recorder. Each can be set to receive the data via a different MIDI channel, hence a different instrument if required. A metronome pulse is available but only through the monitor speaker.

However, if multi mode is selected, when the tracks are combined each of the original tracks will still only play on the MIDI channel and therefore on the instrument used for their input, even though they are all combined onto one track. Very clever, that, and now there are three spare tracks ready for further recording.

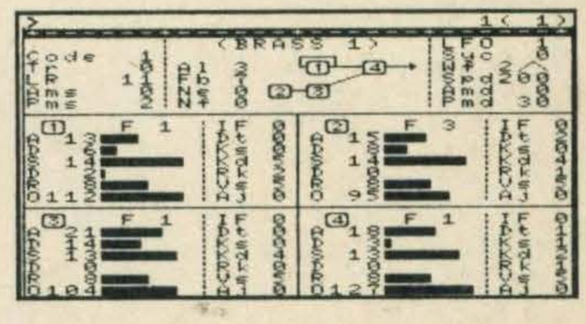
The editing functions leave nothing to be desired, with extensive control over note position, tempo, volume etc, so there are no excuses for not creating perfect songs.

Graphic Artist

And now for something completely different. This is nothing to do with music and may appeal to the artistic reader.

Although the manual states that the mouse is optional, it would be foolish not to make use of it. Having said that, the mouse could be better implemented.

All menu selections are performed by choosing an icon but there is no pointer or mouse cursor, one simply scrolls the mouse to left or right and the blue shading jumps from icon to icon. Not altogether satisfactory, but once the drawing starts the pointer is there as pen or brush or whatever the chosen implement.



Straight lines, free hand, rectangles, circles, various types of shading, MSX graphics characters, two styles of alphabet and musical notation (back to that again) are all there to be used in the construction of a masterpiece.

Having created your Picasso lookalike, you can store it in memory until required, when it will redraw itself, or until power off whichever is the sooner.

Permanent storage is obtained by the use of the ubiquitous cassette tape or a floppy disk. Rather strangely it will only load safely on a single-sided disk, so double-sided ones should be formatted accordingly.

For those who bought the CX5 at the final knock-down price, the relatively small extra outlay provides a remarkable musical tool at a fraction of the cost of stand-alone units.

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FOCUS ON MIDI

Musical Instrument Digital Interface; sounds quite a mouthful, doesn't it? In fact it is not really as complicated as it sounds. MIDI is standard communications protocol for electronic musical instruments. These are generally keyboard synthesisers, but there are some guitar synths available. To understand what information can be transferred from one musical device to another, we need some basic knowledge of how a modern synth operates. For the sake of argument we shall restrict this to keyboards.

The instrument will always consist of a sound generating system, a controlling keyboard and a modification section which may be set or controlled during a performance. Since many controls have to be set just to create one sound the majority of synthesisers now have memory banks so that the different sounds (or voices) can be recalled at the touch of a button.

For many years the sound module has been an electronic oscillator whose output frequency (pitch) is governed by an applied voltage, supplied by the keyboard. The virtual industry standard has been one volt per octave. Many synths were therefore thoughtfully supplied with external connections (in & out) for this control voltage, CV, and the on/off pulse known as GATE.

This gave a measure of compatibility between different units since the sound module of one could be controlled by the keyboard of another, or by a sequencer which is a device able to record the CV and GATE information and play the sequence back so that the synth would play a series of notes. These devices are used extensively in the playing and recording of modern music.

Some manufacturers expanded this principle a little further to enable more control, but it always fell short of providing the complete answer with full control over the performance features offered by many well appointed synthesizers.

Then came MIDI. The industry finally decided on a standard control system which would be able to transmit control data for any feature incorporated in a MIDI equipped instrument. It is in fact analagous to the RS232 port on many micros in that it can be programmed to transmit and receive data relevant to that particular machine. MIDI data is also always sent in a serial stream.

It also incorporates a clock signal for synchronisation of different devices on playback and can be transmitted and received on any of 16 selectable channels.

MIDI is now a *de rigeur* fitment for today's electronic musical instrument and they all have MIDI IN, OUT and THRU sockets. The THRU socket merely sends on the information received from the IN socket so that many MIDI devices can be strung together. By selecting different channels on different instruments each can be set to receive only selected data.

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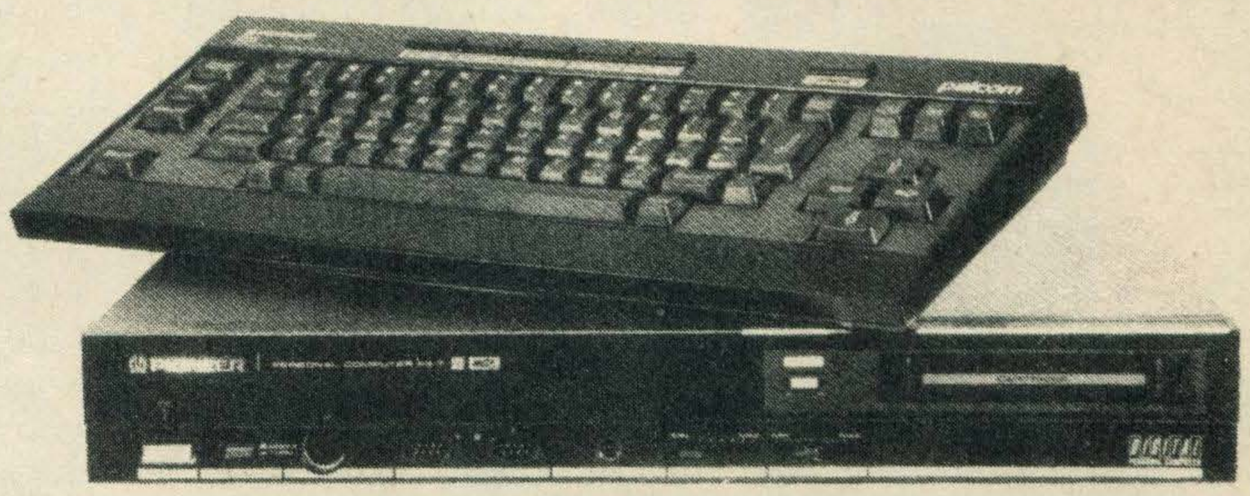

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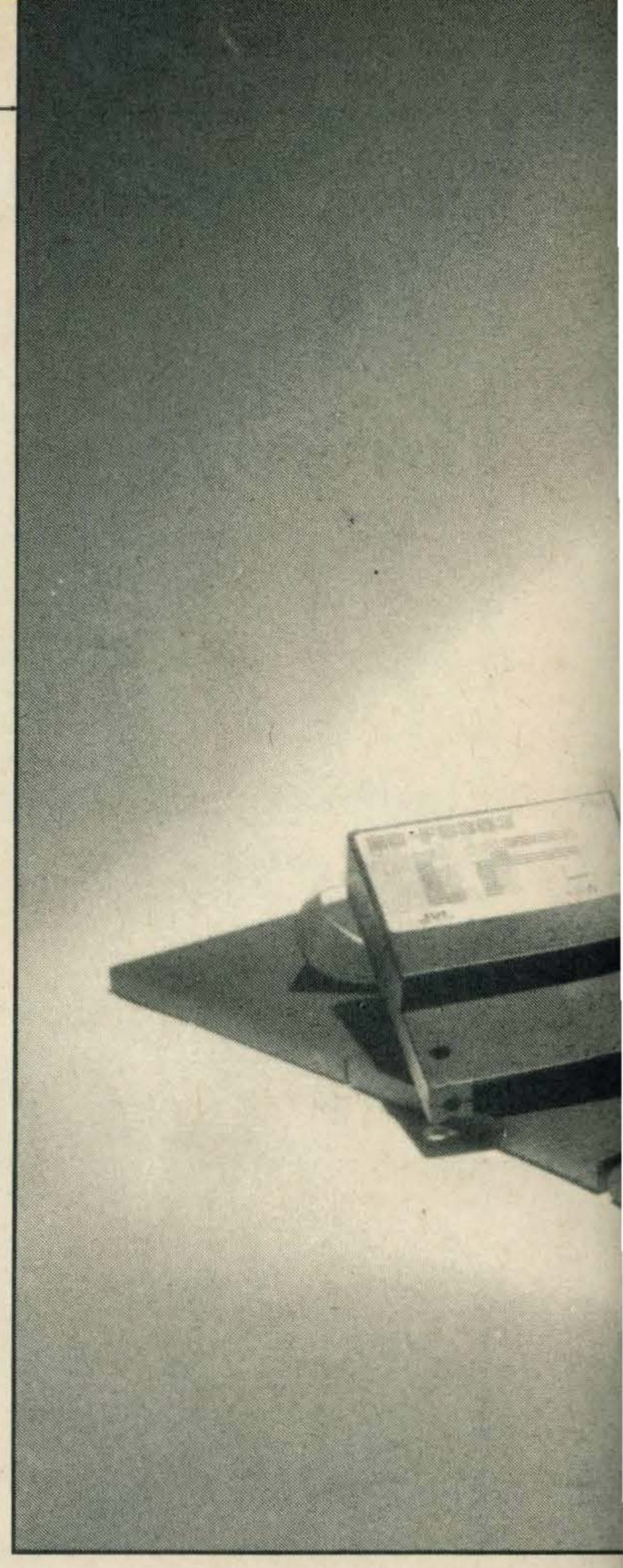
DISK

Finding information on disk systems can be harder than buying one. By Alan Wood



There have been many articles in various computer magazines explaining how data is stored on disk and going on about tracks, sectors, directories and so on. Practical information about how to actually use a disk system is less easy to find. This article sets out to help those who want to use disks on an MSX machine, not only for running existing software, but also to write programs specifically for use with disk systems.

A disk drive for MSX is not cheap, and this is a major reason why they haven't exactly taken off in the UK. The high cost lies partly in the fact that the disk drive also contains the disk controller electronics, with its own dedicated microprocessor chip, the disk basic input/output system (BIOS) and MSX Disk Basic itself. This lot is simply plugged in to an expansion slot, connected to the mains supply and away you go! Remember though that a disk system needs at least 16K of user RAM available in the computer. Some machines seem to need more however, my PX-7 for example needs a full 64K before it will work. This should be verified before purchase of the disk drive.

Having got this far you are confronted with Disk Basic. This is exactly the same as MSX BASIC but with a few additions necessary to access the disk system. The owners handbook supplied with the disk drive should describe all the extra commands. Essentially they are for formatting new disks, reading the directory, loading and running programmes, copying, renaming and deleting files and reading and writing information to and from the disk.

Files stored on a disk can have names with up to eight characters plus a three character file extension. The file extension is very useful for classifying files into types. For example "DEMOFILE.BAS" is a file called "DEMOFILE" written in Basic, you therefore know that it must be LOADed, if the file was in machine code then it may be of type .BIN (binary) in which case it will need BLOAD instead. Data, which is usually used by another program might be of type .DAT and so on. These extensions can be anything you like but it is a good idea to do the same as other users to avoid confusion. Issuing the command FILES will print on the screen a complete list of the files on disk together with their file types.

You will quickly want to copy your programs from cassette tape to disk, and for Basic files this is quite easy. Let's assume you have a Basic program on cassette called DEMO. Transfer it to disk like this:

CLOAD "DEMO"

Switch on the recorder and the computer should soon respond with:

Found:DEMO

After loading you will get the familiar 'OK' message. To put it back on to the disk type:

SAVE "DEMO.BAS"

Notice we used the file extension .BAS to remind us that it is a Basic programme.

Machine code programmes are similar but rely on you already knowing the start, end; and execution addresses. Let's assume you have a machine code file called BLOTTO which starts at address &H8000, ends at &H87FF and runs from &H8050. Transfer it to disk like this:

BLOAD "CAS:BLOTTO"

Switch on the recorder and the computer will soon respond with:

Found:BLOTTO

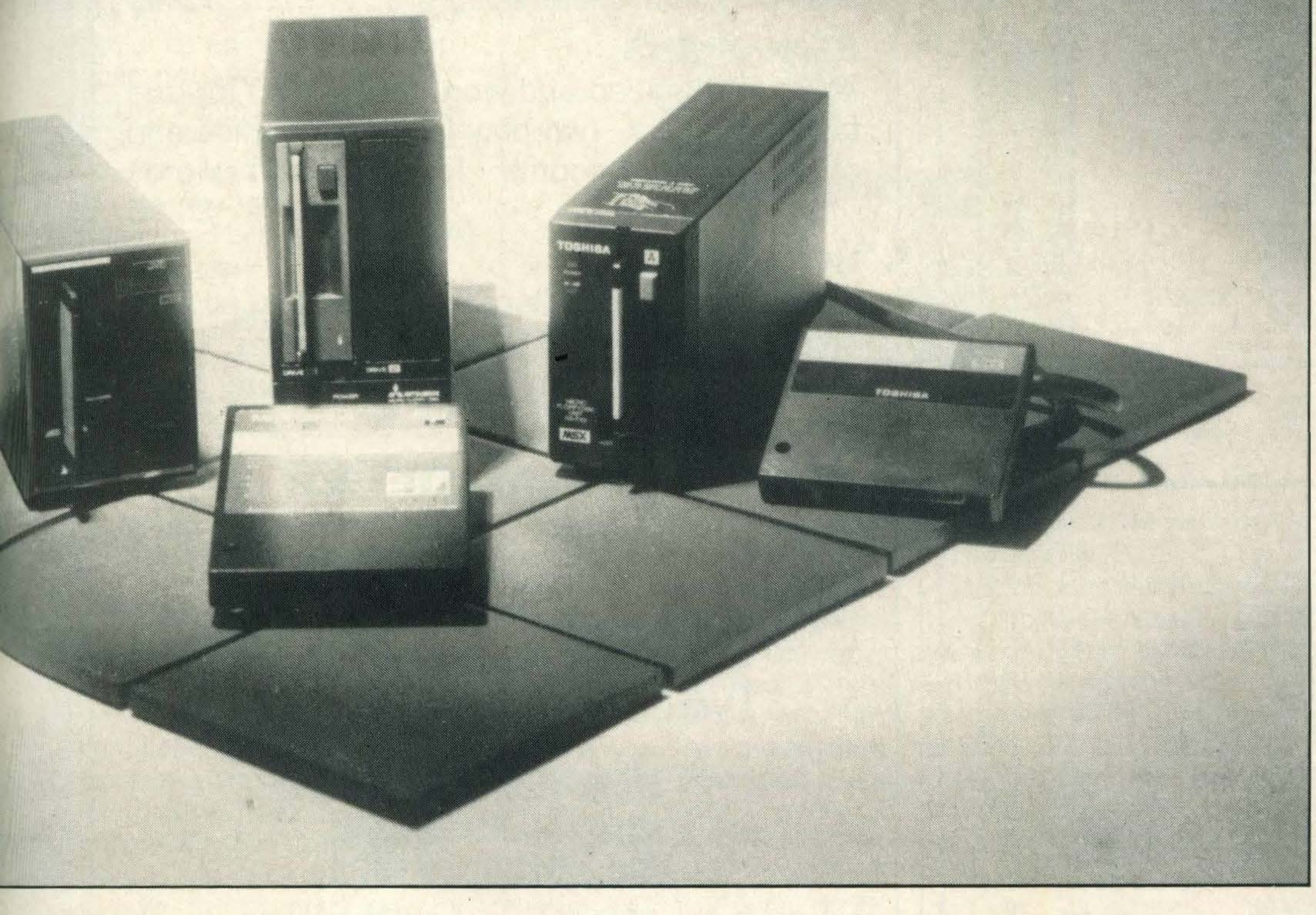
After loading you will get the familiar 'OK' message. To send it back to the disk use:

SAVE"BLOTTO.BIN", &H8000,&H87FF, &H8050

Now you have a disk-based equivalent of your cassette system with all the speed and convenience that brings and the ability to write programs which can access mass storage easily and quickly. A single-sided 3½ inch disk can hold a massive 360K or so. The dedicated Basic programmer need read no further, unless he is of a curious disposition and wonders if something better might be his for the taking.

So far, the operating environment has been Basic. That is, Basic has provided facilities not just for programming but also for handling disks, printers and various other housekeeping duties. Even if the program was written not in Basic itself but in machine code, and was designed to run via Basic using the BLOAD command, it is said to be 'running under Basic'.

There is another environment available to the disk user called simply a 'disk operating system' (DOS). This is a program specifically written to provide an interface between the computer hardware and the user/programmer. It handles all things connected with disks, the text screen, keyboard, input/output ports, real-time clocks etc., and makes access to these facilities easy and convenient for the programmer. Programs written to run under a disk operating system



will interact with it in an efficient manner to give speedy results.

A major advantage of a DOS is that someone else has done all the work necessary to interface it with your particular make of computer, thus (in theory at least) your programs will run on someone else's machine provided only that he has the same DOS, and that you have followed the rules properly when writing your program.

There are many disk operating systems available, all offering different features but all doing fundamentally the same job. The two of interest to use are MSX-DOS and CP/M. Believe it or not, neither seem to be commercially available in the UK! It appears that they either come pre-packaged with a complete disk system or you have to pester your supplier or disk drive manufacturer for a copy. CP/M — written by Digital Research — has been around for a long time and is very popular. It has an enormous library of public domain (not subject to copyright) software available to run under it. The system most likely to appeal to MSX users however is MSX-DOS. This is a stripped down, eight bit, version of Microsoft's MS-DOS and is also very similar to CP/M. Indeed many CP/M programs will run under MSX-DOS without modification.

MSX-DOS expects a full 64K of RAM to be available in the computer. If your machine doesn't boast that amount then a 32K RAM expansion cartridge is usually all that is required which plugs directly into another expansion slot. Better count your slots first though: you have already used one for the disk drive and now another for RAM, if you will require more you'll need a slot expansion module.

MSX-DOS consists of two files: MSXDOS.SYS and COMMAND.COM. When the computer is switched on or the RESET button is pressed, a 'BOOT' loader — which is resident on track zero sector zero of every disc (put there by the formatter) — is automatically loaded and run. It in turn looks for a file called MSXDOS.SYS and if found, loads it in and runs it. After setting up the DOS environment COMMAND.COM is automatically loaded and this provides the user interface. Its job is to interpret commands given to it by the user and carry them out.

Filenames in MSX-DOS have the same specifications as those with Disk Basic and listing the directory will display the file name, type extension, size of file, date and time of creation. Date and time are useful if you are developing or updating files, it enables you to keep track of the latest version without having to delete old files or remember different filenames.

If a command is given to the DOS which it doesn't understand, it is passed on to the disk itself. Any files on the current disk which have been given the type extension .COM are considered to be extensions of the DOS command list, so if a file exists with the unrecognised command name it will be loaded and run. Thus, to run a machine code programme of type .COM (COMmand) you simply name it, press RETURN and hey-presto!

