

MSX

COMPUTING

BUSINESS DRIVE *Spectravideo's new micro*



Tested: MSX-compatible TV/monitors under scrutiny

Subroutines: tidy up your BASIC software skills

COMPETITION: 50 CL... H... U... T...

All MSX computers are built to the same standard.

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At Pioneer we've never believed in following the crowd. We prefer them to be one step behind us.

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The future of sound and vision

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 The LaserVision trademark certifies compatibility with other laser optical video

MSX COMPUTING

REGULARS

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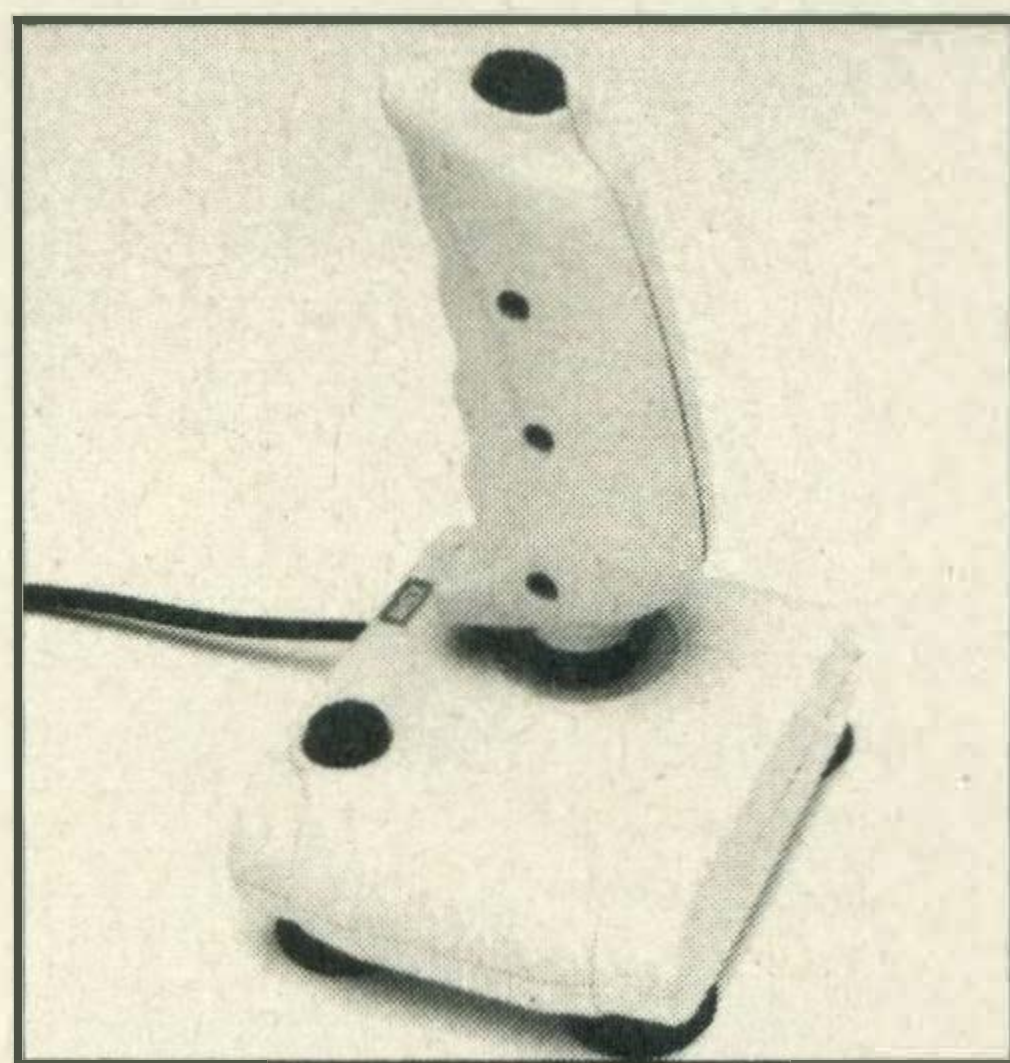
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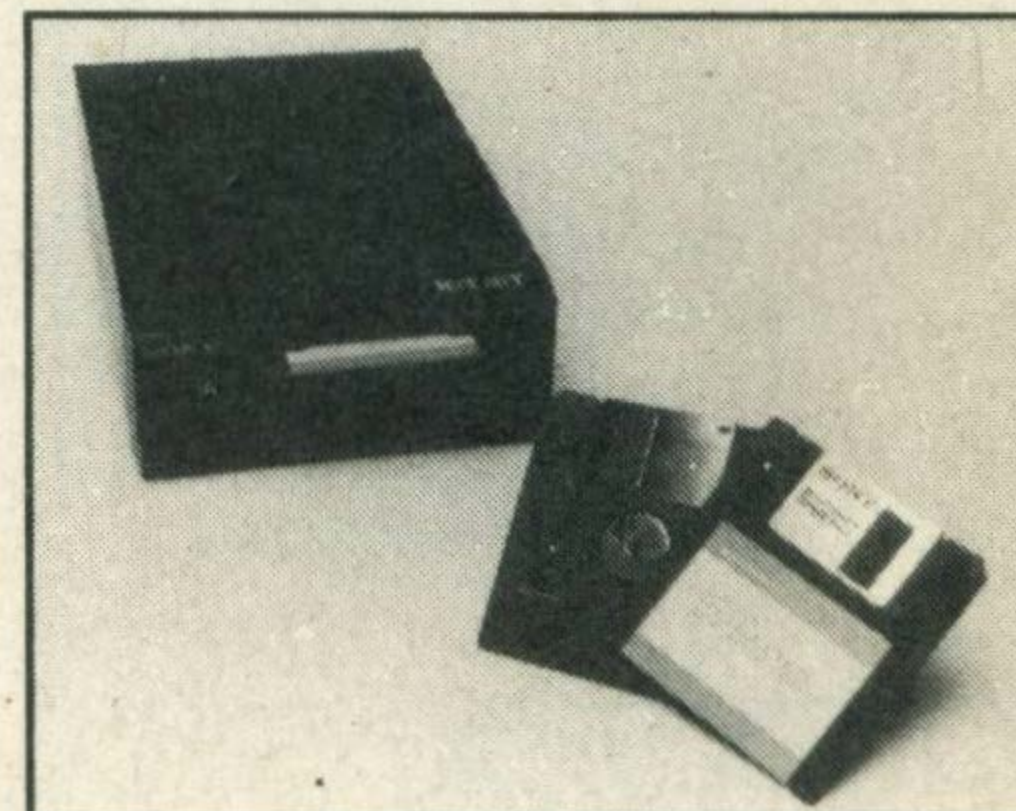
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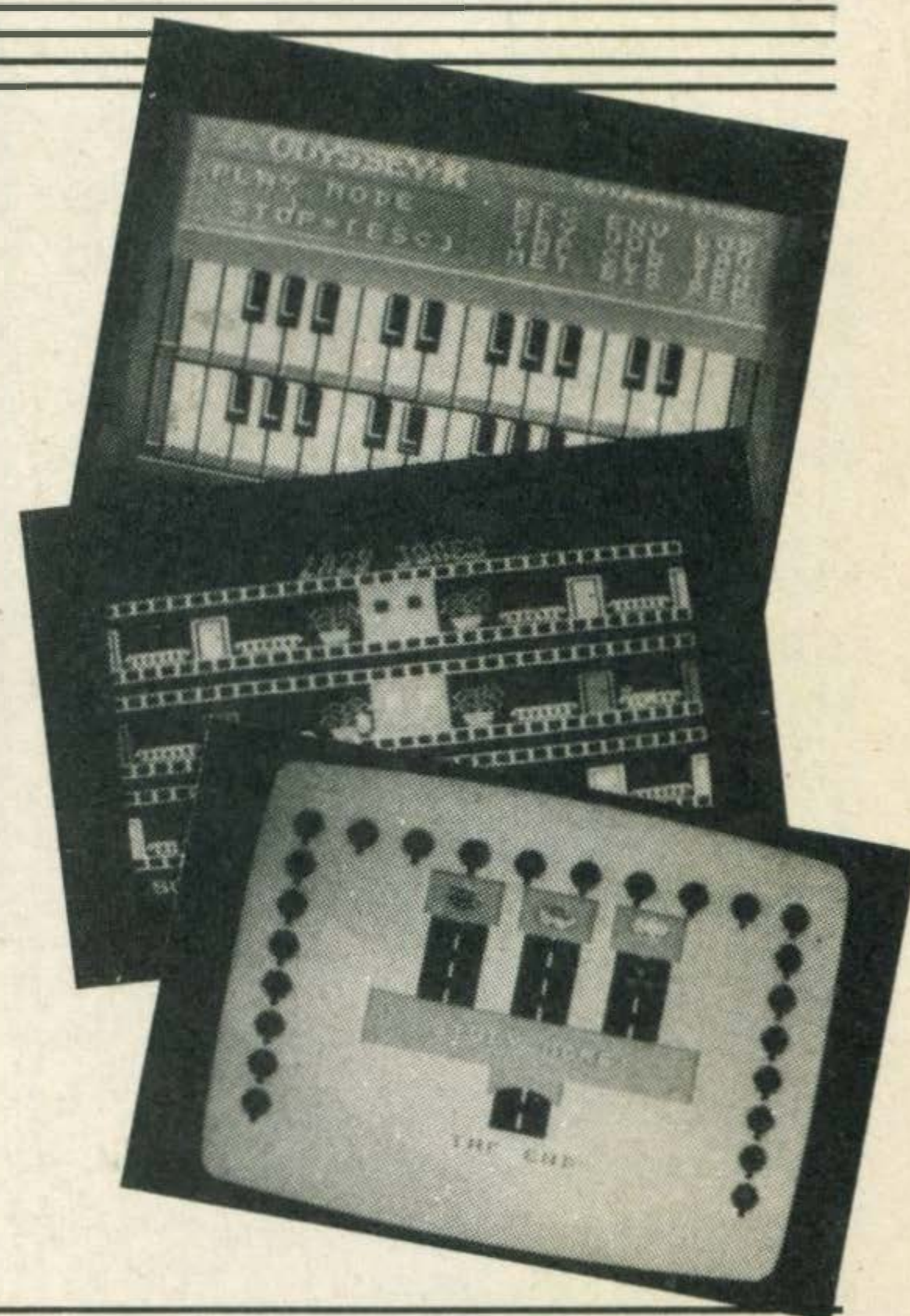
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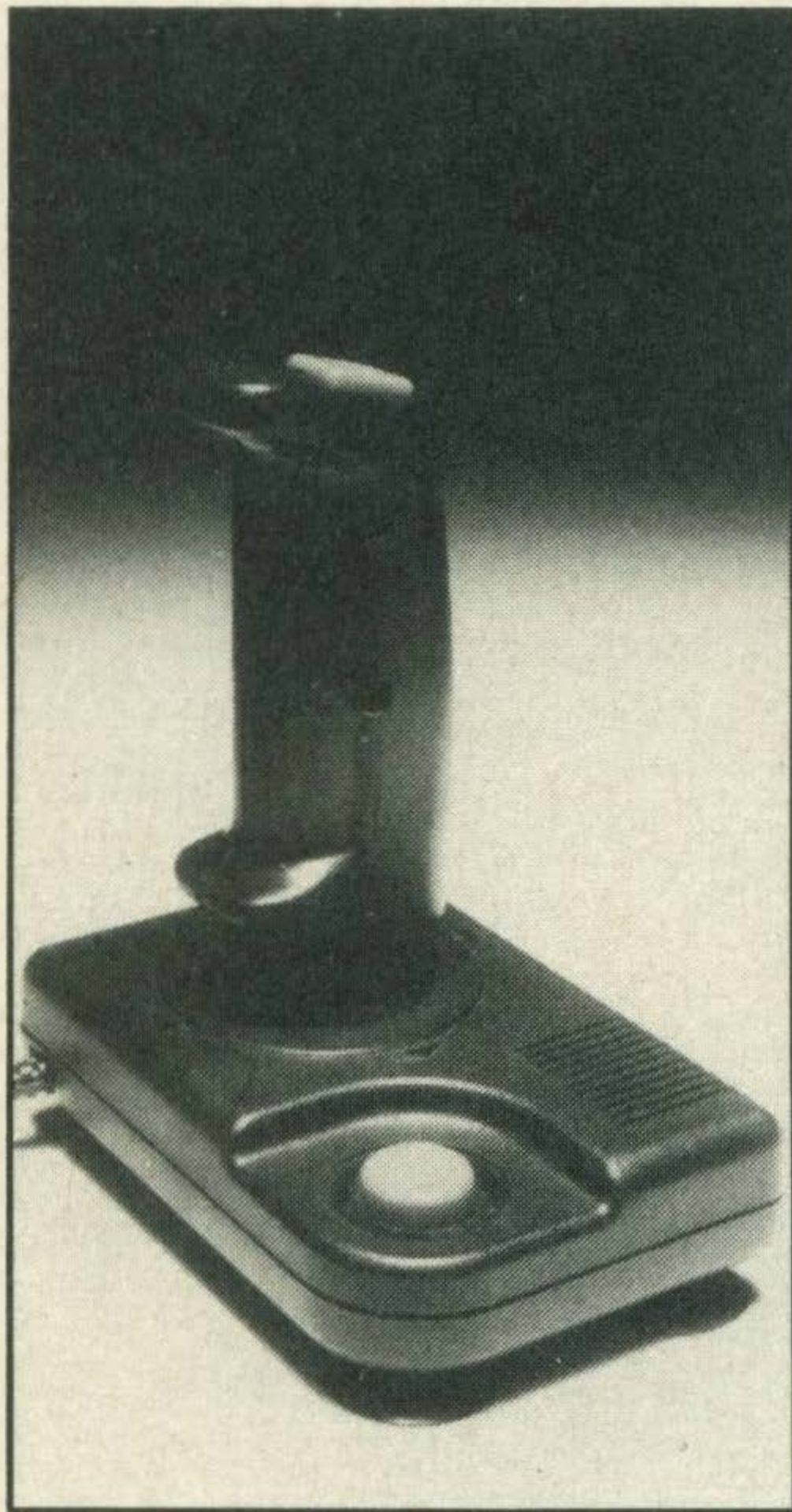
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The original JY102 joystick

Lightning revamps joystick

Lightning has released an enhanced model of its popular JY102 joystick.

Known as the Lightning Deluxe JY106 and costing £9.95, its special features include twin firing buttons as well as an additional automatic firing button.

It also has a longer lead for more user manoeuvrability, with a standard 'D' connector, and is mounted on rubber suction pads for easier one-handed operation. An MSX adapter is included.