Of course the DOS will permit you to run any language you choose. There is a full 64K of RAM available. None has been pinched for Basic and you are free to load assemblers, compilers, interpreters, word processors, spreadsheets or anything else you want. If for example you load Pascal then you will naturally write your programs in Pascal, just as you did with Basic.

The compiler itself runs under MSX-DOS but you won't even notice. A good compiler will let you create 'stand alone' programs of type .COM which you can subsequently run without Pascal being loaded. You can pass your work on to other MSX-DOS users who need not even know the program originated in Pascal at all.

Writing programs in machine code can be very rewarding. It permits you to remain in absolute control of your computer at all times without being restricted by the limitations of a high level language. Small routines can of course be written directly by 'hand assembling' and typing it in using a hex loader — which could be written in Basic, but the machine level programmer will quickly realise that he needs the convenience of an assembler.

Fortunately for the UK MSX user, a British company — Hisoft — has produced a superb macro assembler together with a de-bugger and a full text editor. The complete package is called *DEVPAC-80* and is available at £39.95. I cannot recommend this development package too highly, it is very professional, complete, well documented and even has a tutorial for beginners. In addition it comes on disk complete with a free copy of the latest version of MSX-DOS; this solves the problem of non-availability mentioned earlier. Incidentally, MSX-DOS is also supplied with their *PASCAL80* and *'C'* compilers.

The editor, ED80.COM, is a pleasure to use. Even though most of us are restricted to 40 character lines, ED80 automatically shifts the whole screen over to permit you to use 80 characters. This is essential if your printer dumps are not to appear cramped, and also permits you to include a full 'comment' field in programs — as all good programmers should. The editor is *Wordstar* compatible which means that some of the keys used for commands are strange indeed and extremely difficult to remember unless you are one of the many Wordstar users. There is however a special 'installation' program supplied which permit you to customise ED80 commands and options

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to suit your own keyboard or personal taste. For example the cursor is normally moved by pressing the CTRL— S,H,E and X keys. Luckily they can be changed to use your cursor arrow keys instead. CTRL—J is the HELP key and provides a list of all commands and options on screen in case you forget. It is more logical to use CTRL—H instead. These changes also alter the HELP file so are automatically incorporated into your own personal version.

Assembler

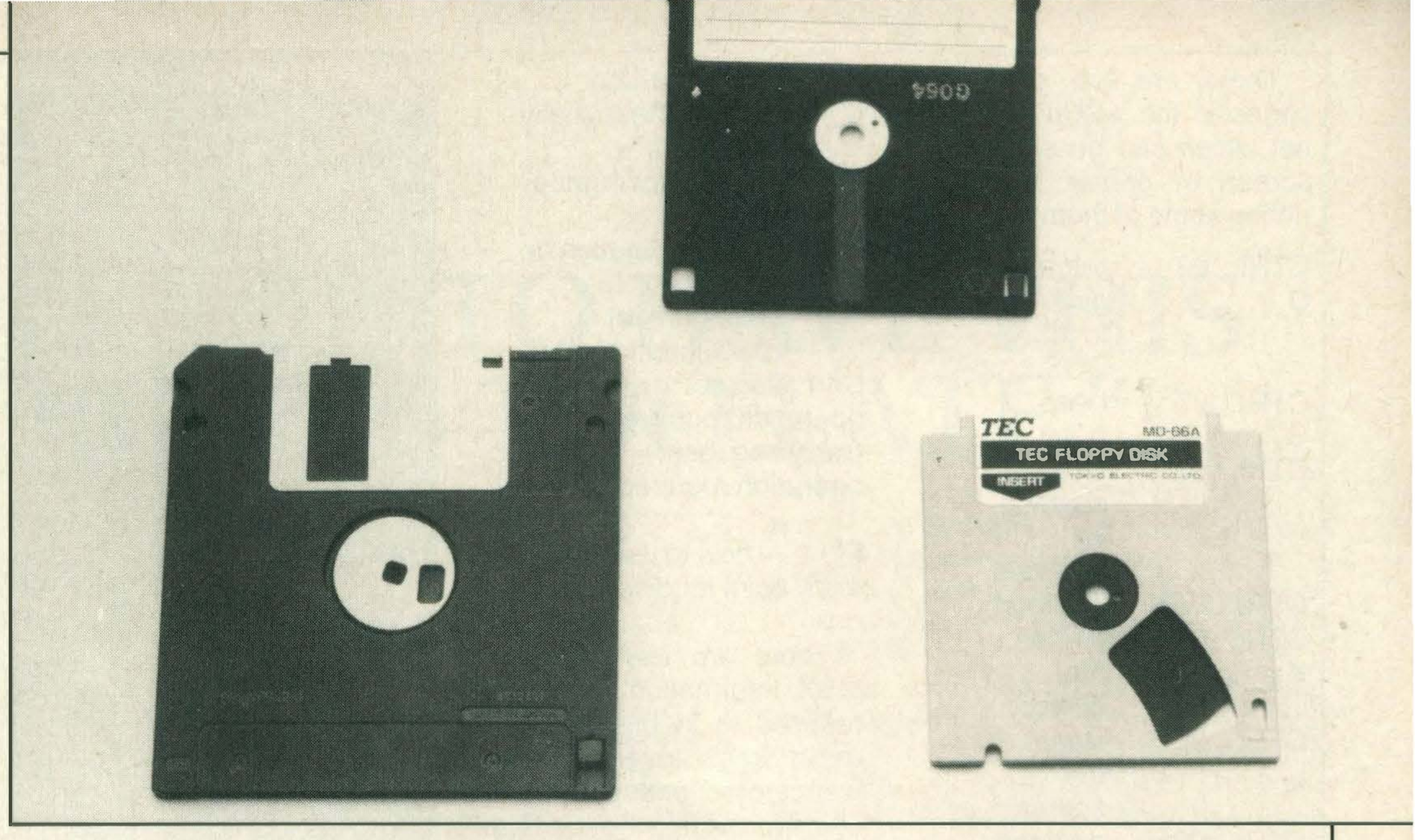
The assembler GEN80.COM uses standard Zilog Z80 mnemonics and standard pseudo ops. Macros are supported as are arithmetic operators, assembly commands and optional assembly. Anyone who has used a good assembler before will quickly feel at home with GEN80.

The debugger MON80.COM provides the usual range of commands and facilities and includes a labelling disassembler which will re-assemble without modification using GEN80. Debug monitors for me are always to cluttered on the screen and rely on having to remember too many eccentric commands. This one is no exception and I will certainly be writing my own. Having said that, MON80 is very powerful and will permit rapid debugging of programmes. As debuggers go it is among the best I've seen, and will be entirely satisfactory for all but the most fussy.

How to start

So much for the tools of the trade but how do you start? MSX-DOS provides a standard set of BIOS access routines to enable your programmes to 'talk' to the computer hardware (via the DOS of course).

To use these routines, simply put the routine number in the C register, initialise any other registers as appropriate and call the basic disk operating system (BDOS) entry point at location 0005H. For example if you wanted to write a character to the screen simply put the ASCII code of the character in register E, load C with the number 2 (console output) and CALL 005H. Routines available handle input and output from the console, (screen, keyboard, printer), handling I/O ports, disk access for reading and writing and so on.



Most of these are the same as CP/M which explains why CP/M software can be used, sometimes with no modification. MSX-DOS provides a few extra routines to handle date and time and one or two other minor things. They are all listed in the *MSX Technical Data Book*.

MSX-DOS (or CP/M for that matter) does not offer any means of accessing MSX machine-specific facilities such as graphics, colour, sound, joysticks etc. This at first seems to spell disaster but all is not lost! If you were to write machine code programs under Disk Basic you would need to access a whole host of BIOS routines provided for your use between addresses 0000 and about 0156H. The BIOS is part of the 16K standard Basic ROM supplied with your machine and occupies the bottom 8K of memory space. Here are found BIOS routines to do almost anything you could wish for.

But MSX-DOS expects all 64K of memory to be RAM so the BIOS ROM must be switched out of circuit. If only it were possible to use these routines under the DOS environment. Well, you can! The secret lies in switching slots.

The 64K of memory space can be made up of several small chunks of memory in different slots, the computer keeps tabs on which slot holds which chunk of memory and where it goes in the memory map, but you can tell the computer to change it. This means that although you have all 64K as RAM, you can temporarily switch the first 16K our (without losing any of your memory contents) and switch in the Basic ROM with that all -important BIOS.

Having done that you are free to call any BIOS routine you choose and then swtich back to RAM as if nothing had happened, except that you've been able to use the full facilities provided with the machine. Dashed clever these Japanese! This bit of magic is done as follows:

```
LD    A,"P"      ;write P to the screen
LD    IX,00A2H   ;address of CHPUT BIOS routine
LD    IY,0       ;BIOS ROM slot number
CALL001CH        ;perform an inter-slot call
                 ;rest of program
```

I believe an owner has the right to expect access to sufficient information for him to be able to make full use of his purchase. Since purchasing an MSX computer, my own hunt for detailed information has been long and traumatic.

There are still many fundamental questions which remain unanswered but here are some nuggets which I hope will help the reader to realise more of the power of his machine.

Machine code programs designed to run under Disk Basic must be located above ROM space, ie at location 8000H or higher. MSX-DOS programs however — having the full 64K available — usually run from address 0100H. If you want to use your assembler under MSX-DOS to produce programmes intended to run under Disk Basic (ie. using the BLOAD,R command) it is not sufficient just to re-locate it higher in memory before committing it to disk. The files for Basic and MSX-DOS are stored differently on the disk and one cannot read the other. Investigation however reveals that the only difference is that Basic binary files (normally saved using BSAVE) have additional information put on the front of the file. If you know what Basic expects then it is simple to put in these extra bytes using the assembler.

Now it is possible for you to write machine code programs under MSX-DOS which are intended to run under Disk Basic. Remember however that the DOS entry point at location 0005H is not available to these programs and you will need to access the BIOS routines directly (see below).

```
ORIGIN  EQU     8000H   ;start address of program
ORG     ORIGIN-7        ;space for the file header
DEFB    0FEH            ;code byte for Basic
DEFW    START           ;start address of file
DEFW    END             ;end address of file
DEFW    START           ;'run' address of program
START                   ;your program starts here
                        .
                        .
                        .
                        .
                        ;and the last line is:-
END     EQU     $       ;end of program
```

There are lots of control codes in the ASCII character set which can be sent to the screen or printer. It's worth noting some of them:

CTRL C	03	returns directly to MSX-DOS
CTRL G	07	beep
CTRL I	09	tabs in 8 character-er intervals
CTRL J	0AH	line feed
CTRL K	0BH	homes the cursor
CTRL L	0CH	clears the screen
CTRL M	0DH	carriage return (RETU-RN key)

Most MSX BIOS routines are well enough documented, but at least one is noticeable by its absence — PHYDIO which is the only one provided to access the disk system! Fig 1 gives the complete details as far as I know them. I approached my disk system manufacturer to provide disk access information relating to the disk BIOS ROM.

According to the *MSX Technical Data Book* these are supposed to be made public, which I understand to mean they should be available to owners. I was told to contact Microsoft about the above mentioned book where I was assured all the information I required was to be found. Not so! The only reference to the routine PHYDIO describes briefly what it dows. There is no information at all about how to use it.

Under MSX-DOS there are no problems because all the required calls are available via the BDOS, but what about disk access for machine code programs under Disk Basic? It's all very well being able to write programs for others, who don't have MSX-DOS, to use but if there are no proper BIOS routines to handle files, they can't do anything much at all. These calls are available in your computer but where are they?

PHYDIO entered by CALL 0144H reads and writes to and from the disk drive.

Input Parameters:

B = number of sectors to be read or written
C = format type (usually 0F8H)
DE = start sector number
HL = RAM destination or source
A = drive number (0=default drive)
Carry flag set = WRITE operation required
Carry flag reset = READ operation required

Fig 1 — how to use the BIOS entry point for disc access

There are few sources of MSX information of the kind referred to in this article. As usual Basic lovers are quite well catered for as are graphics users (providing they use Basic of course). The best book around is *The Complete MSX Programmers Guide*. This gives fairly complete information on Basic and lists such things as BIOS entry points, hook addresses, RAM system addresses and internal codes. *The MSX BIOS* book contains the original source code of the MSX BIOS ROM. This must be quite interesting but at the price it's something of a luxury.

Finally I have written a simple program to run under MSX-DOS (listing 1). Its purpose is to demonstrate the way programs are written in this environment and how to use several of the BDOS entry points. All the program does is to return the ASCII code of any key pressed. That might not seem very useful but try seeing the effect of keys such as CODE, GRAPH, or any other special keys which you may have, these might be useful in your own programs.

References:

The complete MSX Programmers Guide. by T. Sato, P Mapstone, I Muriel from Melbourne House (Publishers) Ltd, Castle Yard House, Castle Yard, Richmond TW10 6TF

MSX Technical Data Book. Price £20 plus £2 postage from Microsoft Ltd., Excel House, 49 De Montfort Road, Reasing, Berkshire RG1 8LP

MSXBIOS book. Price £30 plus £2 postage from Microsoft Ltd. (address above)

DEVPAC80 for MSX with MSX-DOS. Price £39.95 all inclusive from HiSoft, 180 High Street North, Dunstable, Bedfordshire LU6 1AT.

```
; *** DISPLAY THE CODE OF THE KEY PRESSED ***
;
CONIO       EQU   6             ;get keyboard
CHPUT       EQU   2             ;write character
STROUT      EQU   9             ;string output
BDOS        EQU   5             ;entry point
;
;  ORG 100H
;
; *** MAIN PROGRAMME ***
;
START       LD    SP,STACK      ;set up a stack
            LD    DE,MSG1
            LD    C,STROUT      ;give instructions
            CALL  BDOS          ;write instructions
KEYIN       CALL  GETKEY        ;get a key
            CP    1BH           ;ESC?
            JR    Z,EXIT        ;yes so exit
            PUSH  AF            ;save the code
            CALL  CHROUT        ;print it
            LD    DE,EQUALS
            LD    C,STROUT
            CALL  BDOS          ;"="
            POP   AF            ;restore code
            CALL  HEXOUT        ;write it in HEX
            LD    A,"H"
            CALL  CHROUT        ;it's HEX-must say so!
            CALL  LFCR
            JR    KEYIN         ;do it again
EXIT        LD    DE,MSG2
            LD    C,STROUT
            CALL  BDOS          ;give code of ESC
            JP    0             ;back to MSX-DOS
;
; *** SUBROUTINES ***
;
;get a key from the keyboard into A
;
GETKEY      LD    E,0FFH        ;set for direct input
            LD    C,CONIO
            CALL  BDOS          ;scan the keyboard
            OR    A             ;got one?
            JR    Z,GETKEY      ;wait for a press
            RET
;
;write the character in A to the screen
;
CHROUT      LD    E,A           ;put character in E
            LD    C,CHPUT
            JP    BDOS          ;write it and return
;
;send LFCR to the screen
;
LFCR        LD    A,0AH
            CALL  CHROUT        ;write LF
            LD    A,0DH
            JR    CHROUT        ;write CR and return
;
;print the code in A as a HEX number
;
HEXOUT      PUSH  AF            ;save the code
            RRCA                ;shift top 4 bits down
            RRCA
            RRCA
            RRCA
            CALL  HEX1          ;write first digit
            POP   AF            ;restore the code
HEX1        AND   0FH           ;strip off top bits
            ADD   A,"0"         ;make it into ASCII
            CP    "9"+1         ;is it 0-9?
            JP    C,CHROUT      ;yes-print and return
            ADD   A,7           ;bias down the letter
            JP    CHROUT        ;and print it
;
; *** MESSAGE AND DATA AREA ***
;
EQUALS      DEFM  "     = $"
MSG1        DEFB  0CH
            DEFM  " ***** KEY CODE INTERROGATOR *****"
            DEFB  0DH,0AH,0AH
            DEFM  "       Press ESC when finished"
            DEFB  0DH,0AH,0AH
            DEFM  "Now press the keys...."
            DEFB  0DH,0AH,0AH,"$"
MSG2        DEFB  0CH
            DEFM  "ESC = 1BH"
            DEFB  0DH,0AH,0AH,"$"
;
STACK       EQU   $+20          ;20 bytes stack space
```

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A number of years ago I was a speech teacher, living in a small flat with no savings and a beat-up old banger that still wasn't paid for.

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That hurt. So I challenged her.

"If you'll type up the recipes," I said, "I'll take out a small ad in a magazine and we'll see if anyone will pay £3.98 for your collection of recipes."

I rented an accommodation address and placed the ad. It cost £53.00

Several weeks later I stopped by the office. I walked over to my box. When I looked through the little glass window on the door, I almost dropped my key. The box was stuffed – jammed – full of letters. All of them contained cheques for £3.98.

The next few days were hectic, to say the least. My wife typed the recipes. I had them duplicated, stapled them together and our crude little book was born.

Several months later we decided to try marketing another booklet. This time, I typed some of my own home beer-making and winemaking recipes. I placed a small ad in another popular paper. Again, we received hundreds of orders for £3.98 each. And, most of it was clear profit because the booklet cost us less than 12p per copy.

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In the months that followed, I corresponded with other advertisers:

- A 71 year old retiree marketed a booklet she had printed for 6p a copy. She placed her small ad (which I prepared for her) in several magazines. When things finally settled down, she discovered that she had taken over £3,000.00 in the first 90 days!
- A friend of mine wrote to tell me he'd taken over £14,000 selling a tiny 4-page booklet about getting rid of moles in your garden.
- A man I spoke with published some of his grandmother's recipes. Using a small ad in various newspapers he sold over 40,000 copies at £4.95 each. Almost £200,000 in sales!
- Another man put together an A4 booklet of business advice. So far it's brought him over £166,000 ... all by post.