According to Loretta Cohen, the company's home computer director, 'We are delighted with the sales of our original joystick . . . and are looking to this new model to emulate its performance'.

Complaints

Anyone considering buying Ranjan Software's *Bonanza* tape should think twice.

We have received several complaints from readers who have bought the tape, found it to be bugged and very poor value for money and haven't received their money back.

You have been warned!

Bag yourself a bargain in the summer sales

Two top high street electrical retailers have slashed the prices of their MSX micros.

Dixons has cut the price of the Sony Hit Bit to £149.99 and Toshiba's HX-10 is selling for a mere £99!

Hot on Dixons' heels with its reductions is Comet with Canon at £149.99 and the Sony and Sanyo models for £179.

If you live in Gerrards Cross, OCP is selling the Sanyo for £140 and a 48K Mitsubishi for £115.

By shopping around you can pick up some real bargains. Mitsubishi is also offering a good deal in the form of a £50 trade-in.

Just take your old computer (whatever the make or model) or video

games machine along to your local dealer and he'll allow you £50 off Mitsubishi's ML-F48 or ML-F80 home micros.

The company's Mike Gardiner says the aim of the promotion is to 'generate more interest in MSX and matches the strong competition from other manufacturers'.

It sounds like a good offer, especially as the company is still offering its free starter pack of six games (worth £45), an operating instruction manual and BASIC language handbook with both machines.

Mitsubishi's MSX micros normally retail for around £219 and £275 respectively and are available from any Mitsubishi dealer.



Trade in your old micro for £50 off a Mitsubishi

Microsoft appoints MSX man

In an apparent effort to provide more support for software houses and dealers — and to show the strength of its plans for MSX in the UK and Europe — Microsoft (UK) has appointed a European MSX general manager.

Tom Sato — whose name should be familiar to anyone who has been reading *MSX Computing* since last year — is the first full-time MSX person to be taken on by Microsoft. Some may say it's none too soon, judging by the poor performance of MSX in the UK to date.

Sato's priorities are to sell

MSX licences both at home and abroad, support software houses as much as possible (including the supply of technical documents) and to provide a regular newsletter for dealers and distributors to keep them up to date with the latest developments.

One of Sato's first tasks will be to sort out the generic MSX stand at the PCW Show in September. It looks like Sony, Mitsubishi, JVC and Toshiba are getting together there, with Sanyo running its own separate stand in order to include its up-market business micros too.

Solving the software shortage

Having problems getting hold of software and peripherals for your MSX? The Midland Computer Library may be able to help you out.

The library's managing director has decided to expand the company and start selling disk drives, printers, assorted peripherals and more software.

'We've been having a devil of a job tracking down software to keep the library stocked. There's not enough distributors handling MSX and if we're having problems then so are many of the home computer users.'

Jones expects to carry a wide range of products by the end of July, so if you've still not got hold of that game you were after it could be worth your while investing in a phone call.

For more information telephone (0905) 611027.

User groups on the increase

MSX user groups seem to be thriving — we've just located another one recently set up in Nottinghamshire.

Called the MSX Club, it has been set up by Lee Simpson with the help of the Association of Computer Clubs.

Lee reckons that although there are at least three other user groups in the UK there's still room for another one. He also says that, 'MSX needs the back-up of user groups just like other micros,' and we'd go along with that.

Membership costs £3 for the first year and £1 for each year afterwards. So if you've not yet joined a group and would like more information send a stamped addressed envelope to Lee Simpson, 3 Mayfair Place, Tuxford, near Newark, Nottinghamshire NG22 0JD.

Joint export venture

Microlink has teamed up with international micro exporters Quad House Computers to market its products in South America and Western Europe.

Mick Chick, Microlink's managing director, tells us, 'We've got the goods and Quad House has the contacts. Initially we're interested in exporting the Mitsumi quick disks and our JP range of printers.'

However he also indicates that more products including some business software would be taken onboard once plans have been finalised.

Mud, mud, glorious mud

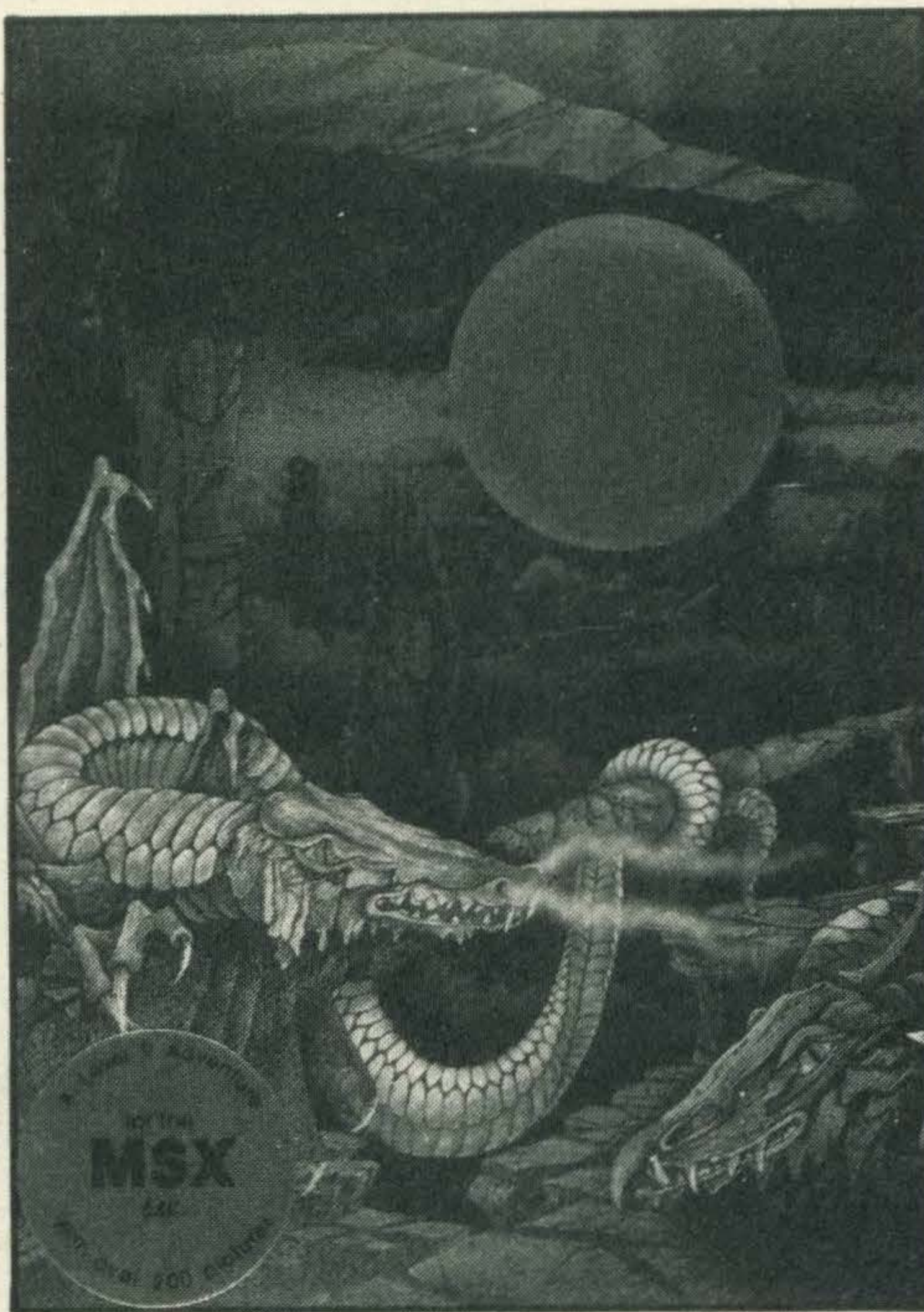
British Telecom will be launching its own version of Essex University's popular Multi-User Dungeon adventure at the PCW Show in September.