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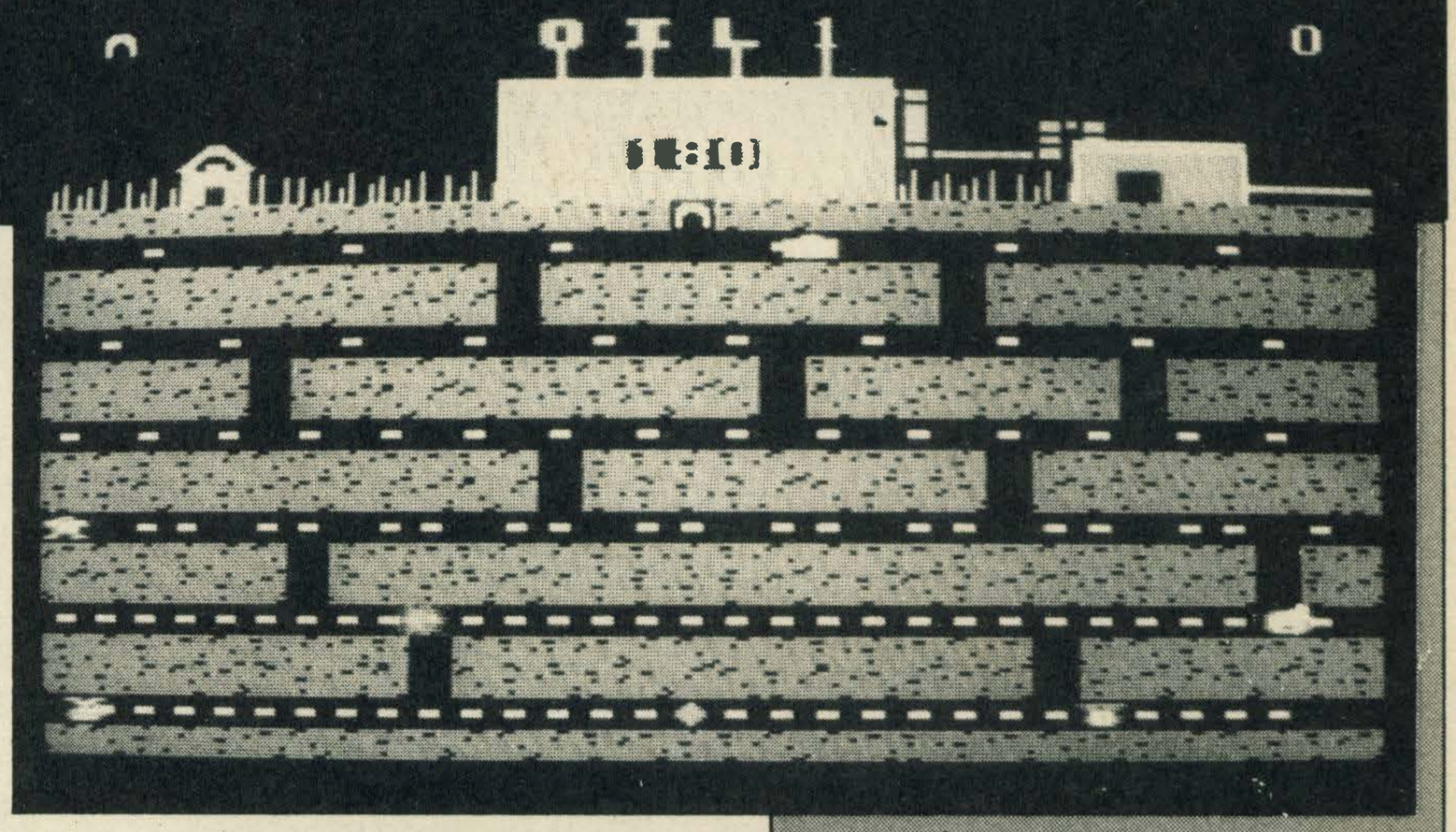
SOFTWARE SCENE

All the latest MSX software reviewed in our usual format to help you spend your hard-earned money wisely. In addition to our detailed description of each program we use a star rating system, evaluating games on graphics, sound, value for money and our overall verdict. Where a rating is not applicable — use of sound in a wordprocessor, for instance, the rating is given as N/A.

STAR RATINGS
★ Not worth the trouble
★★ Acceptable, but nothing exciting
★★★ One of the best

OIL'S WELL
£7.95



If you have ever envied JR Ewing and all the other oil barons in the infamous soap operas on the BBC you can have a (fictitional) taste of the good life with Aackosoft's latest MSX title.

Geologists have located one of the largest oil deposits in North America on your land. All you have to do is extract the oil from the ground, sell it, and squander your profits on life's little luxuries.

Sounds easy but it isn't. All the other oil barons are jealous of your fortune and they will do anything to sabotage your operation. Scattered around your oil field are oozies and land mines which will wreck your drilling equipment.

The only way to stop the other barons from cheating you out of your millions ist o fight back.

The oozies will gobble up your pipeline but you can stop them by picking up as many drill bits as possible; not only do you get more points but the oozies are destroyed by these.

Alternatively you can grab a petromin, a large oil nugget which will slow the oozies down and give you more time to collect the oil pellets, but be quick it doesn't last long and there's only one on each level. Once you've got all the pellets you advance to next field and once you've worked your way through all eight fields you can sell your oil and retire disgustingly rich.

Oil's Well is based on the *Pacman* theme but once you start playing and become deeply engrossed it doesn't feel like an ordinary 'gobble 'em up' game. The action is much faster and the levels are better thought out than in many of the other *Pacman* variants we've come across.

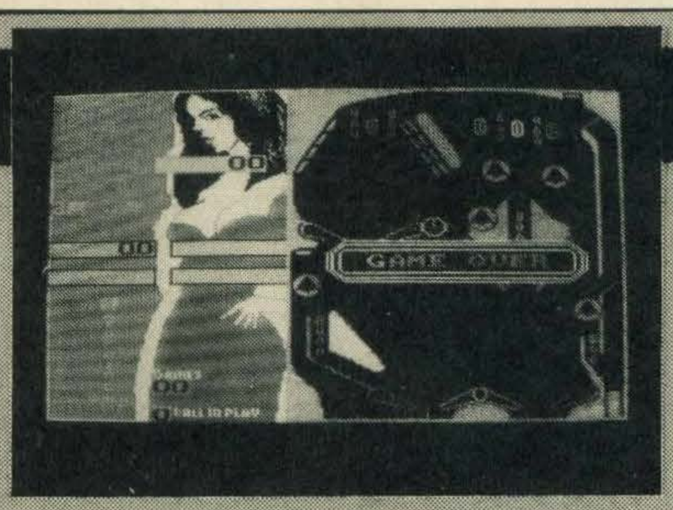
The graphics are exceptionally good as are the sound effects and a lot of planning has gone into the title to make sure that each level is totally different in design to the previous one.

The action is fast and furious and as there is no pause facility you have to be on the ball the whole time. A lapse in concentration can cost you valuable points and a life.

Games of this nature are generally of limited appeal but *Oil's Well* is an excellent interpretation of the *Pacman* theme and is highly addictive.

SUPPLIER: Nemesis
01-741 2299
TYPE: Arcade
FORMAT: Cassette
RAM NEEDED: 48K

GRAPHICS: ★★★
SOUND: ★★★
VALUE: ★★★
VERDICT: ★★★



MACADAM BUMPER £8.95

SUPPLIER: PSS
(0203) 667556
TYPE: Arcade
FORMAT: Cassette
RAM NEEDED: 64K

GRAPHICS ★★
SOUND ★
VALUE ★
VERDICT ★

Pinball games are very few and far between and maybe that's because they all look the same and the outcome is predictable. But have we got news for you! PSS has wracked its brains and come up with a pinball game called *Macadam Bumper*. This is a pinball game with a few interesting additions to it.

Macadam Bumper is a full pinball simulator and design package. Not only can you play a really mean game of pinball but when you get fed up you can completely alter the design and layout and play a game conforming to your own personal preferences.

The actual pinball game itself isn't bad and quite high scores can be achieved with a quick flick of the wrist and some natty manoeuvering with the flipper keys.

Interestingly enough we found an Achilles' heel. By pressing the CAPS LOCK key and a random selection of other keys the scoring system goes completely haywire and it is possible to give yourself a really high score that even the most experienced gamester will find hard to beat.

After a while the game does get monotonous and this is where the design mode comes into its own. By using a variety of functions you can end up playing a game tailor-made to your own specifications.

To start off with you are presented with a menu of functions and once you've worked out where to have the bells or flippers and how far apart all you have to do is press the appropriate key and hey presto! If you make a mistake simply choose the rub out function and erase the offending item with the pre-defined Y, G, H or B keys. Nothing could be simpler. And, if you don't like the colour simply choose the appropriate function key to re-paint the background, alter the colour of the border or just paint in one of the flippers.

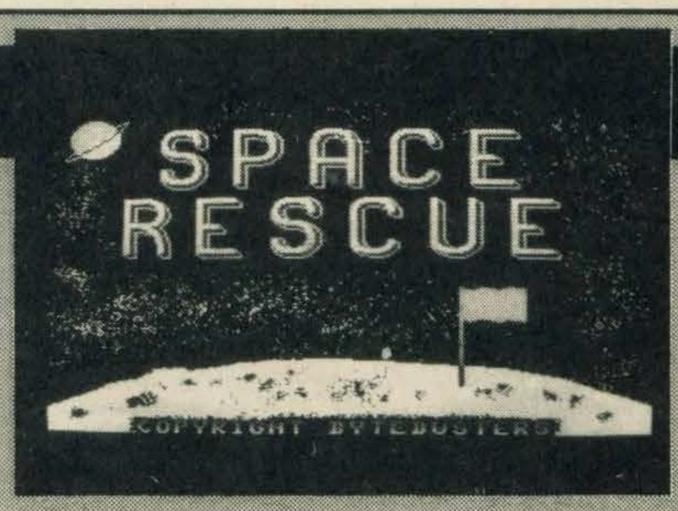
Once you are completely satisfied with your creation there is also a facility for saving it to tape so that you can play it again later without all the legwork.

PSS has really put a lot of imagination into this title which probably explains why they've not released any titles for MSX over the past few months.

Pinball games aren't everyone's cup of tea as they usually tend to be much of a muchness but PSS has really excelled itself with this title.

If you're a pinball fan then *Macadam Bumper* is going to be right up your street. You won't get much change from nine pounds but we know of no other title for the money that allows you to play a standard game, then totally re-design the layout and create your own game.

SPACE RESCUE £1.99



SUPPLIER: Nemesis
01-741 2299
TYPE: Arcade
FORMAT: Cassette
RAM NEEDED: 16K

GRAPHICS ★
SOUND ★★
VALUE ★★★
VERDICT ★★

Games without loading instructions usually signify that the company hasn't quite got its act together and that the game isn't going to be all that brilliant, but this isn't the case with *Space Rescue*.

For a start, not only is *Space Rescue* cheap but it requires only 16K which should please owners of 32K Mitsubishi MSX micros who frequently write in and complain that most games require 64K and that they feel hard done by.

As the title suggests, your task is to rescue fellow spacemen who are trapped on a lunar surface somewhere in the murky depths of outer space.

The game starts with a spectacular picture of the galaxy and the surface of the planet and then presents you with a spaceship flying back and forth across the screen with you inside it. Down below are nine space stations each worth between 50 and 150 points. Inside each space station is a space man and your task is to land on the station, grab the man and head back for the mother ship. Once you've managed to retrieve all nine men you can then go on to tackle the next task on the next level.

But, as in all good games, obstacles lie in your path. Between you and the space stations are enemy spaceships out to destroy you and considerable skill is required to avoid being blasted.

I say skill because the controls aren't exactly fluid and the response time is hardly hyper-fast.

The cursor control keys are used to move you left and right and when used you don't move to the left or right straight away, instead you tend to glide and frequently into the enemy. Figuring out the gliding time is a knack and until you manage to pace it you're not going to get very far.

Also when descending it is very easy to fall into the path of the enemy and the best way round this is to keep gliding to the left and right to dodge them.

Ascending is another matter. You have to be spot on to get back inside the mothership. A couple of times we misjudged and caught the corner of the craft which means certain death in a spectacular explosion. Again it's all a question of timing, get that right and you'll have few problems.

The graphics are very basic but adequate for this sort of game and the sound is suitably realistic especially the explosions!

Despite the fact that this title is written in Basic and could be described as an up-market reader's listing, it is great fun to play.

If you like space-type games, and let's face it who doesn't, then this is a must.

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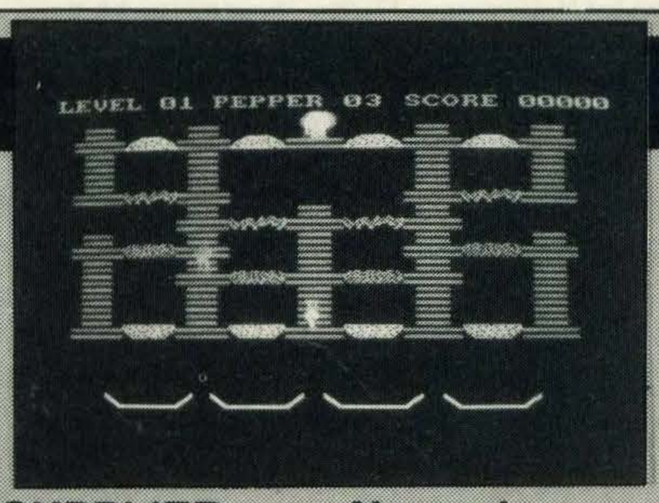


MACATTACK — £1.99

SUPPLIER: Nemesis
01-741 2299
TYPE: Arcade
FORMAT: Cassette
RAM NEEDED: 64K

GRAPHICS ★★★

SOUND ★

VALUE ★★

VERDICT ★★

Dutch programmers seem to have a warped and bizarre sense of humour when it comes to devising ideas for the basis of a new game. Ronald Van Der Putten is no exception to the rule as he is the brains behind Bytebusters latest title for MSX, *Macattack*.

If you are a fast food fanatic and live off hamburgers and the like you will have guessed by now that this game is indeed about burgers, but to be more precise about Freddy's Belly Burgers!

This is a typical platform game and on each level there are various bits of food that make up a belly burger. Your task is to trundle around the levels slotting the food between the bun. Once you have completed all four belly burgers you can then move onto the next screen.

Sounds easy doesn't it? Well, it isn't. Would you believe you have to watch out for fried eggs and sausages? Bump into one of these and you lose a life and as you only have three to start off with its a good idea to be extra cautious.

The only way to dispose of the eggs and sausages is to grab a pepper pot, liberally douse them in pepper and pop them in the bun alongside the meat and salad. But, the pepperpot only appears intermittently and it's a question of being in the right spot at the right time so that you can grab it.

The second level is much the same as the first as you are faced with the same scenario and have the same number of burgers to complete, but, there are an awful lot more sausages and fried eggs running around and it's mighty difficult to complete.

Having said that we did manage to complete it and get on to level three needless to say we didn't last very long. There aren't many people who can boast they've been zapped by a sausage!

Once you manage to work out the pace of the game you can then use various playing techniques such as doubling back to fool the fried egg. Alternatively try starting at the top because, when a piece of food is pushed down it pushes the food below it onto the level below that and so on.

However one of the annoying features of the game is that when you lose a life instead of continuing straight away the game reverts back to the first screen with all the instructions for playing.

Another is that even when you manage to complete the belly burgers without losing a life you are not rewarded with an extra one.

Other than that *Macattack* is great fun to play, highly amusing and totally original and we're sure the company would treble their sales if the game was sold with a big mac.

SAMANTHA FOX STRIP POKER — £8.95

SUPPLIER: Martech
(0323) 768456
TYPE: Arcade
FORMAT: Cassette
RAM NEEDED: 64K

GRAPHICS ★★★

SOUND ★★

VALUE ★★

VERDICT ★★

Page three model Samantha Fox, star of records and chatshows like *Wogan,* has now endorsed a computer game appropriately called *Samantha Fox Strip Poker*. Unfortunately Martech tells us that the game only loads on JVC or Toshiba MSX micros — a major handicap for other MSX owners.

It's a totally unoriginal idea, old hat in fact but Sam's assets are bound to turn this title into a hit, if not with the youngsters then most certainly with their fathers.

On the first side of the tape is a straight forward game of seven card stud. The idea is that as Sam loses she peels off a layer of clothing — £200 is the equivalent to one layer. Needless to say the game isn't easy and you have to be a really ace player to get her down to her birthday suit.

Sam is far from reckless with her money: in fact she's downright frugal and most hands tend to finish with one or other player folding while the stakes are low. Throughout each game the hand, the pot and your remaining money are displayed. At the end of each hand a sequence of frames shows the status of Sam's apparel, in other words what she's still wearing.

The graphics aren't bad but I reckon you'd be better off forking out for a copy of *The Sun* if your interest is in ogling. Serious poker players might be better off with a pack of playing cards.

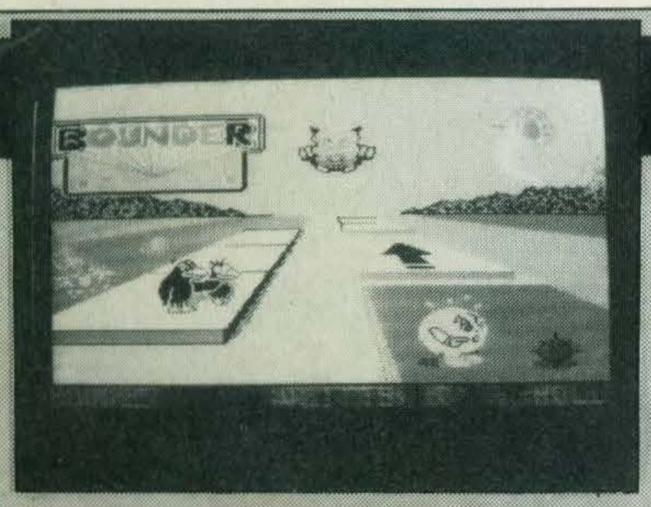
However on side two of the cassette it is a different story. You are presented with the real business — international seven card stud for 'real' poker players. You can choose one, two, or if you're feeling brave, three opponents to play against and mercifully Sam is excluded from this game.

If you're new to the game there is a demo mode which is useful to watch and handy for picking up a few elementary tips. So even if you know absolutely nothing about poker you should soon pick up the basics of the game and eventually become quite good at it. It may then be worth your while having a game with Sam — who knows, you could win.

As far as poker games go Martech has devised a pretty good game. Your opponents are able to analyse your play and try to turn it to their advantage which makes the game all the more difficult and unusual.

Occasionally they can be bluffed. However the program controlling the simulation is extremely sophisticated and incorporates a high level of artificial intelligence, it's going to take a better player than me to win.

At £8.95 it's a little pricey and as it's compatibility is somewhat limited it probably won't be a hit.



BOUNDER £8.95

SUPPLIER: Gremlin Graphics (0742) 753423
TYPE: Arcade
FORMAT: Cassette
RAM NEEDED: 64K

GRAPHICS ★★★

SOUND ★

VALUE ★★

VERDICT ★★★

Bounder is a converted version of the game of the same name that has been widely acclaimed on other popular home micros.

The press release that came with the game announces that *Bounder* is back — we didn't even know it had gone away.

Anyway to get back to the game. *Bounder* revolves around a bouncing ball and is very reminiscent of the phenomenally successful *Boulderdash*. With *Bounder* you have to bounce onto hexagonal slabs. Miss the slabs and you're a goner.

There are various sorts of aliens out to destroy you and these include binoculoids, stickits, moscita birds, chomper domes, pterries and coins.

However the good news is that there are a few friendly aliens such as the teleports and the bonus bugs.

Despite the very colourful cassette cover the game is very plain. The first level is played on an off white and black background and at first I found it visually very confusing and failed to get anywhere.

But, perseverance paid off and once through the first level you have to bounce your way around a bonus level which bumps up your score quite considerably.

Getting to level two is a welcome break not just because the scenery is different but it is also a different colour, a dirty yellow.

Again you have to bounce your way around the screen avoiding the nasties and scoring as many points as possible.

To be honest when I first played the game it didn't appeal, but I'm glad I gave it another go. Once you've worked out what to do and where the best positions are it's really good fun. In fact it has the same addictive qualities as *Boulderdash* and with the right marketing it could turn out to be just as popular and become a classic.

Once you become fairly adept, you can start to show off (as I did) and take longer jumps so that you have time to give your chums an aerobatics display!

As for playing techniques you will undoubtedly find the pause function very useful for freezing the game so that you can draw a map and mark the danger zones.

It is also worth ignoring the instructions that run across the screen as the programmer tries to kid you that you haven't got a cat in hell's chance of winning unless you use a joystick.

Speaking from experience that's absolute nonsense and he's having you on. The keyboard gives you more tactile control which means you land on more slabs and get more points and what do points make?

At £8.95 it is a little pricey for a cassette based game but fun to play.

CLUEDO £9.95

A murder has been committed on the ground floor of a country mansion called Tudor Close. The body is that of Doctor Black, the owner of the house.

Who committed the murder, what weapon did he or she use and where was the gruesome crime carried out? Solving the mystery is the name of Virgin's latest release for MSX, a computer version of the famous *Cluedo* board game.

Fans of the game will know that it is a game of investigation, detection, skill and a lot of luck. The object is to find the villain by a process of elimination.

The game starts with the players being given a limited number of clues and the first one to find out who did the dirty deed, what with and where, wins and can go into business as a private eye.

You can either play against the computer which will assume the roles of the other five occupants of the house or you and a buddy can pit your wits against the computer and each other.

Playing the computer version cuts out the need to physically throw the dice, move the counters and the implements but you still need the note pad to make your notes and try to eliminate the innocent parties from your enquiries.

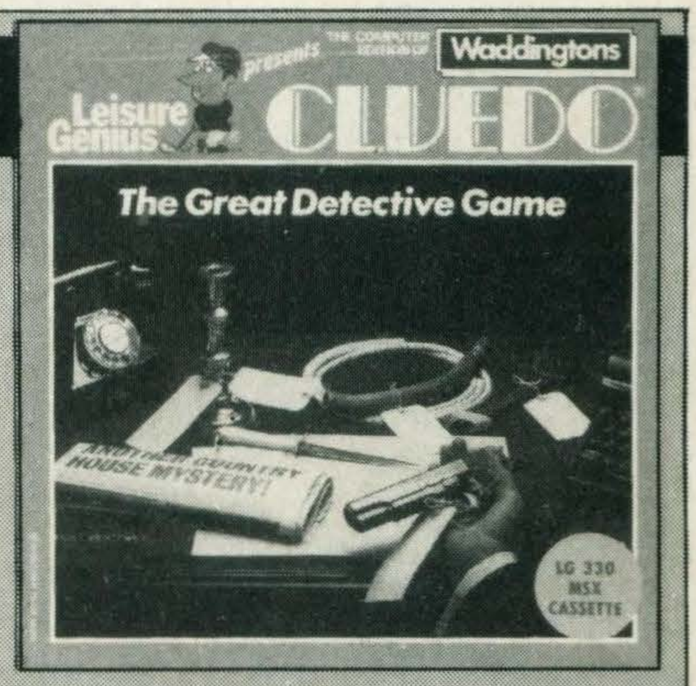
Thankfully Virgin includes a wadge of detective notes with the game but avid players will soon get through them so unless the company is going to supply refills you'd better have a rubber handy.

Like those of other Virgin releases the graphics in *Cluedo* are superb, very clear, bright and detailed. An exact replica of the board appears each time a player throws the dice and when it comes to making an accusation the guilty party, murder weapon and the room appears on the screen. If the accusation is incorrect the game continues.

The sound effects are monotonous and do little to enhance the game. Apart from these minor quibbles, it is a very good simulation of the real thing. Board games don't have sound effects, after all, and you can always turn the volume down.

There aren't many board games that have been successfully translated into computer versions. But Virgin is on to a definite winner as the titles it chooses are classic games that appeal to all ages and will never be 'out of fashion'.

At £9.95 the cassette is probably cheaper than the actual board game and is just as much fun to play. If you're on the lookout for a game to keep yourself occupied during the summer months, *Cluedo* should be at the top of the list.



SUPPLIER: Virgin Games 01-727 8070
TYPE: Board game
FORMAT: Cassette
RAM NEEDED: 48/64K

GRAPHICS ★★★

SOUND ★★

VALUE ★★★

VERDICT ★★★

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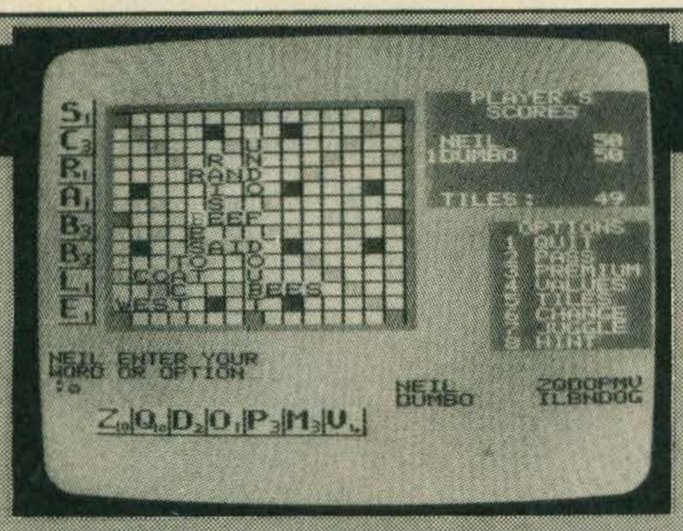


COMPUTER SCRABBLE £9.95

SUPPLIER: Virgin Games 01-727 8070
TYPE: Board game
FORMAT: Cassette
RAM NEEDED: 48K/64K

GRAPHICS ★★★
SOUND ★★
VALUE ★★★
VERDICT ★★★

Computer versions of traditional board games seem to be in vogue at the moment and Virgin Games has wasted no time in bringing out *Scrabble* on cassette.

Many of my peers were brought up on Marmite and *Snakes and Ladders* but I was dragged up on *Scrabble.* Not only did it improve my spelling but also increased my vocabulary and so I was pleasantly surprised to find that Virgin's offering is just like the original game. It is licensed from J. W. Spear and Sons who introduced the original board game many moons ago.

The game gives you two playing options, against the computer or against up to three other people.

On loading you are presented with these options and once you've made your choice the program provides an 'on-screen board and all the usual facilities you get with the board game.

All the words have been selected from *Chambers 20th Century Dictionary* and *Chambers Words* (which is the reference used in official Scrabble tournaments). The programs vocabulary is in excess of 11,000 words — more than adequate.

The program rates as a technical tour-de-force, with some very nifty data compression techniques used to cram a respectably large vocabulary into a relatively small memory capacity. The average word is probably either five or six characters, so conventional programming would eat up the whole 64K just for the vocabulary, leaving nothing for the game code!

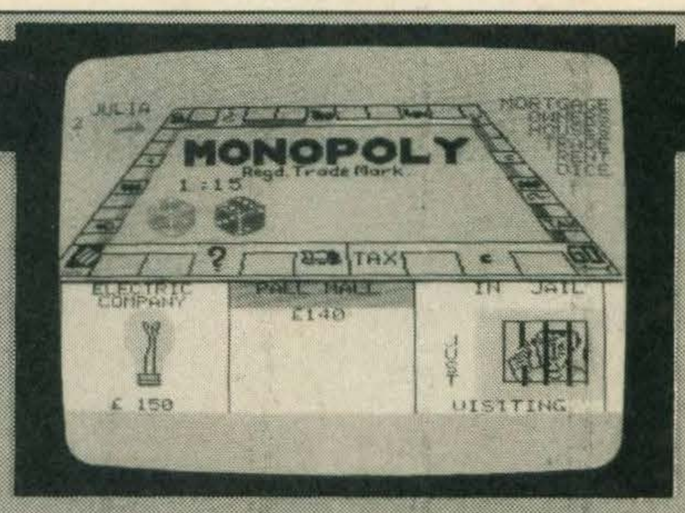
As for playing the game itself, it is almost identical to the board game. I say almost because the traditional game doesn't give you the option of playing at different skill levels (for obvious reasons) neither does it offer you the option of sound effects, again for obvious reasons!

A unique feature that is built into the game is the colour option. If you have only got a black and white monitor the program substitutes special symbols for the premium square colours so that you can still see what's where. No other game to my knowledge offers such a feature.

There is also an option that allows you to see the computer 'thinking' as it tries to create words and boost its own score. And if you find yourself stuck the computer will lend a hand by giving you a hint of one playable word.

Graphics are bright, attractive and far superior to those of many games reviewed in the past issues of *MSX Computing.* The sound is also very realistic when you shuffle the tiles in the rack trying to form a word.

COMPUTER MONOPOLY £9.95



SUPPLIER Virgin Games 01-727 8070
TYPE: Board game
FORMAT: Cassette
RAM NEEDED: 48/64K

GRAPHICS ★★★
SOUND ★★
VALUE ★★★
VERDICT ★★★

Monopoly must be one of the all-time classic board games, and there can't be a home that hasn't got a set or at the very least borrowed someone else's.

It is a fun game to play but always a drag when the game is over and all the pieces have to be put back into the box. But now thanks to Virgin you don't have to do that as the company has launched its long-awaited computer version called *Computer Monopoly.*

When the game first arrived in MSX Computing's office the first thing we noticed is that the game is available in either 48K or 64K versions which is great news for owners of the Yamaha Mitsubishi ML-F80 and Pioneer micros.

But what about the game? Well, if you've already played Monopoly you are more than familiar with the aim of the game and the rules. For those who have never played (can there possibly be anyone who hasn't?) the aim is to buy as much property as possible, make lots of money and force your opponents into poverty or bankruptcy — the one with the most property and money wins.

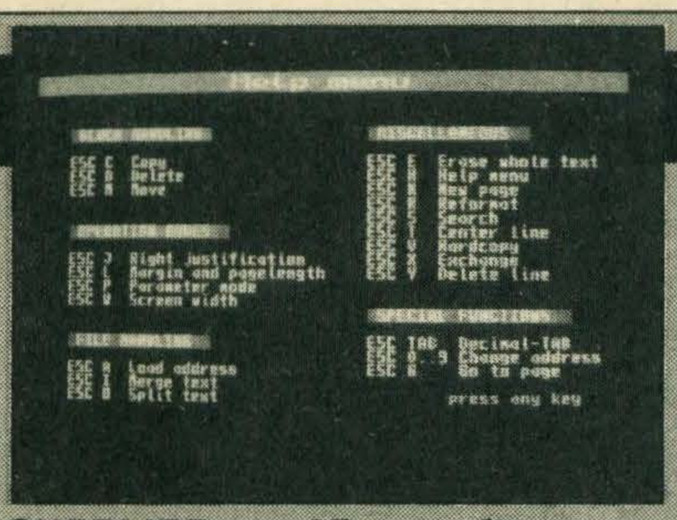
The rules are identical to the original version. The only difference is that the board is on the screen and you can't physically handle the pieces. Full instructions are included letting you know which keys to press for buying/selling/mortgaging and throwing the dice.

And if you can't find anyone to play against you can pit your wits against the computer, but be warned — it plays a mean game.
The graphics are superb — very bright and clear, and all the pieces on the board can be distinguished easily. The players' properties and money are displayed in the bottom half of the screen so that at all times you know exactly what you own and how much money you have.

A further advantage or disadvantage, depending on how you like to play, is the loss of one old standby of the opportunist player — robbing the bank while no-one is looking. OK, so it's against the rules and highly immoral, but property speculators aren't exactly noted for their philanthropy in any case!

The only fault we could find with the game is that it takes time to get used to playing the game on the computer and if more than two of you are playing it gets a little crowded. Other than that there's nothing to complain about.

These days you will be hard pressed to find a good board game that will give you change from £15 so £9.95 for a classic game isn't too high a price to pay.



MULTITEXT £31

SUPPLIER: Victorsoft (0532) 714552
TYPE: Wordprocessor
FORMAT: Cartridge

GRAPHICS ★★
SOUND N/A
VALUE ★★
VERDICT ★★★

Most word processors suffer from one major problem — they use the standard MSX screens for text editing. That's fine so long as you only ever write shopping lists or are preparing text for use on book spines. But for most sensible applications you need to be able to use considerably more than 32 characters per line.

This software gets around that problem admirably by using a redefined character set. The Tasword program did this too, but not as legibly and not on cartridge — the most convenient software format known to mankind.

Multitext allows you to edit in 32 or 64 column modes. Screen presentation is very clear, particularly the informative status section at the top of the screen.

Like many professional word processors, Multitext makes extensive use of control keys, although in this case you use the ESC key rather than CTRL. Pressing ESC along with another key performs operations such as right justify, page length setting and block operations, as well as a host of other functions. If you forget what a particular key is for, pressing ESC-H gives an on-screen list.

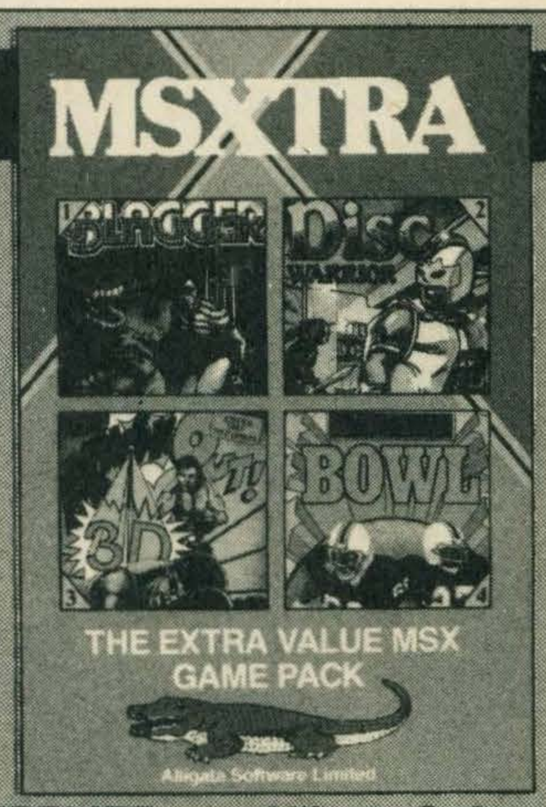
The program obviously uses some clever programming tricks. When you first switch into edit mode you are told that there are nearly 61,000 bytes free for text. This is an astonishing number for a 64k home micro, and is enough for even quite a long chapter of a book.

The other main feature is friendliness. Many of the screens are reminiscent of games. This word processor isn't going to frighten anyone and that might make it particularly suitable for young people making their first forays into this area. But that's not to deny the serious applications of the software. It has enough serious features to make it a strong contender in the small business stakes.

That said, there are a few grumbles. The software has a demo mode! Surely the memory space could have been put to better use, like a routine to detect if a printer is connected. If you try printing a file without a printer plugged in the software simply hangs up.

The same applies to storage, where the machine will wait forever for a cassette machine or disk drive that isn't there. However, it's nice to see a program which takes account of Quickdisks as well as the more conventional storage media. But gripes aside, it's a nice piece of kit and well worth the money.

MSXTRA £9.95



SUPPLIER: Alligata Software (0742) 755796
TYPE: Games
FORMAT: Cassette

GRAPHICS ★★
SOUND ★
VALUE ★★(★)
VERDICT ★★

While not exactly Alligata's 'Greatest Hits', this is an interesting compilation of four, quite varied games. What you get in exchange for your hard-earned tenner is *Blagger, Disc Warrior, 3D Knockout* and *Superbowl*.

Most games have a very short selling life. So one way of making more money out of them is to package the titles in compilations like this. Fortunately, it's also good news for the customer, assuming that you haven't got more than one of the titles already (if you have, what are you doing reading this review?).

Blagger is the classic platform game — classic in the sense that it's been done lots of times. Judging by the number of high score claims we get, it's also one of the most popular.

The best game on the tape, however, is *Disc Warrior*. The 3D graphics don't exactly force back the frontiers of computer design, but they are imaginative and clever — certainly good enough to make the game very engaging.

It's one of those games where you're in constant trouble — a little like editing a home computer magazine. It's all good, action-packed stuff.

If you've still got some energy after that, flip over the tape and load in *3D Knockout*. It doesn't take an A-Level in Brain Damage to work out that this is a boxing simulation. It looks reasonably good too, with a wide range of punches, built-in grogginess factor and stamina level. But as someone with an almost pathological aversion to dangerous situations I preferred to pass on to the next game.

Superbowl was originally released under the Budgie Software label, priced at £2.99. Public and press reaction was almost complete indifference. As with the original, the instructions spend more time telling you about the rules of American Football than about how to play the computer game. And there are some strange features, like the way it automatically goes into demo mode if you don't hit a key for a while. This can be very disconcerting.

However, *Superbowl* does demonstrate one of the crucial rules of compilation tapes. What looked like a game worth avoiding in its original incarnation suddenly becomes value for money when sold with three others of higher quality.

So is it worth a tenner? Well, if you haven't already got Blagger or Disc Warrior the answer is definitely — maybe. If you haven't got both, the answer is yes.

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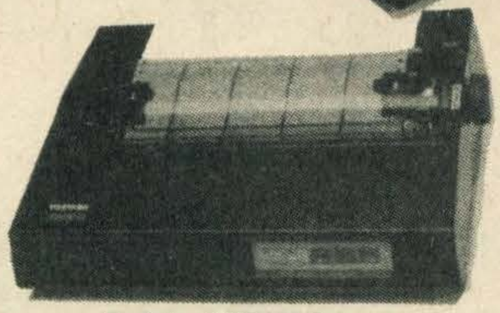

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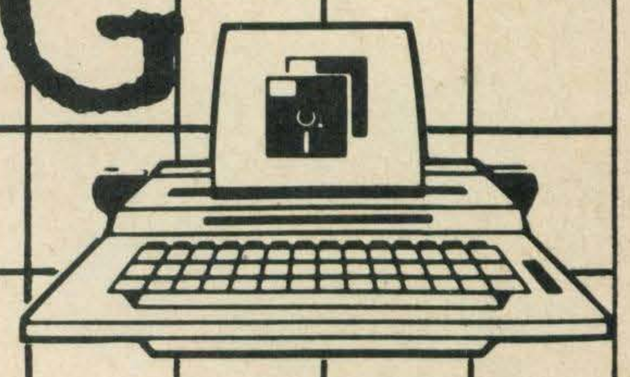

GARBAGE MAN by Kyuh-Bom Kim

This program from Berne in Switzerland is a maze game featuring the hazards faced by an innocent bin-man as he tries to clean up the environment.