The British Telecom version will have more locations and objects, with up to 100 or more simultaneous players.

Anyone with a computer, a phone line and a modem (300/300, 1200/75 baud) can join in the fun. But you're also going to need a MUD starter pack (£20) and to open an account with BT.

Further details on 01-379 6755.

Red Moon



Level 9 Computing

Myths, magic and monsters from Level 9

The much vaunted *Red Moon*, Level 9's first 'magical' adventure, has finally been released.

It's a combined text and graphics adventure. For £6.95 you can be whisked back to the days when 'MAGIK' still worked and mythical monsters guarded the treasure.

Armed only with your

wits and a handful of spells you must recover the Moon Crystal.

Level 9 is also adding the finishing touches to *The Worm in Paradise*, a political science fiction adventure that takes place 100 years after its famous jungle adventure *Return to Eden*. Look out for our reviews in forthcoming issues.

UPDATE

Keeping floppy disks safe

Keeping micro floppy disks safe and well-protected is a problem that has prompted Conway Computer Services to add a micro-diskette box to its product range.

The MD-60T is a lockable diskette storage box that can hold up to 60 3½-inch micro floppy disks.

It costs £18, is made from injection moulded anti-static plastic and comes complete with colour coded indexes, five dividers and two keys.

Further details of this product are available from Conway Computer Services, 39 Conway Road, London N15 3BB.

Tearing off a strip

At long last someone's come up with a solution to the problem of tearing the strips off the sides of computer print outs.

A company called ACS has developed a simple gadget called Easystrip. It has a cutter blade that clamps over the paper's margin and a series of pegs to hold the sprocket holes — all you have to do is pull! It's dead easy to operate and costs only £9.95.

Further details from ACS, Bowmaker House, Etruria Road, Hamlet, Stoke-on-Trent ST1 5NH.

Budget joysticks range from Spectravideo



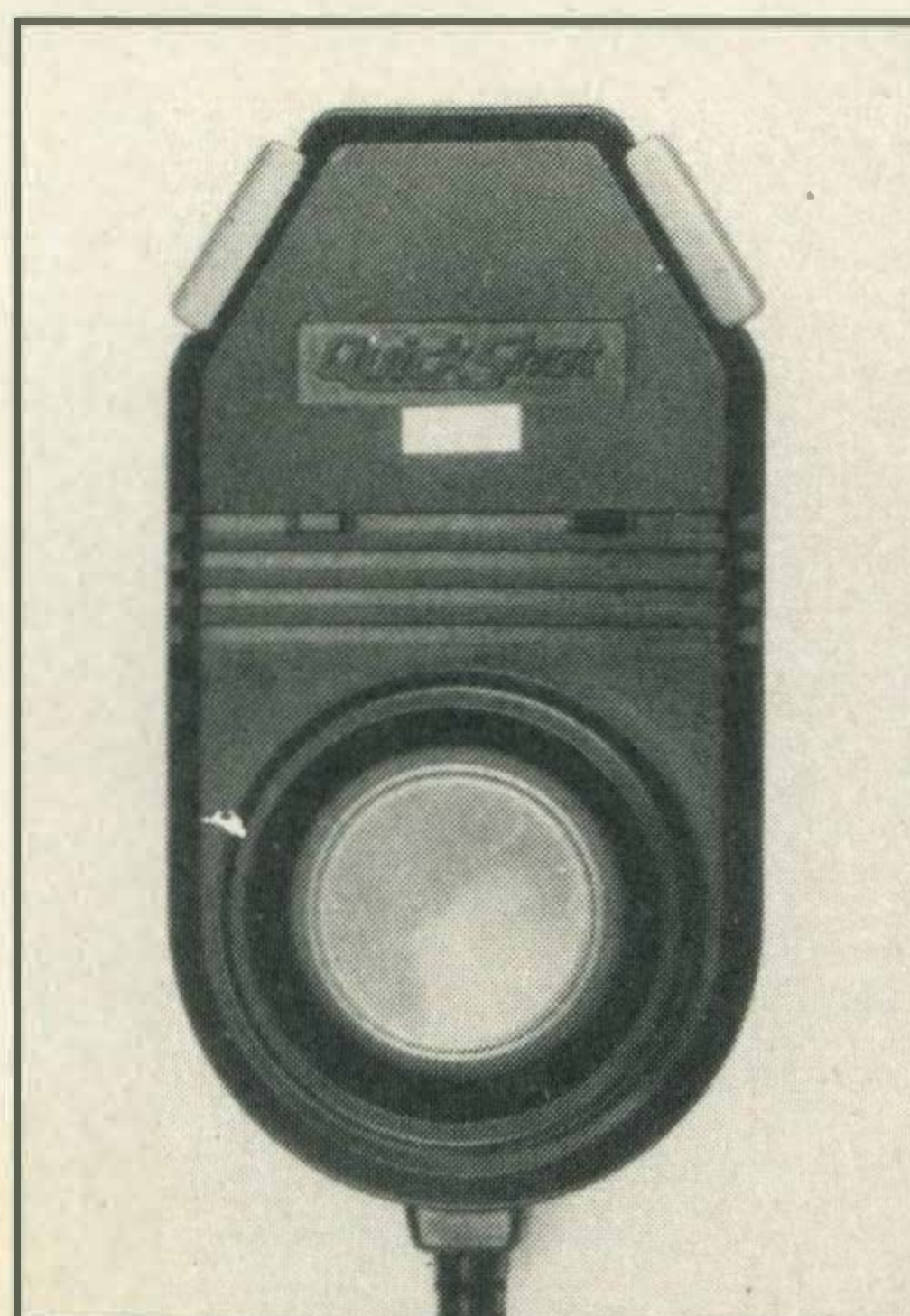
The SVI-101 at £7.95...

Trigger happy and budget conscious alien zappers are well catered for with the latest Spectravideo joysticks.

The SVI-101 has just been released at the extremely modest price of £7.95. Features include a contoured hand grip, two fire buttons and four suction pads for stability.

A deluxe joycard controller is how Spectravideo describes its Quickshot VII. For £12.95 you get two firing buttons mounted on the sides of the joycard and a central pad for controlling the action.

The SVI-101 is available now, the joycard in August.



... and the Quickshot VII at £12.95

Wizards Lair

Adventure fans will be delighted to learn that *Wizards Lair* is going to be converted for MSX in the early autumn.

Bubble Bus' Ann Lovejoy tells us, 'Wizards Lair has been very successful on the Spectrum and should do just as well on MSX.'

Conversions are also underway for Amstrad and Commodore machines. Although prices haven't been finalised the MSX version is expected to sell for £7.95.

Champion — the Wico joystick

The Champion is the latest addition to CGL's popular range of Wico joysticks.

Costing £11.99 the Champion has been designated a 'budget hand control' and is at the lower end of the range as opposed to the up-market Bat handler which costs £25.

Special features include a contoured hand grip, built-in auto fire and two fast fire action fire buttons. And on its base there are suction caps for greater stability and interchangeable rubber feet.

Like the rest of the joysticks in the range the Champion can only be used with your MSX if you have an MSX interface cable (£4.99) that converts all Wico products and standard 'D' plug hand controls for use with MSX.

Axis goes under — poor MSX sales blamed

Axis, the retailer marketing organisation set up to coincide with the launch of MSX, has ceased trading.

The company was launched just over a year ago and offered independent retailers the benefits of national advertising.

Initially the company hoped to have over 100 member retailers by the end of the year but when the company decided to close it only had 18, with 49 outlets between them.

Axis' founder Danny Churchill (ex-Sanyo sales and marketing director) believes that the company's misfortune is the result of poor MSX sales. His partner John

Bartlett tells us, 'We spent over £200,000 on a marketing campaign . . . MSX was not as successful as we had hoped.' He adds: 'Unfortunately we just couldn't get enough dealers, but we're still convinced that MSX is a good product.'

One of Axis' members, Roy Allen, who is general manager of Tavistock Hi-Fi, told us, 'Danny Churchill received plenty of support from manufacturers and dealers like ourselves — it's a pity there weren't more of us.'

Axis as a company will still operate under partner John Bartlett, as Churchill is rumoured to have rejoined Sanyo.



007 games on its way

The latest James Bond movie, *A View to a Kill*, looks set to be available on MSX by the early autumn.

Domark has already produced the game on cassette for the Commodore and Spectrum with a version for the Enterprise underway.

Triton makes its debut

British electronics manufacturer Radofin has made its entry into the MSX market with a quick disk.

Called the Triton Quick Disk, it costs £119.95 and uses 2.8-inch floppy disks with a loading time between two and eight seconds.

The company has also brought out versions for the Commodore 64, Spectrum and Dragon.

Radofin's Gary Leboff says there are no plans to sell the drives through retailers until the autumn.

Earlier in the year the company was rumoured to have a 64K MSX micro, also called the Triton, and to have taken on the Spanish company Eurohard to handle the marketing. As yet the micro hasn't been released and according to Leboff there are no immediate plans for a launch in the UK — although it is on sale in Holland.

For further details on the quick disk contact Radofin Electronics, Hyde House, The Hyde, London NW9 6LG.



Dennison's dust buster kit

Greasy fingerprints and dust can plague the screens of most monitors and televisions, but Dennison Manufacturing reckons it has the answers.

The company has expanded its Elephant range of products to include a do-it-yourself cleaning kit. For £19.50 you can buy a kit that includes a CRT screen cleaner for removing grubby finger marks, a solution for getting rid of static charges and a pack of 50 lint-free cleaning cloths.

A spokesman for the company told us that air vents on monitors need to be cleaned regularly to prevent heat build up (that goes for micros too) and keyboards can short circuit if dust builds up during periods of high humidity. Sounds like sense to us.

For more information contact Dennison Manufacturing, Colonial Way, Watford, Herts WD2 4JY, telephone (0923) 41244.

Canon's low cost thermal printer

A serial thermal dot matrix printer for under £150 is the latest computer peripheral from Canon.

The T-22A, which costs £149, can be connected to any MSX micro for data printout and performs a variety of tasks.

Features include a print speed of 56 characters per second (standard character size) and 62cps (using condensed character mode), and it has a one line print buffer.

Single and double density graphics modes are available for the transfer of high resolution graphics onto paper.

The T-22A weighs a lightweight 3kg, measures 312 x 220 x 89mm, (not much bigger than a standard telephone directory) and is available from mid-July.



Micro Peripherals breaks price barrier

Micro Peripherals has come up with a low-cost MSX compatible printer aimed at home users who need to keep a tight rein on their wallets.

Costing only £79 the CRP40 has a Centronics

interface, prints in colours with a choice of 40 or 80 column printing. It uses 4½ inch paper and is suitable for plotting graphs, charts or pictures as well as for listing programs. Both

mains or battery operation is possible.

Further details can be obtained from Micro Peripherals, Intec Unit 3 Hassocks Wood, Wade Road, Basingstoke, Hampshire RG24 0NE.



New sources for 3.5 inch diskettes

Disk drive owners will be pleased to hear that from September 3M is adding 3.5 inch diskettes to its well-known Scotch range of computer media.

The diskettes will be sold in packs of two and five, the two-pack price being around £5 for single sided disks and

£6 for the double sided.

Product manager Nigel Allsop told us, 'The Scotch diskettes are covered by the same guarantee as 3M brand diskettes.'

The Scotch line-up will also include computer cassettes in a choice of three lengths for 60 pence.

Fuji Photo Film is also cashing in on the floppy disk market with the introduction of 3.5 inch floppies in a choice of three colours with prices ranging from £3.09 for a pack of 10 single sided/double density disks to £5.10 for double sided/double density diskettes.

Msx'r on the move already

Since the July issue of *MSX Computing* went to press, we've heard that MSX'r has changed its address.

If you're eager to keep up-to-date with developments on the MSX front, stamped addressed envelopes should now be addressed to MSX'r, 161 Nunts Lane, Holbrook, Coventry CV6 4GJ.

While we're on the subject of user groups, if you belong to the Lancashire based MSX User Group a 10 per cent discount on software is yours for the asking. Bubble Bus, Llamasoft, Shine Crest Products and Oxford Computer Supplies are just some of the companies offering reductions. Contact the MSX User Group for further details of current offers. When ordering your software, don't forget to quote your membership number!

At a loose end

I have to first compliment your magazine on its first class layout and readability etc. Now down to business. Having read with interest your articles on the inner workings of the MSX Z80 CPU and assembly language routines, I wondered if it is at all possible for you to print full length machine code programs in your *Get Typing* section. I am itching to get typing on my newly purchased *Zen* assembler, and as I am relatively new to the art of machine code programming I am at a loose end with nothing of reasonable interest to type in.

After all, BASIC is the Z80's second language.

Martyn Wright
Newcastle Under Lyme
Staffordshire

We'd love to print machine code or assembler programs — as soon as people start sending them in. But we would stress that any such submissions would need extensive documentation, just to make sure there are no mistakes — a machine code program can be horrible to de-bug.

In a flash

I have recently purchased *Sorcery* for MSX. I am unable to load this program and I am very disappointed. I sent this tape back. Virgin tested it and they were able to load it.

I assume the fault is either with my Ferguson computer dedicated cassette recorder Model 3T31 or my Sony Hit Bit home computer. I wonder if you have had any problems loading flash load tapes using this combination. I'm able to load all my other tapes perfectly.

Christopher Rutherford
Hexham
Northumberland

The same old story

For Christmas 1984, I received a Sony MSX Hit Bit computer from my father who bought this machine because, after considerable research, he believed it to be the best buy.

When I found that it was compatible with all MSX computers I thought this was great news and hoped that meant that there would be a wider range of software on the market.

I realise that MSX computers are fairly new and it will take some time for the better software to become available but I am becoming impatient. When are we going to get a better and wider range of software?