On the first screen, you are working on the roads. Picking up the rubbish (dots) is easy as long as you can avoid the blue car which chases you. If you manage to clear the streets you go on to the next level. This is more difficult as the blue car now puts up road blocks at random.

The second scenario puts you at work in a space station. The matrix of corridors is guarded by two spaceships from a rival company. If either of them spots you, you will be thrown out of the station immediately. If you finish this screen you will find yourself on the next level where the ships move faster. One hint for this screen — you have a better chance of survival at the extreme edges of the grid.

Program Structure

10- 40	REMarks
80- 100	Define variables (Game Option 1)
120- 140	Main loops
160- 170	New level
190- 260	Move Trashman
280- 310	Move the car
330- 340	Set directions for car to go
360- 380	Define variables (Game Option 2)
400- 440	Main loops
460- 470	New level
490- 500	Move spaceships
520- 580	Trashman gets caught by spaceships
600- 650	Set up playfield
670- 700	Print outer blocks
720- 760	Print inner blocks
780- 850	Print dots
870-1030	Define Sprites, characters and variables
1050-1110	Trashman gets hit by car
1130-1240	Input Game options
1260-1430	Hi-score table

Main Variables

LI%	Lives
S%	Score
L%	Level
X%,Y%	X-Y Co-ordinates of Trashman
A%,B%	X-Y Co-ordinates of the car
V%	Variable use for vpeeking
K	Defines the control (Joystick or Keyboard)
P	Sprite Pattern of Trashman
M%	Decides when to change the directions of the car
E%	Sprite Pattern of the car
J%,K%	Used to set the direction for the car to go
N%	Number of dots left
G	Game option
C%	The Positions of spaceships
Z%	Step of ships
Q%	The speed of spaceships moving
HI%(9)	Hi-scores
HI$(9)	Hi-score names
H%,U%	Horizontal and vertical directions of the car
J	Stick (Ex. J=STICK)
M$,M1$	Introductory Music
W%	Number of obstacles the car is going to set
R,H,F	Variables used in Hi-score table

Sprite Patterns

1	—	The Round Shape of Trashman
2	—	Trashman going right
3	—	Trashman going left
4	—	Trashman going up
5	—	Trashman going down
6	—	Car going vertically
7	—	Car going horizontally
8	—	Spaceship going horizontally
9	—	Spaceship going vertically

Character Patterns

152	—	Dots
168	—	Block (green)
176	—	Empty background (red)

*Characters number 168 and 176 are not defined, but the colours of characters are changed.

```
 10 REM        TRASHMAN
20 REM
30 REM (C) KYUH-BOM KIM 1985
40 REM
50 SCREEN1,0:KEY OFF:WIDTH32:COLOR15,1
,1
60 GOSUB870:GOTO1130
70 'GAME OPTION 1
80 LI%=3:S%=0:L%=0
90 GOSUB600:N%=217:W%=L%*2
100 PLAY"S3M5000L64T255":X%=88:Y%=88:H
%=0:U%=0:A%=16:B%=160:P=1:V%=6507:M%=0
:TIME=0:PUT SPRITE2,(A%,B%),4,6:SPRITE
 ON:ON SPRITE GOSUB1050
110 'MAIN LOOPS
120 GOSUB190
130 GOSUB280
140 IF N%>0THEN120
150 'NEW LEVEL
160 SPRITE OFF:PUT SPRITE2,(A%,B%),1,1
0:L%=L%+1
170 GOTO90
180 'MOVE TRASHMAN
190 J=STICK(K)
200 PUT SPRITE1,(X%,Y%),10,1
210 IF J=1AND VPEEK(V%-32)<>168THEN Y%
```

```
=Y%-8:V%=V%-32:P=4
220 IF J=5AND VPEEK(V%+32)<>168THEN Y%
=Y%+8:V%=V%+32:P=5
230 IF J=3AND VPEEK(V%+1)<>168THEN X%=
X%+8:V%=V%+1:P=2
240 IF J=7AND VPEEK(V%-1)<>168THEN X%=
X%-8:V%=V%-1:P=3
250 PUT SPRITE1,(X%,Y%),10,P:IF VPEEK(
V%)=152THEN PLAY"N5":VPOKE V%,176:S%=S
%+5:N%=N%-1
260 LOCATE24,9:PRINTS%:RETURN
270 'MOVE CAR
280 IF L%>(RND(1)*100)AND M%>30AND W%>
0 THEN LOCATE(A%/8),(B%/8):PRINTCHR$(1
68):N%=N%-1:W%=W%-1
290 M%=M%+1:IF M%MOD4=0THEN GOSUB330:R
ETURN
300 A%=A%+H%:B%=B%+U%:PUT SPRITE2,(A%,
B%),4,E%
310 RETURN
320 'SET DIRECTION FOR CAR TO GO
330  J%=X%-A%:K%=Y%-B%:IF ABS(J%)>ABS(
K%)THEN H%=SGN(J%)*8:U%=0:E%=7 ELSE U%
=SGN(K%)*8:H%=0:E%=6
340 RETURN
350 'GAME OPTION 2
360 LI%=3:S%=0:L%=0:Q%=7
370 GOSUB600:N%=217
380 PLAY"V10S3M5000L64T255":X%=88:Y%=8
8:T%=0:C%=16:P=1:V%=6507:Z%=8
390 'MAIN LOOPS
400 IF (C%=X%AND VPEEK(V%+32)<>168)OR(
C%=Y%AND VPEEK(V%-1)<>168)THEN520
410 GOSUB190
420 IF (C%=X%AND VPEEK(V%+32)<>168)OR(
C%=Y%AND VPEEK(V%-1)<>168)THEN520
430 IF T%MOD Q%=0THEN GOSUB490
440 T%=T%+1:IF N%<>0THEN400
450 'NEW LEVEL
460 PUT SPRITE2,(0,0),1,10:PUT SPRITE3
,(0,0),1,10:L%=L%+1:Q%=Q%-1:IF Q%<1THE
N Q%=1
470 GOTO370
480 'MOVE SPACESHIPS
490 C%=C%+Z%:IF C%=160OR C%=16 THEN Z%
=-1*Z%
500 PUT SPRITE2,(C%,167),1,8:PUT SPRIT
E3,(8,C%),1,9:RETURN
510 'TRASHMAN GETS CAUGHT BY SPACESHIP
520 LI%=LI%-1:LOCATE25,19:PRINTLI%:PLA
Y"S3M5000T150":PLAY M1$
530 IF C%=X%THEN550
540 FOR L=16TO(X%-8):PUT SPRITE3,(L,C%
),7,9:NEXTL:FOR L=(X%-8)TO256:PUT SPRI
TE3,(L,C%),7,9:PUT SPRITE1,(L+8,Y%),10
,2:NEXTL:PUT SPRITE1,(L,Y%),10,10:PUT
SPRITE3,(L,C%),1,10:GOTO560
550 FOR L=168TO(Y%+8)STEP-1:PUT SPRITE
2,(C%,L),7,8:NEXTL:FOR L=(Y%+8)TO-9STE
P-1:PUT SPRITE2,(C%,L),7,8:PUT SPRITE1
,(X%,L-8),10,4:NEXTL:PUT SPRITE1,(X%,L
),1,10
560 IF LI%=0THEN LOCATE7,11:PRINT"GAME
 OVER"
570 FOR L=0TO2000:NEXT:IFLI%=0THEN1260
580 GOTO380
590 'SET UP PLAYING SCREEN
600 CLS:GOSUB670
610 GOSUB720
620 GOSUB780
630 VPOKE8211,246:VPOKE8213,34:VPOKE82
14,102
640 LOCATE24,2:PRINT"SCREEN":LOCATE25,
4:PRINTL%:LOCATE24,7:PRINT"SCORE":LOCA
TE24,9:PRINTS%:LOCATE23,12:PRINT"HI-SC
ORE":LOCATE24,14:PRINTHI%(0):LOCATE24,
17:PRINT"LIVES":LOCATE25,19:PRINTLI%
650 RETURN
660 'PRINT OUTER BLOCKS
670 VPOKE8213,17
680 LOCATE1,1:PRINTSTRING$(21,168):LOC
ATE1,21:PRINTSTRING$(21,168)
690 FOR L=2TO20:LOCATE1,L:PRINTCHR$(16
8):LOCATE21,L:PRINTCHR$(168):NEXT
700 RETURN
710 'PRINT INNER BLOCKS
720 VPOKE8213,17
730 FOR L=3TO18 STEP3:FOR P=3TO18 STEP
3
740 LOCATEL,P:PRINTCHR$(168)+CHR$(168)
+CHR$(31)+CHR$(29)+CHR$(29)+CHR$(168)+
CHR$(168)
750 NEXTP:NEXTL
760 RETURN
770 'PRINT DOTS
780 VPOKE8211,17
790 FOR L=2TO20STEP3:FOR P=3TO18STEP3
800 LOCATEL,P:PRINTCHR$(152)+CHR$(31)+
CHR$(29)+CHR$(152)
810 NEXTP:NEXTL
820 FOR L=2TO20STEP3
830 LOCATE2,L:PRINTSTRING$(19,152)
840 NEXT
850 RETURN
860 'DEFINE SPRITE/CHARACTERS/VARIABLE
S
870 LOCATE10,7:PRINT"TRASHMAN":LOCATE4
,22:PRINT"(C) KYUH-BOM KIM 1985"
880 M$="L4O3CCCL8DL2EL4EL8DL4EL8FL2G":
M1$="O4L8CCCO3GGGEEECCCL4GL8FL4EL8DL2C
":PLAY"V15S3M5000T150","V13S2M4000T150
":PLAY M$+M1$,"R2"+M$+M1$
890 FOR P=1TO9:S$="":FOR L=0TO7:READ D
:S$=S$+CHR$(D):SPRITE$(P)=S$:NEXTL:NEX
TP
900 FOR L=1216TO1223:READ D:VPOKEL,D:N
EXTL
910 DIM HI%(10),HI$(10)
920 FOR L=0TO9:HI%(L)=100:HI$(L)="KYUH
-BOM KIM":NEXTL
930 RETURN
940 DATA 60,126,255,255,255,255,126,60
950 DATA 60,126,255,252,248,255,126,60
960 DATA 60,126,255,63,31,255,126,60
970 DATA 36,102,247,255,255,255,126,60
980 DATA 60,126,255,255,255,247,102,36
990 DATA 189,255,189,60,60,189,255,189
1000 DATA 231,66,255,255,255,255,66,23
1
1010 DATA 16,16,16,56,186,254,254,130
1020 DATA 240,96,120,127,120,96,240,0
```

```
1030 DATA 0,0,0,24,24,0,0,0
1040 'TRASHMAN GETS HIT BY CAR
1050 SPRITE OFF:LI%=LI%-1:LOCATE25,19:
PRINTLI%
1060 PUT SPRITE1,(X%,Y%),1,10
1070 PLAY"S3M5000T255":PLAY M1$
1080 IF LI%=0THEN LOCATE7,11:PRINT"GAM
E OVER"
1090 FOR L=1TO2000:NEXTL
1100 IF LI%=0THEN1260
1110 PUT SPRITE2,(A%,B%),1,10:GOTO100
1120 'INPUT GAME OPTIONS
1130 CLS
1140 LOCATE11,3:PRINT"TRASHMAN":PRINTT
AB(11)"--------"
1150 LOCATE1,10:PRINT"(1) TRASHMAN ON
THE HIGHWAY"
1160 LOCATE1,15:PRINT"(2) TRASHMAN IN
SPACE STATION"
1170 LOCATE1,22:PRINT"CHOOSE AN OPTION
 FROM ABOVE."
1180 A$=INKEY$:IF A$=""THEN1180
1190 G=ASC(A$)-48:IF G>2OR G<1THEN1180
1200 CLS
1210 LOCATE2,11:PRINT" JOYSTICK/KEYBOA
RD(J/K):-"
1220 A$=INKEY$:IF A$="J"OR A$="j"THEN
K=1ELSE IF A$="K"OR A$="k"THEN K=0ELSE
 1220
1230 BEEP:CLS:IF G=1THEN GOTO80
1240 GOTO360
1250 'HI-SCORE TABLE
1260 CLS:FOR L=1TO3:PUT SPRITEL,(L*10,
1),1,10:NEXTL:IF S%<=HI%(9)THEN1310
1270 FOR L=9TO0STEP-1
1280 IF S%>HI%(L)THEN HI%(L+1)=HI%(L):
HI$(L+1)=HI$(L):R=L
1290 NEXTL
1300 HI%(R)=S%:HI$(R)=""
1310 LOCATE10,3:PRINT"HALL OF FAME":PR
INTTAB(10)"------------":LOCATE0,8:FOR
 L=0TO9:PRINTTAB(3);L+1;TAB(8);HI%(L);
TAB(16);HI$(L):NEXT
1320 IF S%<=HI%(9)THEN1380
1330 LOCATE4,21:PRINT"Please enter you
r name.":H=0
1340 F=0:A$=INKEY$:IF A$=""THEN1340
1350 F=ASC(A$):IF(F=30OR F=31OR F=27OR
 F=12OR F=11OR F=9)THEN 1340 ELSE IF (
F=29OR F=8) AND H>0THEN LOCATE15+H,R+8
:PRINT" ":H=H-1:HI$(R)=LEFT$(HI$(R),H)
:GOTO1340 ELSE IF F=13 THEN1380 ELSE H
=H+1:HI$(R)=HI$(R)+A$
1360 LOCATE15+H,R+8:PRINTA$
1370 IF H<12THEN1340
1380 LOCATE1,21:PRINT"Press FIRE BUTTO
N to replay."
1390 PRINT" Press 'ESC' to return to m
enu."
1400 IF STRIG(K)=-1THEN 1430
1410 IF INKEY$=CHR$(27)THEN1130
1420 GOTO1400
1430 IF G=1THEN GOTO80 ELSE 360
1440 END
```

BALLOONIES by S Northcott

Definitely a game for the more athletic, this program from S. Northcott of Sidmouth puts you in control of two somersaulting acrobats. Using a see-saw to alternate between the acrobats, you have to burst the tall columns of balloons.

The program is intended to use a joystick in port 1, but altering line 970 to read A=STICK(0) will convert it to keyboard control.

Variables

N$	HIGH SCORER NAME
HI	HIGH SCORE
R	SCORE
O	LIVES
Z	SEE-SAW X COORDINATE
F,G	X,Y COORDINATES JUMPER 1
B,C	X,Y COORDINATES JUMPER 2
U	CURRENT CHARACTER JUMPER 1
D	CURRENT CHARACTER JUMPER 2
L	SEE-SAW CHARACTER
Q	IS JUMPER 1 JUMPING?
W	IS JUMPER 2 JUMPING?
TIME	SYSTEM CLOCK
BB	BONUS
V	HEIGHT OF JUMP (RANDOM)
U	JUMP ANGLE (0=UP, −1=45 DEGREES)
BA (X,Y)	BALLOON POPPED? (0=YES, 1=NO)
A	JOYSTICK READING

```
10 REM********************
20 REM*  BAL(LOON)IES  *
30 REM* BY S.NORTHCOTT *
40 REM*  (C) FANGSOFT  *
50 REM*ENTERPRISES 1985*
60 REM********************
70 CLEAR 2000
80 DIMBA(5,4):N$="Snaggle Tooth the II
I."
90 ON SPRITE GOSUB 1160
100 CLS:SCREEN 1,2,0:COLOR 15,1,1:PRIN
T "Please wait for the Loonies  to arr
ive !                          Thankyou!"
:GOSUB 460:HI=1600
110 CLS:GOSUB 700
120 REM * THE GAME *
130 CLS:O=3:R=0
140 GOSUB 1150
150 PRINT"GGGGGGGGGGGGGGGGGGGGGGGGGGGG
G";
160 FOR X=1 TO 17:PRINT"G
                    G";:NEXT X
170 PRINT"GGGGGGGGGGGGGGGGGGGGGGGGGGGG
G"
180 Z=100:F=98:B=108:G=136:C=134:FOR X
=0 TO 3:PUTSPRITEX,(0,0),0,0:NEXT X
190 H=1:D=1:L=10:Q=0:W=0:TIME=0
200  SPRITE ON
210 IF INT(R/150)=R/150 AND R<>0 AND E
M =0 THEN GOSUB 900:GOSUB 1580
220 PUTSPRITE1,(F,G),13,H
230 PUTSPRITE2,(B,C),10,D
240 SPRITE OFF
250 PUTSPRITE0,(Z,135),9,L
260 GOSUB 960:REM JYSTICK
270 IF Q=0 AND W=0 THEN Q=1:P=0:Y=-2:V
```

```
=INT(RND(1)*8):L=12:C=C+2:G=G-2:U=STRI
G(1)
280 IF W=1 THEN GOTO 360
290 G=G+Y:H=H+1:IF H>8 THEN H=1:P=P+1
300 IF P>V THEN Y=-Y:P=-2
310 F=F-U:IF F>225 THEN U=-U
320 IF G=132 AND F>=Z-10 AND F<Z-2 THE
N Q=0:L=10:C=C-2:H=1:F=Z-2:GOSUB 1570:
GOTO 360
330 IF G>132 AND F<Z-10 THEN GOTO 1050
340 IF G>132 AND F>=Z-2 THEN GOTO 1050
350 GOTO 200
360 REM * MAN 2
370 IF W=0 THEN W=1:P=0:Y=-2:V=INT(RND
(1)*8):Q=0:G=G+4:U=STRIG(1)
380 C=C+Y:D=D+1:IF D>8 THEN D=1:P=P+1
390 IF P>V THEN Y=-Y:P=-2
400 B=B+U:IF B<20 THEN U=-U
410 IF C=134 AND B>=Z-2 AND B<Z+10 THE
N W=0:L=12:G=G-2:D=1:B=Z+8:GOSUB 1570:
GOTO 440
420 IF C>132 AND B<Z-2 THEN GOTO 1050
430 IF C>132 AND B>=Z+10 THEN GOTO 105
0
440 GOTO 200
450 GOTO 450
460 REM *       DEF SPRITES       *
470 DEFINT A-Z:DIMA$(15)
480 FOR A=1 TO 15:FOR B=1 TO 32
490 READ C:A$(A)=A$(A)+CHR$(C)
500 NEXT B
510 SPRITE$(A)=A$(A)
520 NEXT A
530 RETURN
540 *       SPRITE DATA       *
550 DATA 0,0,12,12,8,20,20,20,24,8,8,8
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0
560 DATA 0,0,0,0,0,0,1,1,2,4,0,0,0,0,0
,0,0,0,16,56,224,160,128,64,0,0,0,0,0,
0,0,0
570 DATA 0,0,0,0,19,15,1,0,0,0,0,0,0,0
,0,0,0,0,0,192,248,152,64,0,0,0,0,0,0,
0,0
580 DATA 0,0,2,2,1,1,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,128,96,144,120,24,0,0,0,0,0
,0,0
590 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,16,32,32,48,80,80,80,32,96,96,0,0
,0,0,0,0
600 DATA 0,0,0,0,0,0,0,0,0,0,1,1,0,0,0
,0,0,0,0,0,3,4,28,220,56,112,128,128,0
,0,0,0
610 DATA 0,0,0,0,0,0,0,0,3,3,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,112,142,121,0,0,0,0
,0
620 DATA 0,0,0,0,0,0,0,1,1,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,128,128,232,80,56,24,
4,4,8
630 DATA 3,15,19,51,39,103,127,63,63,3
1,15,3,1,1,2,12,128,224,240,248,248,25
2,252,248,248,240,224,128,0,0,0,0
640 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,7,31,
25,1,0,0,0,0,0,0,0,0,0,0,24,248,224,12
8,128,128
650 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,31,31
,1,1,0,0,0,0,0,0,0,0,0,0,0,248,248,1
28,128
660 DATA 0,0,0,0,0,0,0,0,0,0,0,24,31,7,1
,1,1,0,0,0,0,0,0,0,0,0,0,224,252,1
52,128
670 DATA 0,0,24,36,2,2,0,12,16,35,37,3
7,5,4,0,0,0,0,48,72,128,128,0,96,16,13
6,72,72,64,64,0,0
680 DATA 0,0,0,4,10,2,0,12,16,19,0,0,2
,0,2,0,0,0,0,64,160,128,0,96,16,144,0,
0,128,128,0,0
690 DATA 0,0,0,0,0,2,0,4,0,3,0,0,0,0,0
,0,0,0,0,0,0,128,0,64,0,128,0,0,0,0,0,
0
700 REM * TITLE SCREEN *
710 BB=0
720 PRINT"Fangsoft Proudly presents:"
730 PRINT"       BAL(LOON)IES
      DDDDDDDDDDDD"
740 LOCATE 0,14
750 PRINT"THE Pop Hero :-
 ";N$:PRINT" With:";HI
760 LOCATE 0,18:PRINT"PRESS FIRE TO PL
AY."
770 PRINT " OR JOSTICK UP FOR
          INSTRUCTIONS."
780 GOSUB 810
790 IF STICK(1) = 1 THEN GOTO 1340
800 IF STRIG(1) = 0 THEN GOTO 780
810 IF O=0 THEN GOSUB 900:O=1:A=100:B=
120:C=120:D=120:E=8:F=1:G=-2:H=-2:Z=10
:X=10:P=0:Q=0
820 PUTSPRITE2,(100,124),10,Z:PUTSPRIT
E3,(120,124),11,X
830 PUTSPRITE0,(A,B),13,E
840 PUTSPRITE1,(C,D),10,F
850 E=E-1:IF E<1 THEN P=P+1:E=8:IF P>4
 THEN G=-G:P=0:IF B>110 THENZ=Z+1:GOSU
B 1570:IF Z>12 THEN Z=10
860 F=F+1:IF F>8 THEN Q=Q+1:F=1:IF Q>3
 THEN H=-H:Q=0:IF D>110 THENX=X+1:GOSU
B 1570:IF X>12 THEN X=10
870 B=B+G:D=D+H
880 FOR T=1 TO 10:NEXT T
890 RETURN
900 SPR=4:EM=1
910 FOR AY=1 TO 5:FOR AX=1 TO 3
920 PUTSPRITESPR,(AX*50+5,AY*18),AX+AY
,9:BA(AX,AY)=1
930 SPR=SPR+1:NEXT AX
940 NEXT AY
950 RETURN
960 REM * JOSTICK *
970 A=STICK(1)
980 IF A=3 AND Q=0 AND Z<225 THEN F=F+
2
990 IF A=3 AND W=0 AND Z<225 THEN B=B+
2
```

LISTINGS

```
1000 IF A=3 AND Z<225 THEN Z=Z+2
1010 IF A=7 AND Q=0 AND Z>23 THEN F=F-
2
1020 IF A=7 AND W=0 AND Z>23 THEN B=B-
2
1030 IF A=7 AND Z>23 THEN Z=Z-2
1040 RETURN
1050 REM * DEATH *
1060 SPRITE OFF
1070 IF Q=1 THEN M=1 ELSE M=2
1080 IF Q=1THEN N=F ELSE N=B
1090 FOR X=132 TO 0 STEP -1
1100 PUTSPRITE M,(N,X),15,7
1110 NEXT X:O=O-1:GOSUB 1150
1120 IF O>0 THEN LOCATE 10,14:PRINT"AG
AIN.....!":FOR T=1 TO 1000:NEXT T:LOCA
TE 10,14:PRINT"                    ":SPRITE O
N:GOTO 180
1130 LOCATE 1,14:PRINT "          Game o
ver.":GOSUB 1630
1140 FOR T=1 TO 2000:NEXT T:GOSUB 1490
:GOTO 110
1150 LOCATE 1,0:PRINT"Score :";R;"Loon
ies :";O:EM=0:RETURN
1160 REM *POPS?*
1170  SPRITE OFF:I=4
1180 IF G>96 AND C>96 THEN RETURN
1190 C=C+8:G=G+8:F=F+8:B=B+8
1200  FOR E=1 TO 5:FORS=1 TO 3
1210  IF F>(S*50)-2 AND F<(S*50)+28 AN
D G<(E*18)+20 AND G>(E*18)-4 AND BA(S,
E)=1 OR B>(S*50)-2 AND B<(S*50)+28 AND
 C<(E*18)+20 AND C>(E*18)-4 AND BA(S,E
)=1 THEN 1260
1220 I=I+1:NEXT S
1230 NEXT E
1240 C=C-8:G=G-8:F=F-8:B=B-8
1250 RETURN
1260 FOR J=13 TO 16
1270 PUTSPRITEI,(S*50+5,E*18),15,J
1280 FOR T=1 TO 20:NEXT T:NEXT J
1290 PUTSPRITEI,(0,0),0,0
1300 SOUND 6,255:SOUND 7,1:SOUND 8,16:
SOUND 12,15:SOUND 13,2:BA(S,E)=0
1310 R=R+10:GOSUB 1150
1320 C=C-8:G=G-8:F=F-8:B=B-8
1330 RETURN
1340 REM * INSTRUCTIONS *
1350 SCREEN 0
1360 PRINT"          The History of Poppi
                     !!!!!!!!!!!!!!!!!!!!
ng.
!"
1370 LOCATE 0,4:PRINT " Long ago in a
land not so far away  a great gamesman
 called Tad invented a game, in fact a
 national event :-"
1380 PRINT"   THE BALLOON POP."
1390 PRINT:PRINT" Having a fantastic b
uild up of       natural rubber from th
e native bounceplant huge stockpiles h
ad to be         burned each year. This n
ot only gave"
1400 PRINT" off a terrible smell but w
as also a waste; so The Balloon Pop wa
s          invented."
1410 PRINT" Press FIRE to go on:-"
1420 IF STRIG(1)=0 THEN 1420
1430 PRINT:PRINT" You by some freek mi
sfourtune have  been warped to that al
ien land and   fortunately have been g
iven a chance to earn a ship by winnin
y the annual game,which should give yo
u the means of escape....."
1440 PRINT" You control your Radio-Mot
ivated    Droid See-Saw by moving your
 recentlyconverted 'Joystick' left and
 right  and your Droid-Poppers will ju
mp up  or forwards depending on whethe
r your'Fire Button' is up or down
     (respectively)."
1450 PRINT" NOTE:- To catapult the opp
osite     droid you must catch the fir
st on hisside of the See-Saw !
          Droids are commonly known as
Looniesand you will only have 3 to hel
p you  dropping one will result in its
       loss.":O=0
1460 PRINT" Press FIRE to go on:-"
1470 IF STRIG(1)= 0 THEN GOTO 1470
1480 SCREEN 1:GOTO 700
1490 IF R<=HI THEN RETURN
1500 SCREEN0
1510 PRINT" Well done you popped more
than our  greatest Pop Hero! (Groan..)
          You have now won the ship th
at you  needed and we wish you luck on
 your  voyages in future."
1520 PRINT" But first cold we have you
r name forour archives:-"
1530 INPUT"Your name oh wondourous Pop
-Hero
          ";N$
1540 IF LEN(N$)>20 THEN CLS:PRINT"I ca
n't write all that.Lets try again shal
l we.....":GOTO 1530
1550 HI=R
1560 SCREEN1:RETURN
1570 SOUND 6,51:SOUND 7,255:SOUND 8,16
:SOUND 12,10:SOUND 13,0:RETURN
1580 REM *BONUS*
1590 TT=INT((TIME*2)/85):BB=BB+(R-TT):
IF BB<0 THEN BB=0
1600 IF INT(BB/10)<>BB/10 THEN BB=INT(
BB)+1:GOTO 1600
1610 TIME=0
1620 RETURN
1630 REM * BONUS ADD *
1640 LOCATE 1,16:PRINT"Score:";R;" + B
onus:";INT(BB):FOR T=1 TO BB/40:NEXT T
:SOUND 6,50:SOUND 8,16:SOUND 7,60:SOUN
D 12,2:SOUND 13,20:GOSUB 1150
1650 IF BB<10THEN RETURN
1660 BB=BB-10:R=R+10:FOR T=1 TO 5:NEXT
 T
1670 GOTO 1640
```

TOWERS
by Peter Bailey

This game seems simple at first, but turns out to be an infuriating test of logic. All you have to do is move all the hoops from one pole to another, stacking them in size order. The difficulty is that you many not rest any hoop on top of a smaller one, and you have only one spare hoop to use as temporary storage. This is a simple program to type in but a difficult game to beat.

```
10 SCREEN2:COLOR 15,1,1:CLS
20 DRAW"BM17,50S32;C4R3D1L1D4L1U4L1U1B
R4;C10R3D5L3U5R1BD1C10R1D3L1U3;BU1BR3;
C9R1"
30 LINE(80,50)-(88,90),9:LINE-(96,90),
9:LINE(96,85)-(88,50),9
40 LINE(96,90)-(104,74),9:LINE-(112,90
),9:LINE-(120,90),9:LINE-(128,50),9:LI
NE-(120,50),9:LINE-(112,84),9:LINE(92,
74)-(100,62),9:LINE-(108,62),9:LINE-(1
16,74),9
50 DRAW"BM136,50S32;C13R3D1L2D1R1D1L1D
1R2D1L3U5BR4;C12R2F1D1G1F1D1L1H1D1L1U5
BD1BR1D1R1U1L1BU1BR4;C15G1D1F2L1U1L1D1
F1R1E1U1H2R1D1R1U1H1L1
60 PAINT(18,51),4:PAINT(50,51),10:PAIN
T(81,51),9:PAINT(138,51),13:PAINT(178,
55),12:PAINT(214,51),15
70 PRESET(60,150)
80 OPEN"GRP:"AS1
90 PRINT#1," P. BAILEY 1986."
100 FORX=0TO1500:NEXTX
110 LETLS=0:LETSC=0:LETW=500
120 GOSUB170
130 GOSUB350
140 GOSUB450
150 GOSUB540
160 GOTO130
170 SCREEN1:WIDTH29:COLOR 15,1,1:KEYOF
F
180 LOCATE13,1:PRINT"RULES":LOCATE12,2
:PRINT"*******"
190 LOCATE0,5:PRINT"1 The object of th
e game is    to get all the discs from
    the first tower onto either  of th
e other two towers."
200 LOCATE0,10:PRINT"2 Only one disc m
ay be moved   at once."
210 LOCATE0,13:PRINT"3 No disc may be
placed on     top of one smaller than
     itself."
220 LOCATE0,17:PRINT"4 Slow play adds
to score."
230 LOCATE0,23:PRINT"PRESS SPACE BAR T
O CONTINUE."
240 A$=INKEY$
250 IFA$<>" "THEN240
260 CLS
270 LOCATE0,3:PRINT"5 Foul moves are i
gnored."
280 LOCATE0,5:PRINT"6 All moves except
 foul moves  count."
290 LOCATE0,8:PRINT"7 Levels 2 & 3 hav
e less       thinking time"
300 LOCATE0,11:PRINT"8 Lowest score wi
ns."
310 LOCATE2,23:PRINT"PRESS SPACE BAR T
O PLAY"
320 A$=INKEY$
330 IFA$<>" "THEN320
340 RETURN
350 LETE$=CHR$(&HD5)+CHR$(&H1C)+CHR$(&
HD5)
360 LETD$=CHR$(&HD5)+CHR$(&HDF)+CHR$(&
H1C)+CHR$(&HD5)+CHR$(&HDF)
370 LETC$=CHR$(&HD5)+CHR$(&HDF)+CHR$(&
HDF)+CHR$(&H1C)+CHR$(&HD5)+CHR$(&HDF)+
CHR$(&HDF)
380 LETB$=CHR$(&HD5)+CHR$(&HDF)+CHR$(&
HDF)+CHR$(&HDF)+CHR$(&H1C)+CHR$(&HD5)+
CHR$(&HDF)+CHR$(&HDF)+CHR$(&HDF)
390 LETA$=CHR$(&HD5)+CHR$(&HDF)+CHR$(&
HDF)+CHR$(&HDF)+CHR$(&HDF)+CHR$(&H1C)+
CHR$(&HD5)+CHR$(&HDF)+CHR$(&HDF)+CHR$(
&HDF)+CHR$(&HDF)
400 LETST$(1,5)=A$:LETST$(1,4)=B$:ST$(
1,3)=C$:LETST$(1,2)=D$:LETST$(1,1)=E$
410 LETSP(1)=0:LETSP(2)=5:LETSP(3)=5
420 LETR$=STRING$(5,&H20)+CHR$(&H1C)+S
TRING$(5,&H20)
430 LETO$=STRING$(4,&H20)+CHR$(&H1C)+S
TRING$(4,&H20)
440 RETURN
450 CLS:SCREEN1:WIDTH 32:COLOR 15,2,2
460 LOCATE6,2:PRINT"ENTER NUMBER OF TO
WER          YOU WISH TO DECREASE"
470 GOSUB1240
480 LOCATE0,19:PRINTSTRING$(5,&HDB);"1
";STRING$(9,&HDB);"2";STRING$(9,&HDB);
"3";STRING$(5,&HDB)
490 FORX=5TO25STEP10:FORY=18TO12STEP-1
500 LOCATEX,Y:PRINTCHR$(&HDE)
510 NEXTY:NEXTX
520 LOCATE0,18:PRINTA$:LOCATE1,17:PRIN
TB$:LOCATE2,16:PRINTC$:LOCATE3,15:PRIN
TD$:LOCATE4,14:PRINTE$
530 RETURN
540 LETW1=W
550 I$=INKEY$
560 LETW1=W1-1
570 IFW1=0THENGOSUB1150
580 IF I$=""THEN550
590 LETT=VAL(I$)
600 IFT<1ORT>3THENGOTO550
610 IFSP(T)=5THENGOTO550
620 LETL=LEN(ST$(T,SP(T)+1))
630 LETT$=ST$(T,SP(T)+1)
640 RO$=O$:IFL>10THENRO$=R$
650 A=1:IFL>10THENA=0
660 X=10*T-5-((L-1)/2)
670 FORY=SP(T)+14 TO 10 STEP-1
680 LOCATEX,Y:PRINTT$
690 LOCATE10*T-10+A,Y:PRINTRO$
700 NEXTY
710 LOCATEX,Y:PRINTT$
720 LETSC=SC+1
730 GOSUB1240
740 LOCATE18,3:PRINT"IN"
750 LETSP(T)=SP(T)+1
760 LETW2=W
770 I$=INKEY$
780 LETW2=W2-1
790 IFW2=0THENGOSUB1150
800 IFI$=""THEN770
810 LET T=VAL(I$)
```

LISTINGS

```
820 IFT<1ORT>3THEN GOTO770
830 IFSP(T)=5THEN GOTO 860
840 LETM=LEN(ST$(T,SP(T)+1))
850 IFL>MTHEN GOTO 990
860 LOCATE0,9:PRINTSTRING$(32," ")
870 LETX=10*T-5-((L-1)/2)
880 LETF=SP(T)+13
890 FORY=10TOF
900 LOCATE10*T-10+A,Y-1:PRINTRO$
910 LOCATEX,Y:PRINTT$
920 NEXTY
930 LETSP(T)=SP(T)-1
940 LETST$(T,SP(T)+1)=T$
950 IFSP(T)=0ANDT<>1THENGOTO1070
960 LOCATE18,3:PRINT"DE"
970 GOTO540
980 RETURN
990 LETZ=5
1000 LOCATE11,22:PRINT"FOUL MOVE"
1010 FORS=0TO100:NEXTS
1020 LOCATE11,22:PRINTSTRING$(9," ")
1030 FORS=0TO100:NEXTS
1040 LETZ=Z-1
1050 IFZ=0THENGOTO760
1060 GOTO1000
1070 IFW>200THENGOTO1190
1080 LOCATE11,22:PRINT"GAME OVER"
1090 LOCATE1,24:PRINT"PRESS SPACE BAR
TO PLAY AGAIN"
1100 IFSC<LSTHENLETLS=SC
1110 IFLS=0THENLETLS=SC
1120 A$=INKEY$
1130 IF A$<>" "THEN1120
1140 LETW=500:LETSC=0:CLS:GOTO 130
1150 PLAY"T200O4L2GL4DGL2AD","T200O4L2
GL4DGL2AD","T200O4L2GL4DGL2AD"
1160 LETSC=SC+1
1170 GOSUB1240
1180 RETURN
1190 LOCATE1,24:PRINT"PRESS SPACE BAR
FOR NEXT LEVEL"
1200 LETW=W-150
1210 A$=INKEY$
1220 IF A$<>" "THEN1210
1230 CLS:GOTO130
1240 LOCATE2,21:PRINT;"SCORE-"SC;TAB(1
9);"LO SCORE-";LS
1250 RETURN
```

DESIGN by M A Walsh

No sooner had Steven Mansfield announced a longing for an icon-driven graphics program in the last issue than this one appeared. Icons are used to select functions within the program, by positioning the cursor over the option and pressing FIRE or the spacebar.

Another novel feature is the way graphics are saved to cassette. The tables of data are transferred from VRAM to user RAM and 'BSAVED', with the procedure reversed to load. The author claims that this method is the fastest available using Basic.

Use is straightforward, and aid ed by the icons. Once the program is running in 'draw' a cross-shaped cursor wil be seen on the screen. Initially this is black, which means that the pen is up and the cursor can be moved without drawing. Function keys F1 and F2 select pen up and down, changing the colour of the cursor appropriately. F3 clears the screen in this mode.