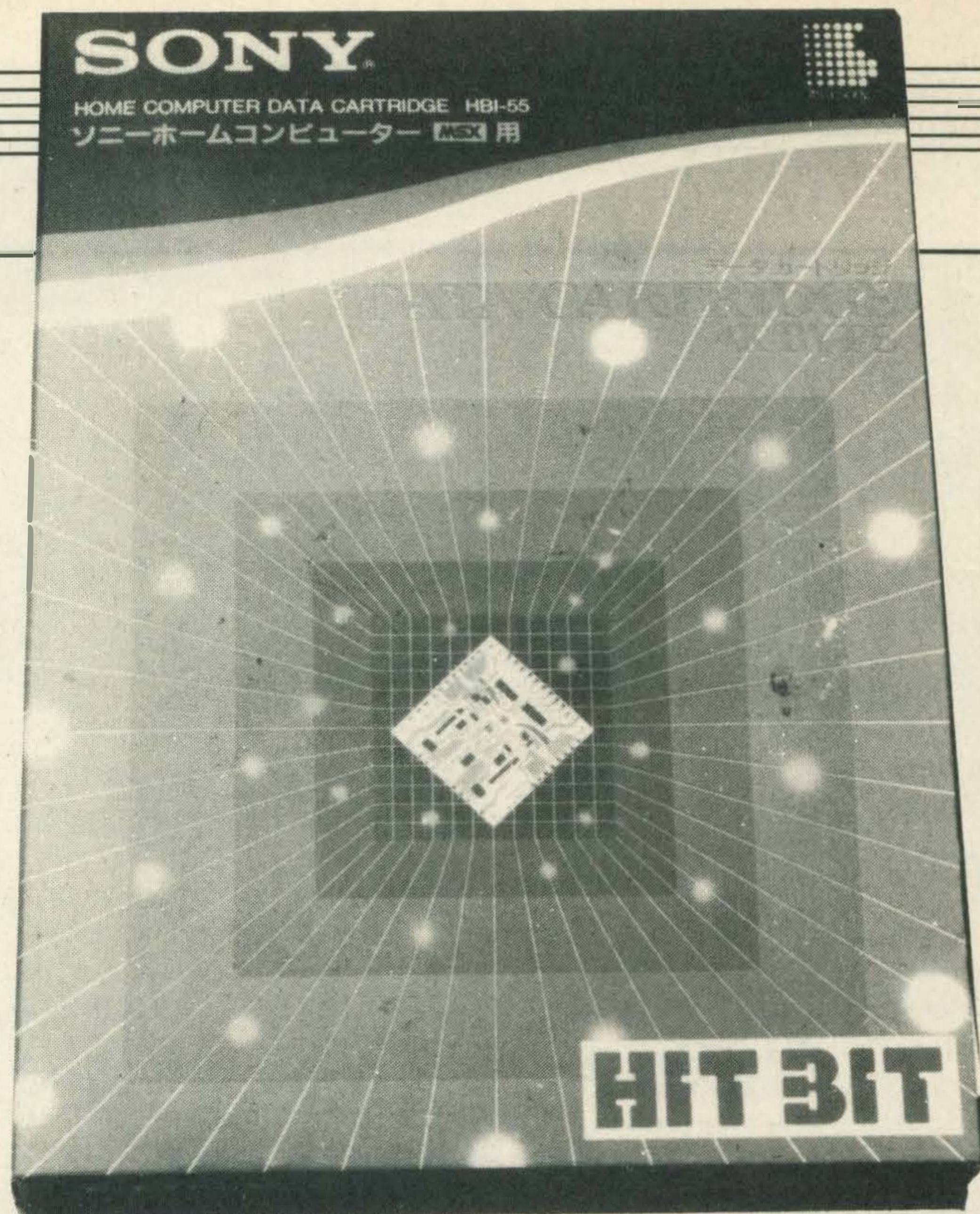
Also why are there more games on the market than educational software? Games may be popular with younger MSX users but they are mere time wasters to me. More educational software would be far more useful, and not just up to 'O' level standard either, but some software to advanced levels. I have just finished taking my 'O' levels so 'O' level software is useless to me now.

Another question which I would like to clear up is about cartridges.

The answer is, yes. Flash loading involves using higher baud rates — that is, the data is sent at a faster rate. Any problems are more likely to be disastrous at these speeds.

Most tapes with flash loading facilities include a normal, slower recording on the reverse side for people who encounter problems. Unfortunately, this doesn't seem to be the case with *Sorcery*.

Ironically, data recorders can cause rather than solve problems with loading. With our Sanyo we often use the normal, analogue setting, rather than the digital setting.



My father enquired about obtaining blank cartridges for my computer but the sales assistant said this was impossible. Is this true? And if so, why? I know you can buy blank cassette tapes for the computer, so why not blank cartridges which would hold more information.

Stacy Marsh
Watford
Herts

It's a familiar story.

Many retailers seem to take the attitude that they won't stock large amounts of MSX software until the system really takes off.

There is some

educational software around, but nothing for the past 'O' level student. The proliferation of games titles is a result of simple economics — games sell.

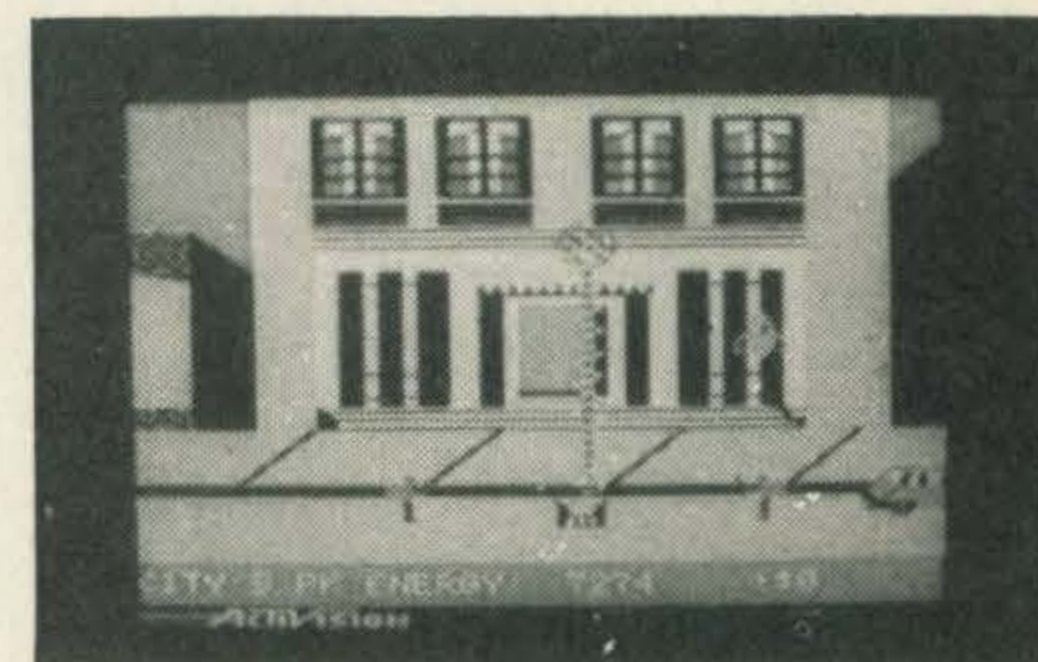
And as for your last point — Sony makes a data cartridge which can be used to store data and, one assumes, programs. But because it needs to be battery backed (to avoid losing the data when the micro's turned off) it's quite expensive — around £40. And it only stores up to 4K. You can get much more on a tape for only a fraction of the price.

Take a tip

I am a subscriber of *MSX Computing* and I think I have a nice surprise for all fans of *Ghostbusters*. When the game starts you have to open a bank account. If you type in the name 'Herbie' and the account-number 64301110 the bank will give you \$203,400 to start your *Ghostbuster* business.

Perhaps you will publish this little trick. With many greetings from Germany.
Michael von Helden
Dusseldorf 12
West Germany

Thanks for the tip, but isn't that . . . well, cheating?



Is it bugged?

After playing Activision's excellent *Ghostbusters* I think I have found a bug. In the level when you have to trap the slimer between the streams, if the slimer disappears before you have a chance to spring the trap, and you fire quickly, afterwards, the column rises and the tornado shape at the top refuses to disappear and



stays there. Is this an error exclusive to my copy or is it a genuine fault?

Mark Fishpool
Newent
Glos

We haven't come across this problem — has anyone else?

What a good idea!

As a regular purchaser of *MSX Computing*, I thought I would write to offer suggestions for improving the magazine.

I feel that if you were to add three pages monthly it would greatly increase the standard of an almost ideal magazine. Firstly the addition of a games chart with the top twenty selling MSX games. Secondly a page for people to send in their own hi-scores on games and finally a tips page containing tips, maps and pokes on various games. I really do think these few extras would add a great deal to the standard of the magazine.

Nick Robinson
Leamington Spa

Why don't you . . .

I agree with the letter from Nick Chamberlain (July issue) that a high score chart would help to improve your already ace magazine. Each month you could give a free piece of software to the best scores. If you decided to do this each entrant would obviously have to have the signature of at least one witness with their address and, preferably, phone number.

Craig Kemp
Rushden
Northants

It's funny you should say that! If you look at the last page of this issue you'll find our first high score table. Hopefully this will grow as readers send their scores in. As for giving away prizes — well, it's certainly a possibility, but, as pointed out, there are problems verifying scores.



Sleepless nights

We are new to computing, and our first computer is a Toshiba HX-10. We are trying to learn BASIC. However, our patience is running out.

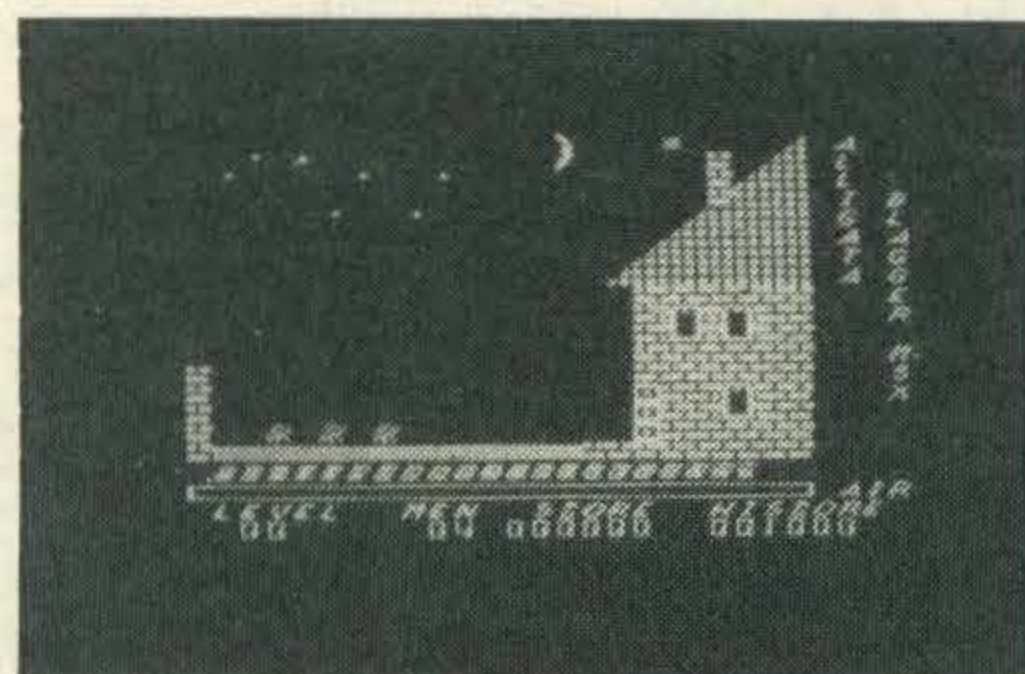
I spent two hours typing in Tim Marke's Typing Tutor program, another hour correcting it, and half the night trying to get it to run. We end up with a 'syntax error' on line 860.

We're looking seriously at the idea of a games chart. But, as you can imagine, it involves a great deal of organisation, and probably isn't worthwhile until the general software availability improves.

As for the tips — if you've got any, send them in. When we get them they tend to go on the letters page. But if enough tips flood in it would be worth creating a special section for them.

Can't get past that screen!

Tempted by your write-up of *Blogger* in the June issue of *MSX Computing*, I purchased a copy and have been frustrated by screen 3, level 2, *The Reactor* ever since. I can see no way to collect the key



at the bottom of the screen, centre right and escape as, unlike all the other floors, this

My son has just typed in *Slalom*, in the May issue, and this stops with an 'Out of data' statement on line 120. I cannot sort out this one either.

As I have said, we are green as far as computers are concerned. Please help.

G Blunt
Launceston

To start with the syntax error in *Touch Typing*.

A comma disappeared from the end of the first line of line 860. So

putting a comma between the second and third double inverted commas should work.

The 'Out of data' problem in *Slalom* is rather more difficult. We can't see a fault, but the type of error you're getting suggests that you've made a mistake in the DATA statements (lines 60-80 and 150-180).

The problem is that you've got too little data to READ, so you've probably missed out one of the 12s or 0s.

one is completely destroyed as Rodger descends. Can you help?

Also, on falling in the bank, Rodger is returned to base along with varying colour floor extensions making it impossible to jump to the safe sometimes. In addition, how can you start at any screen as stated in your magazine?

G D Cleaver
Preston

On the screen in question there's one of the Blogger 'toggle' switches. As you climb up from the start, there's a switch hanging from the ceiling some way along the passage at the top. If you pass (or jump) through this switch, you open up one of the walls of the dead ends, and can therefore escape. Can't help with 'The Bank' though!

To start at any screen, you have to wait for the game to go into 'demo' mode at the beginning. Sometimes a golden key will appear at the bottom left of the screen. Pressing one of the cursor keys will then take you through the screens one by one. Just hit the space bar to begin the game at your chosen level.

Take a tip from an expert

I have a Toshiba HX10 and recently I purchased *Finders Keepers* by Mastertronic. At £1.99 it is great value.

After a few goes I have worked out a few tips:
1) In the slimy lower maze collect the bar of lead and the philosopher's stone. When these two are combined they form a bar of gold which can be traded with Gorden the Trader for £220.
2) To get another part of the castle make your way up to the top of the castle teleport room and stand on the rotating wingnut/corkscrew object.
3) Collect the blacksmith in a room with a view and the broken sword in the lower maze.