Icons at the bottom of the screen indicate the other functions available. When selected a short tune will confirm the choice, and the cursor will change shape except on 'TAPE' and 'FILL' modes.

In 'LINE' or 'BOX' mode, move the cursor to the start position, press F3, move to the other end of the line or the diagonally opposite corner of the rectangle and press F4 to complete. In 'CIRCLE' mode, press F3 with the cursor in the centre of the circle required, move the cursor sideways to desired radius, and press F4 to complete. F1 and F2 vary the aspect ratio (height to width) of the circle in this mode,making ellipses possible.

To change the drawing or fill colour, move the cursor over the sixth icon and press FIRE until the required colour appears. When using the fill mode it is recommended to work from the outside edges of the picture inwards.

To save a picture, select the TAPE icon and press record/play on your cassette recorder. The program will take about a minute to trandfer data from VRAM into user RAM before automatically starting the tape movement.

When you have finished using any icon, moving the cursor away to a different part of the screen and pressing FIRE once again will take you back into the drawing mode.

To convert from joystick to keyboard use, change variable JK in line 40 to 0.

Variables

JK	KEYBOARD OR JOYSTICK
XX,YY	CURSOR COORDINATES
PC,XK	SPRITE COLOUR
PX	PIXEL ON/OFF
CL	GRAPHICS COLOUR
AR	CIRCLE ASPECT RATIO
A,B	VRAM VALUES
MX,MY	LINE AND BOX INITIAL COORD
CX,CY	CIRCLE INITIAL COORD
A$-I$	ICON SYMBOLS

```
10 '*******************************
20 '** DESIGN (APRIL 1986) ****
30 '*******************************
40 CLEAR:JK=1
50 CLS:LOCATE 0,3:FOR P=1 TO 12
60 KEY OFF:PRINT"GOGOGDGEGSGIGGGNGO";:
NEXT P:PRINT"GOGOGO":LOCATE 2,12
70 INPUT"ANY PICTURES TO LOAD IN";LD$
80 IF LD$="NO" OR LD$="N" OR LD$="no"
OR LD$="n" THEN 110
90 GOSUB 1890
100 GOTO 130
110 SCREEN 2,0:COLOR 15,4,4:DIM ZX$(5)
120 ' ** DRAW GRAPHICS AREA **
130 GOSUB 340
140 PLAY"O3A32G32A2G8F8F-20E60D8D-2D8R
64D4","O5A32G32A2G8F8F-20E60D8D-2D8R64
D4"
150 XX=128:YY=96:PX=0:PC=1
160 PUT SPRITE 0,(128,96),PC,0
170 ON KEY GOSUB 830,850,1710
180 KEY(1)ON:KEY(2)ON:KEY(3)ON:DC=3
190 ON STRIG GOSUB 870,870
200 STRIG(JK) ON
210 DR=STICK(JK):IF DR=0 THEN 190
220 ON DR GOTO 230,240,250,260,270,280
,290,300
230 YY=YY-1:GOTO 310
240 XX=XX+1:YY=YY-1:GOTO 310
250 XX=XX+1:GOTO 310
```

```
260 XX=XX+1:YY=YY+1:GOTO 310
270 YY=YY+1:GOTO 310
280 XX=XX-1:YY=YY+1:GOTO 310
290 XX=XX-1:GOTO 310
300 XX=XX-1:YY=YY-1
310 PUT SPRITE 0,(XX,YY),PC,0
320 IF PX=1 THEN PSET(XX+4,YY+5),CL:GO
TO 210
330 GOTO 210
340 ' ** ICON DESIGN **
350 AR=1.4
360 CIRCLE(225,174),8,9,,,AR
370 LINE(30,0)-(225,0),5:LINE(30,192)-
(225,192),5:LINE(5,30)-(5,162),5:LINE(
255,30)-(255,162),5
380 A$="R3D4L3U4R3C9R2C15R3D2G2U4D2F3"
390 B$="C9U1R2C15U4R3D4U2L3R4C9R2D1C15
U3D4U1R3D1U4"
400 C$="R32D30L32U30"
410 D$="R3L3D4R4C9R2C15U5C9R3D1C15R3D2
G2U4D2F2"
420 E$="D4R3C9R3C15U5C9R3D1C15D4U4F4U4
"
430 F$="R8D6L8U6"
440 G$="R3L2D6C9R4U1"
450 H$="R3D3L3U3D6C9R5U1C15U4D5R3L3U3R
2L2U3R3"
460 I$="R3L3D4U2R2C9R4U2C15D5C9R3U1C15
R3L3U5C9R5D1C15D4R3"
470 CL=15:C1=1
480 FOR P=1 TO 164 STEP 32
490 LINE(P+14,165)-(P+14+30,185),9,BF
500 NEXT P
510 LINE(180,170)-(200,180),15,BF
520 LINE(209,164)-(242,185),7,B
530 DRAW"BM17,170XA$;XB$;"
540 DRAW"BM20,177XD$;"
550 DRAW"BM50,170XA$;XB$;"
560 DRAW"BM53,177XE$;"
570 DRAW"BM83,170XA$;XB$;"
580 DRAW"BM90,177XF$;"
590 DRAW"BM120,170XG$;C4R1U5L1C15XH$;"
600 DRAW"BM150,170XI$;"
610 ' ** NORMAL MODE SPRITE **
620 RESTORE:FOR P=1 TO 8:READ O
630 ZX$(1)=ZX$(1)+CHR$(O)
640 NEXT P:SPRITE$(0)=ZX$(1)
650 DATA 195,129,0,28,20,28,129,195
660 ' ** CIRCLE MODE SPRITE **
670 FOR P=1 TO 8:READ Z1
680 ZX$(2)=ZX$(2)+CHR$(Z1)
690 NEXT P:SPRITE$(1)=ZX$(2)
700 DATA 195,195,36,24,24,36,195,195
710 ' ** LINE MODE SPRITE **
720 FOR P=1 TO 8:READ Z2
730 ZX$(3)=ZX$(3)+CHR$(Z2)
740 NEXT P:SPRITE$(2)=ZX$(3)
750 DATA 8,8,8,8,247,8,8,8
760 ' ** BOX MODE SPRITE **
770 FOR I=1TO8:READ Z3:ZX$(4)=ZX$(4)+C
HR$(Z3):NEXT I:SPRITE$(3)=ZX$(4)
780 DATA 255,129,129,157,149,157,129,2
55
790 ' ** PAINT MODE SPRITE **
800 FOR Y=1TO8:READ Z4:V$=V$+CHR$(Z4):
NEXT Y:SPRITE$(4)=V$
810 DATA 255,129,255,3,15,24,24,24
820 RETURN
830 ' ** PIXEL ON (DRAW) **
840 PX=1:YY=YY-1:XX=XX-1:PC=15:RETURN
260
850 ' ** PIXEL OFF **
860 PX=0:YY=YY-1:XX=XX-1:PC=1:RETURN 2
60
870 ' ** BRANCH TO DRAW MODES **
880 ' ** SELECT CIRCLE MODE **
890 IF (XX>15 AND XX<45) AND (YY>165 A
ND YY<185) THEN SN=1:GOSUB 1770:GOTO 1
080:RETURN 170
900 ' ** SELECT LINE MODE **
910 IF (XX>47 AND XX<77) AND (YY>165 A
ND YY<185) THEN ID=0:SN=2:GOSUB 1770:K
EY(1) OFF:KEY(2) OFF:KEY(5) OFF:KEY(3)
 ON:KEY(4) ON:GOTO 1390:RETURN 170
920 ' ** SELECT BOX MODE **
930 IF (XX>79 AND XX<109) AND (YY>165
AND YY<185) THEN ID=1:SN=3:GOSUB 1770:
KEY(1) OFF:KEY(2) OFF:KEY(5) OFF:KEY(3
) ON:KEY(4) ON:GOTO 1390:RETURN 170
940 ' ** SELECT PAINT MODE **
950 IF (XX>142 AND XX<172) AND (YY>165
 AND YY<185) THEN FL=1:SN=4:GOSUB 1770
:FOR K=2TO5:KEY(K) OFF:NEXT K:KEY(1)ON
:GOTO 1390::RETURN 170
960 ' ** SELECT COLOR ROUTINE **
970 STRIG(JK) ON
980 IF (XX>175 AND XX<205) AND(YY>165
AND YY<185) THEN 990 ELSE 1040
990 ' ** COLOR CHANGE ROUTINE **
1000 BEEP:CL=CL+1:IF CL>15 THEN CL=1
1010 LINE(180,170)-(200,180),CL,BF
1020 LINE(205,165)-(205,185),9
1030 ON DC GOTO 1080,1400,170
1040 ' ** SELECT SAVE PIC. ROUTINE **
1050 IF (XX>111 AND XX<141) AND (YY>16
5 AND YY<185) THEN GOSUB 1800
1060 ' ** RETURN TO NORMAL MODE **
1070 FOR K=1TO5:KEY(K) OFF:FL=0:PRESET
(CX,CY):PLAY"O3B32","O4C32","O4E32":PU
T SPRITE 0,(XX,YY),PC,0:RETURN 170
1080 ' ** CIRCLE ROUTINE **
1090 DC=1:STRIG(JK) ON:PRESET(CX,CY)
1100 ON KEY GOSUB 1290,1340,1250,1260
1110 KEY(1) ON:KEY(2) ON:KEY(3) ON:KEY
(4) ON
1120 DR=STICK(JK):IF DR=0 THEN1120 ELS
E 1130
1130 ON DR GOTO 1140,1150,1160,1170,11
80,1190,1200,1210
1140 YY=YY-1:GOTO 1220
1150 XX=XX+1:YY=YY-1:GOTO 1220
1160 XX=XX+1:GOTO 1220
1170 XX=XX+1:YY=YY+1:GOTO 1220
1180 YY=YY+1:GOTO 1220
1190 XX=XX-1:YY=YY+1:GOTO 1220
1200 XX=XX-1:GOTO 1220
1210 XX=XX-1:YY=YY-1
1220 IF POINT(XX+4,YY+5)=1 THEN SK=15E
LSE SK=1
1230 PUT SPRITE 0,(XX,YY),SK,1
1240 GOTO 1120
1250 PRESET(CX,CY):CX=XX+4:CY=YY+5:PSE
T(CX,CY),1:RETURN 1120
1260 ' ** DRAW CIRCLE **
1270 CIRCLE(CX,CY),ABS(XX-CX)+4,CL,,,A
R
1280 RETURN 1120
1290 ' ** LOWER ASPECT RATIO **
1300 AR=AR-.1:IF AR<.1 THEN AR=1.4 ELS
E 1310
1310 LINE(210,166)-(241,182),4,BF
1320 CIRCLE(225,174),8,9,,,AR
```

LISTINGS

```
1330 RETURN 1120
1340 ' ** RAISE ASPECT RATIO **
1350 AR=AR+.1:IF AR>6 THEN AR=1.4 ELSE
 1360
1360 LINE(210,166)-(241,182),4,BF
1370 CIRCLE(225,174),8,9,,,AR
1380 RETURN 1120
1390 ' ** LINE & BOX ROUTINE **
1400 DC=2:STRIG(JK) ON:PRESET(CX,CY)
1410 ON KEY GOSUB 1550,,1600,1630
1420 DR=STICK(JK):IF DR=0 THEN 1420
1430 ON DR GOTO 1440,1450,1460,1470,14
80,1490,1500,1510
1440 YY=YY-1:GOTO 1520
1450 XX=XX+1:YY=YY-1:GOTO 1520
1460 XX=XX+1:GOTO 1520
1470 XX=XX+1:YY=YY+1:GOTO 1520
1480 YY=YY+1:GOTO 1520
1490 XX=XX-1:YY=YY+1:GOTO 1520
1500 XX=XX-1:GOTO 1520
1510 XX=XX-1:YY=YY-1
1520 IF POINT(XX+4,YY+5)=1 THEN SK=15
ELSE SK=1
1530 PUT SPRITE 0,(XX,YY),SK,SN
1540 GOTO 1420
1550 ' ** PAINT SHAPE **
1560 PRESET(CX,CY)
1570 IF FL<>1 THEN RETURN 1430 ELSE 15
80
1580 PAINT(XX+4,YY+5),CL,CL
1590 RETURN 1430
1600 ' ** FIRST CO-ORDINATE **
1610 PRESET(MX,MY):MX=XX+4:MY=YY+5:PSE
T(MX,MY),1
1620 RETURN 1420
1630 ' ** DRAW LINE OR BOX **
1640 IF ID=1 THEN 1680 ELSE 1650
1650 ' ** LINE **
1660 PRESET(MX,MY):LINE(MX,MY)-(XX+4,Y
Y+5),CL:XX=XX:YY=YY:JT=0
1670 RETURN 1530
1680 ' ** BOX **
1690 PRESET(MX,MY):LX=XX+4:LY=XX+5:LIN
E(MX,MY)-(XX+4,YY+5),CL,B:XX=XX:YY=YY:
JT=0
1700 RETURN 1530
1710 ' ** RESTART PROGRAM **
1720 CLS:RESTORE
1730 FOR M=0TO5
1740 SPRITE$(M)=" "
1750 NEXT M
1760 ERASE ZX$:GOTO 110
1770 ' ** MODE TUNE **
1780 PLAY"V5T120O6C18D18C18D18C7A7F7"
1790 RETURN
1800 '** SAVE PICTURE TO TAPE **
1810 LINE(5,0)-(255,192),4,B
1820 BEEP
1830 FOR C=0 TO 5120
1840 A=VPEEK(C):B=VPEEK(8192+C)
1850 POKE 45000!+C,A:POKE 50500!+C,B
1860 NEXT C
1870 BSAVE"CAS:PIC",45000!,56000!
1880 RETURN
1890 '** LOAD PICTURE FROM TAPE **
1900 BLOAD"PIC"
1910 SCREEN 2,0:COLOR 15,4,4:DIM ZX$(5
)
1920 FOR C=0 TO 5120
1930 A=PEEK(45000!+C):B=PEEK(50500!+C)
1940 VPOKE C,A:VPOKE 8192+C,B
1950 NEXT C       1960 RETURN
```

SLINKY SID
by S Marsden

Eat all the frogs you can find while avoiding the poisonous toadstools and the garden wall. You take the role of a snake which gets longer as it eats — running in to yourself will prove fatal! Choose between joystick and keyboard control.

```
10 REM      SLINKY SID
20 REM     By S.Marsden
30 REM
40 COLOR 15,1,1
50 KEY OFF
60 SCREEN 1,,0:WIDTH 31
70 DEFINT A-Z
80 DIM P(400)
90 FOR F=1152 TO 1536 STEP 64
100 FOR G=0 TO 7:READ N$
110 VPOKE BASE(7)+F+G,VAL("&H"+N$)
120 NEXT G:NEXT F
130 DATA 18,7E,FF,FF,18,18,18,0
140 DATA 3C,6E,EF,7F,3F,1F,3E,7C
150 DATA 3C,76,F7,FE,FC,F8,7C,3E
160 DATA 20,71,FB,9F,FF,FF,7E,3C
170 DATA 3C,7E,FF,FF,9F,FB,71,20
180 DATA 3C,56,AB,D5,AB,D5,6A,3C
190 DATA 99,BD,7E,3C,3C,5A,81,81
200 SOUND 0,0:SOUND 8,15
210 SOUND 9,16:SOUND 12,1
220 SOUND 7,44
230 FOR F=19 TO 25:READ W$
240 VPOKE BASE(6)+F,VAL("&H"+W$)
250 NEXT F
260 DATA A1,A1,A1,A1,61,21,FD
270 LOCATE 4,11:PRINT "1=KEYBOARD 2=JO
YSTICK"
280 J=VAL(INKEY$)-1
290 IF J=-1 THEN 280
300 CLS
310 LOCATE 4,11:PRINT "1=EASY 2=FAIR 3
=HARD"
320 M=VAL(INKEY$)
330 IF M=0 OR M>3 THEN 320
340 CLS
350 LOCATE 3,22:PRINT "HI:"HS
360 LOCATE 19,22:PRINT "SC: 0"
370 PRINT STRING$(30,CHR$(204))
380 FOR F=1 TO 20
390 PRINT CHR$(204) STRING$(28," ") CH
R$(204)
400 NEXT F
410 PRINT STRING$(30,CHR$(204))
420 LOCATE 11,11:PRINT CHR$(152) STRIN
G$(5,CHR$(184))
430 FOR F=0 TO 5
440 P(F)=BASE(5)+369-F
450 NEXT F
460 C=5:T=400:H=152:D=-1
470 FOR F=1 TO 10
480 Y=BASE(5)+64+INT(RND(1)*660)
490 IF VPEEK(Y)>32 OR YMOD32=0 OR YMOD
32=31 THEN F=F-1:NEXT F
500 VPOKE Y,192
510 FOR G=250 TO 0 STEP -10
520 SOUND 0,G
```

```
530 NEXT G:NEXT F
540 FOR F=1 TO 5
550 Y=BASE(5)+64+INT(RND(-TIME)*660)
560 IF VPEEK(Y)>32 OR YMOD32=0 OR YMOD
32=31 THEN F=F-1:NEXT F
570 VPOKE Y,144
580 FOR G=16 TO 106 STEP 5
590 SOUND 0,G
600 SOUND 1,INT(G/16)
610 NEXT G
620 SOUND 0,0:SOUND 1,0
630 NEXT F
640 ON INTERVAL=28-M*8 GOSUB 730
650 INTERVAL ON
660 IF ABS(D)=1 THEN 700
670 IF STICK(J)=7 THEN H=152:D=-1
680 IF STICK(J)=3 THEN H=160:D=1
690 IF ABS(D)=32 THEN 670
700 IF STICK(J)=5 THEN H=176:D=32
710 IF STICK(J)=1 THEN H=168:D=-32
720 GOTO 660
730 SP=P(C):C=C+1:T=T+1
740 IF T=401 THEN T=0
750 IF C=401 THEN C=0
760 P(C)=SP+D
770 IF VPEEK(P(C))>32 THEN INTERVAL OF
F:GOTO 840
780 SOUND 2,(255-H)*2
790 SOUND 13,0
800 VPOKE P(T),32
810 VPOKE SP,184
820 VPOKE P(C),H
830 RETURN
840 IF VPEEK(P(C))=192 THEN 900
850 LOCATE 9,11:PRINT " Game Over "
860 FOR F=0 TO 5000:NEXT F
870 IF SC>HS THEN HS=SC
880 SC=0
890 GOTO 300
900 GOSUB 810
910 FOR F=66 TO 0 STEP -6
920 SOUND 0,F
930 SOUND 1,INT(F/16)
940 NEXT F
950 SC=SC+10
960 LOCATE 22,0:PRINT SC
970 T=T-1
980 IF SCMOD100=0 THEN 470
990 INTERVAL ON
1000 RETURN
```

IF IT RUNS, WE WANT TO SEE IT!

This action-packed section will appear in every issue of *MSX Computing*, crammed full of games and utility listings for MSX micros. Each program is listed straight on to a printer from a working version.

As you grow more familiar with your micro, and become confident that you can produce a game or program of interest to all our readers, why not send it in? But we have to insist on tape or 3.5 inch disk copies, as we haven't the time to type in programs ourselves.

Your covering letter should include instructions on how to use or play the program, as well as a brief description of any interesting programming techniques and a list of the main variables.

We will, of course, pay for any listings we print, exactly how much depending on the quality of the program — NOT the length! As a rough guide, you can expect between £10 and £50, with anything up to £100 for a really exceptional program. Programs which, for any reason, we are not interested in using are returned immediately.

Entering your listings

Most of the (fortunately few) complaints we get about listings can be traced to incorrect typing of the program. So it's worth making a few points about how to enter listings, and problems to watch out for.

Sometimes you will see a row of letters or other characters in a PRINT statement. This happens when the program, as supplied, contains graphics characters which our printer doesn't recognise. If the particular character is important then we'll tell you what it should be in the introduction to the program.

When a program crashes, you will often get an error message which refers to a particular line number. But this isn't always as useful as it sounds because it may not be that line which contains the fault. For example, the line may contain a READ command, but the program will crash because of a lack of DATA for this line to READ. The fault actually lies in the DATA statement.

For this reason you must take particular care over DATA entries. Some programs can contain a couple of hundred numbers and strings in DATA lines. Miss out just one item, or one comma, and the program will fail through DATA starvation.

Make sure you are entering exactly what is shown in the listing. Don't type a zero when it should be the letter O, or a small l when it should be the number one.

REM statements can usually be omitted, which saves time and effort. But they do help to explain what is going on. That's handy when you come back to a program after a break and want to make some changes. And watch out for GOTOs. If one of these commands directs the program to a REM line which you've omitted, the program will crash.

If, in the end, you still can't get the program to work, then let us know. But PLEASE WRITE, don't telephone. It's virtually impossible to de-bug a program over the phone, and the intricacies of a program are usually known only to the original programmer, who is never around to answer your questions!

LOOK HERE FOR YOUR MSX SOFTWARE STOCKISTS

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Martech	●	●	●	●	●	●	●	●		●	●	●	●	●	●
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Yie Ar Kung Fu II (cartridge)	£17.95	**£14.25**
Ping Pong (cartridge)	£17.85	**£14.25**
Manic Minor	£7.95	**£6.50**
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Elidon	£8.95	**£7.50**
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The Boss	£6.95	**£4.95**
Way of the Tiger	£9.95	**£7.95**
Harvey Smith Showjumper	£7.95	**£6.50**
Flag Path 737	£8.95	**£7.50**
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Alien 8	£9.95	**£7.95**
Mr Wongs Loopy Laundry	£8.00	**£6.50**
Mr Mens First step	£8.95	**£7.50**
Calculation II	£9.95	**£7.95**
Robcom Head Alignment Kit	£4.95	**£3.95**

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Payment by cheque or postal order only

JOTHAN SOFTWARE

65 Heol Gwys, Upper Cwmtwrch, Swansea SA9 2XQ

Tel: (0639) 830934

PLEASE STATE WHICH MICRO

General advice to readers concerning advertisements

When replying to advertisements in this issue, you should note the following points:

1. Always clarify the exact nature of any guarantee being offered.
2. Never send cash — always a cheque, Postal or Money Order.
3. Insist on a written receipt.
4. Clearly state the equipment you seek, and detail any acceptable alternatives.
5. Request an immediate statement of how and when the goods are to be delivered and whether the delivery will be split.
6. Check by telephone the latest prices and availability of goods you are ordering.
7. Cases of non-supply or wrong supply of goods should initially be taken up directly and as soon as possible with the supplier.
8. Because of fluctuations in prices and discounts, it is advisable to ensure that you reply only to advertisements published in current issues.

Mail Order Protection Scheme (Limited Liability)

If you order goods from mail order advertisers in this magazine and pay by post in advance of delivery, this publication ('MSX Computing') will consider you for compensation if the advertiser should become insolvent or bankrupt, provided:

1. You have not received the goods or had your money returned; and

2. You write to the publisher of this publication ('MSX Computing') explaining the position not earlier than 28 days from the day you sent your order and not later than 2 months from that day.

Please do not wait until the last moment to inform us. When you write, we will tell you how to make your claim and what evidence of payment is required.

We guarantee to meet the claims from readers made in accordance with the above procedure as soon as possible after the advertiser has been declared bankrupt or insolvent up to a limit of £4,500 per annum for any one advertiser so affected and up to £13,500 p.a. in respect of all insolvent advertisers. Claims may be paid for higher amounts, or when the above procedure had not been compiled with, at the decision of the publication ('MSX Computing') but we do not guarantee to do so in view of the need to set some limit to this commitment and to learn quickly of readers' difficulties.

This guarantee covers only advance payments sent in *direct* response to an advertisement in this magazine (not, for example, payments made in response to catalogues etc, received as a result of answering such advertisements). Classified advertisements are excluded.

Note: The sums referred to are annual amounts available for compensation and they will be divided equally amongst all valid claims received.

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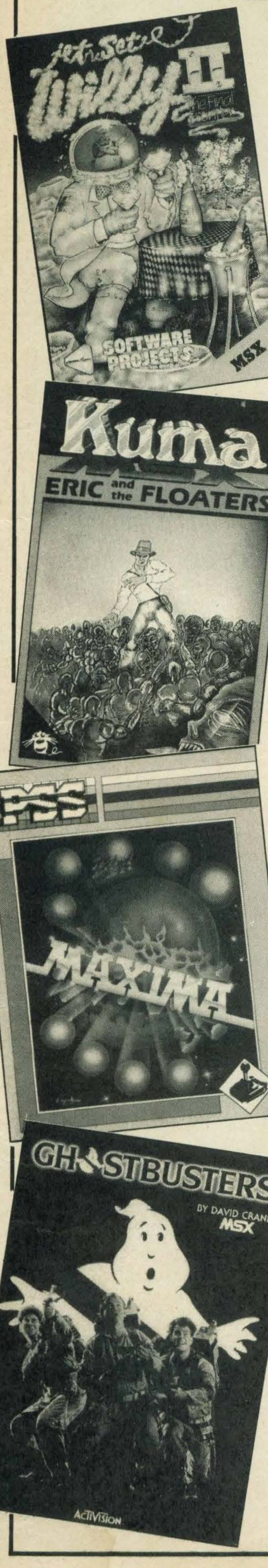
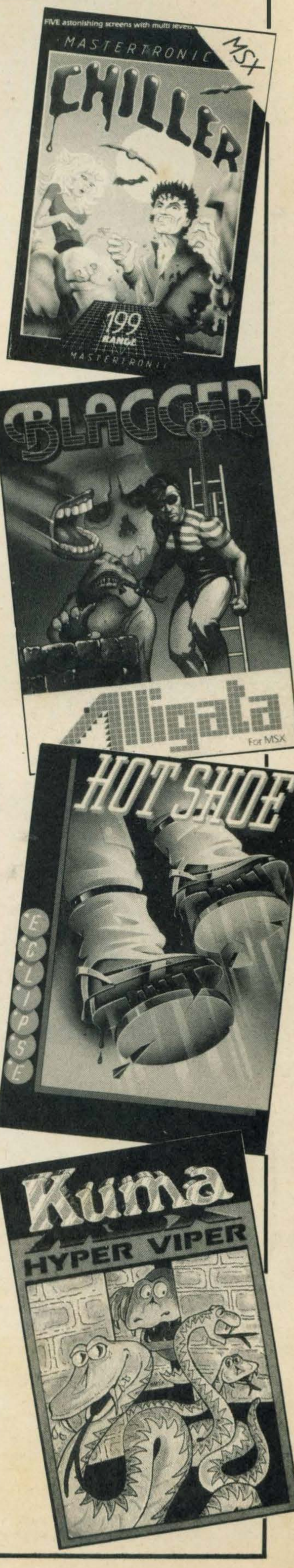
INFO HIGH SCORES

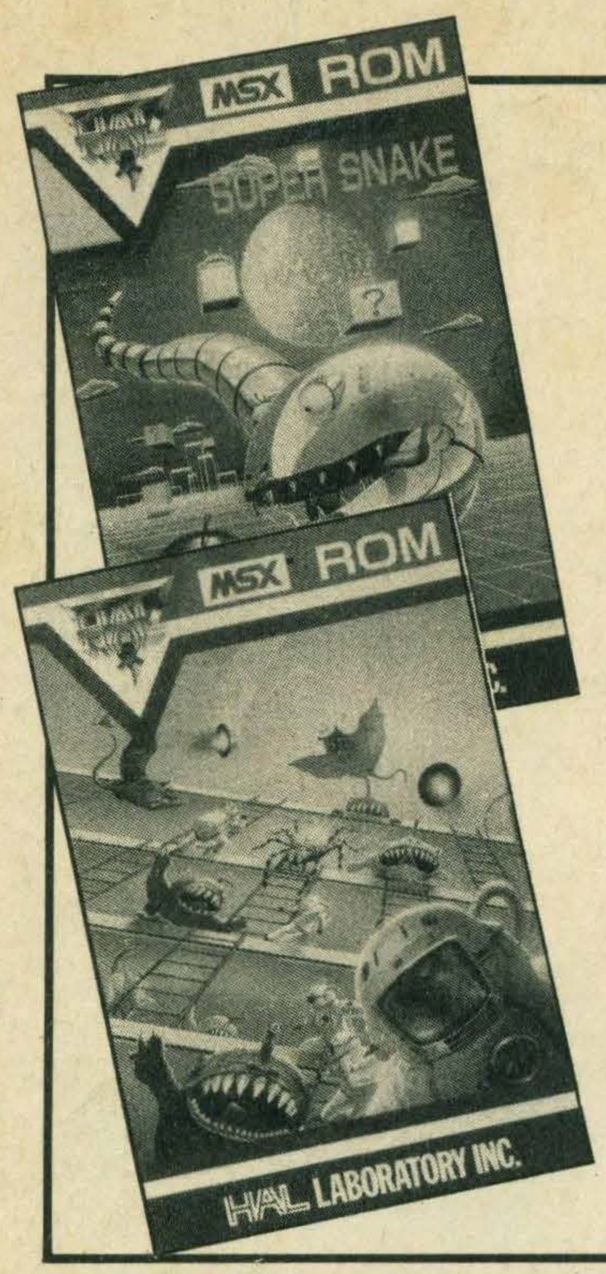
Send your high scores to: High Scores, MSX Computing, 38-42 Hampton Road, Teddington, Middlesex TW11 0JE



Game	Name	Score	Stage
Alien 8	John Philpott (Derby)	23	
Alpha Blaster	Mohamad Shuib (Pontypridd)	89,235	
Antarctic Adventure	David McEwan (Lanarkshire)	16,934,200	
Barnstormer	Graham Dixon (Lincolnshire)	279,955	12
Battleship Clapton II	RS Clark (Bradford)	97,300	
Beamrider	Sean Baxter (Dyfed)	133,380	25
Blagger	Euan Marshall (Epping)	231,520	
Boom	Matthew Durkin (N. Yorks)	51,000	11
Boulderdash	Alan Jones (Streatham)	59,848	F/4
Brian Jacks Superstar Challenge	Paul Fosard (Wolverhampton)	901	3
Buck Rogers	Neil Macfall	310,900	6
Centipede	Michelle Drabwell (Essex)	45,000	7
Chiller	Simon Dobson (Devon)	32,963	
Choro Q	Scott Fielding (Truro)	42,380	
Chuckie Egg	Andrew Talbot (Bridlington)	1,394,190	
Circus Charlie	Ian Bucklow (Worksop)	1,198,460	105
Comic Bakery	Colin Avis (Worthing)	248,870	25
Decathalon	Neil Macfall	12,920	
Disk Warrior	Chris Needham (Banstead)	1,400,000	
Dogfighter	Neil Sims (Derbyshire)	10,100	
Elidon	Andrew Talbot (Bridlington)	37,350	26%
Eric and the Floaters	Sean Baxter (Dyfed)	1,844,160	
Finders Keepers	Paul Griffiths (Lincoln)	16,000	
Fire Rescue	Mark Lowles (Greenock)	29,540	
Formula One Simulator	Matthew Durkin (N. Yorks)	178mph	1st
Fruity Frank	Lesley Robinson (Blairgowrie)	21,000	7
Ghostbusters	Laurence Burke (Ireland)	$999,900	
Golf	Joseph Gleeson (Ireland)	28 under par	
Gridtrap	James Brodie (Stirling)	354,900	23
Gunfright	Neil Alldritt (Chessington)	$150,000	51
Hero	Arild Tønnessen (Norway)	295,995	
Highway	Robin Emmons (London)	175,170	2
Hopper	Christopher Rutherford (Hexham)	100,050	3
Hotshoe	Dan Gavik (Denmark)	187,575	19
Hunchback	David McEwan (Lanarkshire)	2,700,000	
Hustler	Paul Fosard (Wolverhampton)	7 shots	
Hyper Rally	Dermot Long (Limerick)	239,500	
Hyper Sports I	Mark Bosselli (Kenton)	2,050,800	51
Hyper Sports II	L Henry (Battersea)	500,500	
Hyper Viper	Helen Carter (Mkt Weighton)	127,500	8
Jet Fighter	Andrew Daly (Abingdon)	3,650	
Jet Set Willy II	J Alexander (Kew)	110 objects	
Kings Valley	A Baker (London)	1,004,300	68
Knightlore	Robert Elliott (Belfast)	96%	
Knightmare	Neil Alldritt (Chessington)	130,580	3
Lazy Jones	Mark Sutton (Rayleigh)	149,650	
Les Flics	Paul Fosard (Wolverhampton)	74,800	
Le Mans	Jacob Poviah	42,530	8
Manic Miner	Clive Marsh (Watford)	42,470	29
Maxima	Sean Mason (Ireland)	193,960	112
Monkey Academy	Jason Wopling (Essex)	203,600	
Mopiranger	Alan Sinclair (London)	162,300	21
Mutant	Mark Drabwell (Essex)	737	7
Ninja	K Baird (Lancaster)	10,140	8
Oh Mummy	Mark Sellick (London)	1,045	
Oh No!	J C Ledesma (London)	76,250	
Oil's Well	Mark Burrows (N Devon)	83,600	
Pinball	A Baker (London)	1,240,680	
Pitfall II	Arild Tønnessen (Norway)	199,000	
Polar Star	Neil Macfall	100,710	4
Punchy	Philip Pett (Havant)	377,198	
Pyramid Warp	Katie Smith (St Ives)	67,670	6
River Raid	K Baird (Lancaster)	68,300	37
Road Fighter	Daniel Tracey (Colchester)	884,528	65
Roller Ball	A Baker (London)	3,120,180	



HIGH SCORES



Game	Name	Score	Stage
Sasa	Nigel Sims (Derbyshire)	200,195	
Shark Hunter	Baz Bowdidge (Catford)	16,802	7
Sky Jaguar	Arnfinnur Dor Jonsson (Iceland)	689,190	
Soccer	D Grant (Bridlington)	22-1	
Sorcery	John Philpott (Derby)	Comp'd	
Space Walk	Paul Lavoie (Crawley)	1,029,500	
Spooks and Ladders	Helen Carter (Mkt Weighton)	189,930	79
Step Up	Stephen Lam (Orpington)	14,000	
Stop The Express	Mark Sellick (London)	4,400	
Super Cobra	Ian West (Aylesbury)	501,100	62
Super Snake	Mark Sutton (Rayleigh)	43,600	
Sweet Acorn	Lesley Robison	820,040	
Tennis	Mark Drabwell (Essex)	6-0, 6-0	
The Snowman	Mark Drabwell (Essex)	30,030	
Time Bandits	Emma Rippin (Leicester)	9,550	
Time Curb	Amy Louise Goulsbra (Lincs)	176,050	
Time Pilot	Robin Emmons (London)	453,000	6
Turmoil	Kenny Kinghorn (Edinburgh)	3,160	
Vacumania	Peter Gillibrand (Blackburn)	19,350	5
Vicious Viper	David McEwan (Lanarkshire)	3,100	
Way of the Tiger	Christopher Rutherford (Hexham)	Comp'd	
Yie Ar Kung Fu	David McEwan (Lanarkshire)	12,109,700	734
Yie Ar Kung Fu II	Lee Kennedy (Morecambe)	140,500	15
Zaxxon	Martyn Groen (Holland)	1,052,300	

JOIN THE CLUB

Judging by the number of calls and letters we get on the subject, MSX computer users often have difficulty getting in touch with like-minded enthusiasts. One way around this problem is to join a club or user group if there is one in your area.

Listed below are the clubs and user groups we know of. The information is that supplied by the organisers, and inclusion in this listing should not be taken as any form of endorsement or recommendation by *MSX Computing*. Readers are advised to satisfy themselves as to the value of the services offered by any organisation before making a commitment.

Some clubs actually meet at regular intervals, and this is probably the best kind to join if you can find one within a reasonable distance of home. However, you may find that a user group connected by the mail is the only option. The best user groups put out regular newsletters and some freely exchange software written by their own members.

If you run a user group, computer club or information source of interest to owners of MSX computers, please write with details to User Groups, MSX Computing, 38-42 Hampton Road, Teddington, Middlesex TW11 0JE.

MSX'r
C/O Tony Brown
23 Hall Street
Foham
Cambridgeshire
CB7 5BN
Tel: N/A

Memory Alpha
C/O Ross Carter
16 Mayfield Road
North End, Portsmouth
Hampshire
Tel: (Portsmouth) 696543

MK-MSX
C/O Jeff Whiting
8 Blackheath Crescent
Bradwell Common
Milton Keynes
MK13 8AD
Tel: (0908) 674065

The MSX Club (Wales)
C/O PJ Morgan
230 Dunvant Road
Swansea
West Glamorgan SA2 7SR

MSX West
C/O Mark Smith
14 Beech Hill
Wellington
Somerset
Tel: N/A

Yamaha DX/MSX Users Club
C/O Tony Wride
PO Box 6
Ripon
North Yorks HG4 2QT

MSX Link
C/O David Webb
11 Ayscough Avenue
Spalding
Lincolshire PE11 2QB
Tel: N/A

The MSX Computer Club
C/O Dean Adams
173 Hampden Way
Southgate
London N14

The MSX Club
C/O Lee Simpson
3 Mayfair Place
Tuxford, nr Newark
Nottingham NF22 0JD
Tel: (Tuxford) 870 485

MSX User Group
C/O Andrew Phillips
Room 5
14 Moor Street
Ormskirk
Lancashire

MSX (Scotland)
C/O RJ Brown
3 Crauchan Place
Grangemouth
Scotland FK3 0BU
Tel: N/A