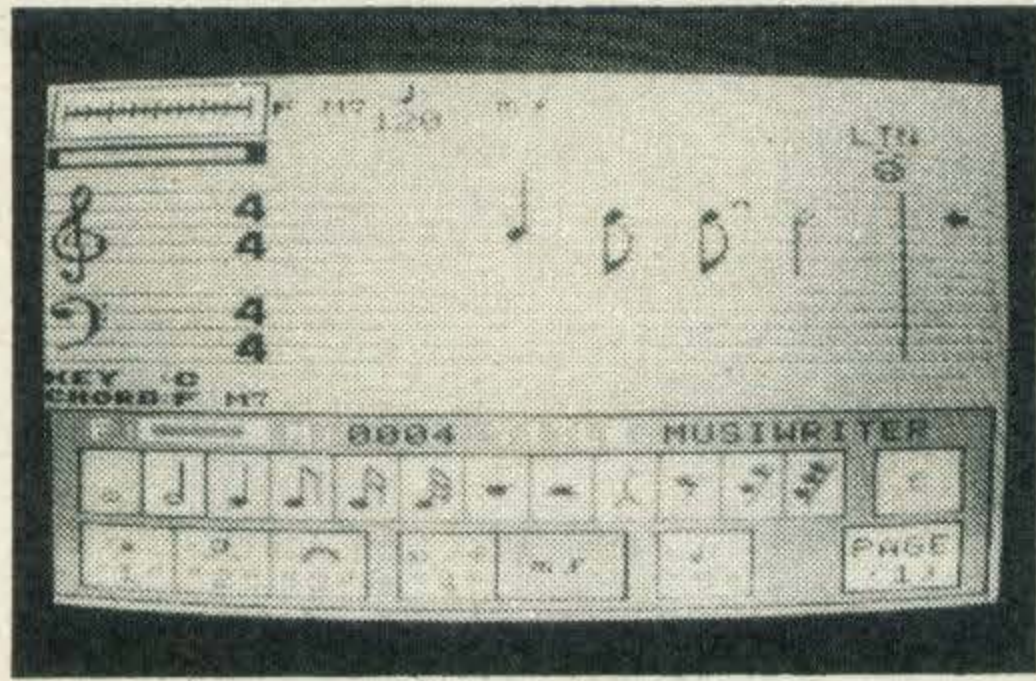
Finally I would like to know if the MSX version of *A View to a Kill* is being converted and when it will be released.

Stephen Walker
West Yorkshire

Other rabid games fans will no doubt find your tips useful. As for *A View to a Kill*, Domark tells us that it will be available sometime in August/September.

PSG Musiwriter™

As reviewed by MSX Computing



- ★ Enjoy composing music with your MSX Computer
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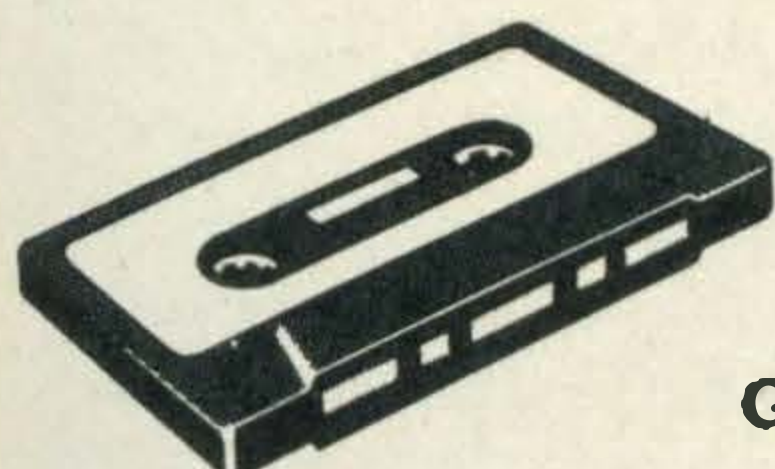
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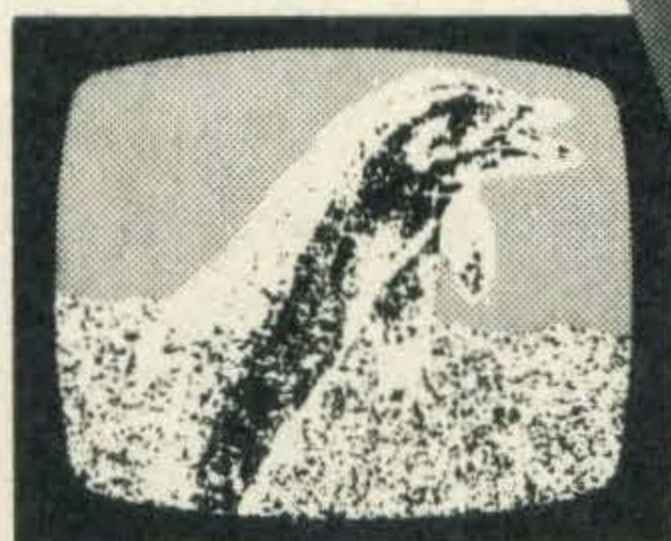
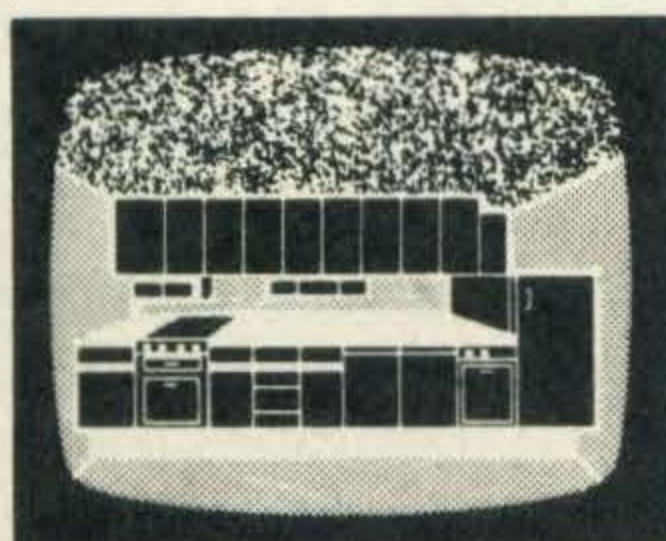
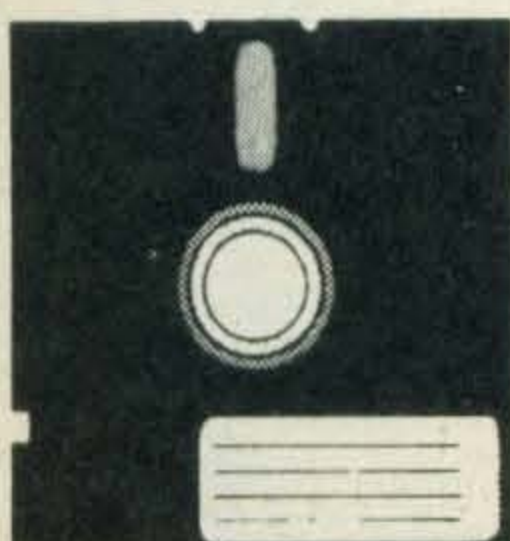
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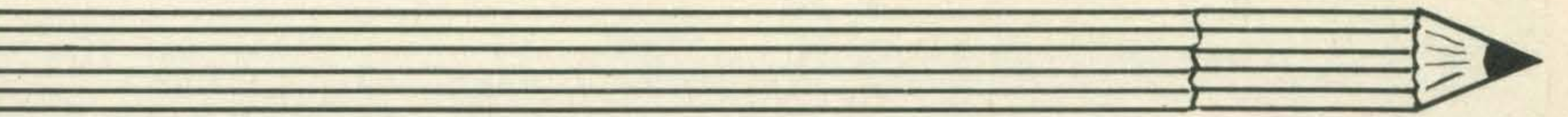
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SPRITE DESIGN

Possibly the most fascinating and rewarding feature of MSX is its graphics. With a range of sixteen colours, sprites, and a host of easily accessible commands, programmers can doodle away to their hearts' content, producing graphs, games and diagrams and the like.

But what of the non-programmer? For the casual artist wishing to dash off a masterpiece, the computer proves to be a formidable opponent to artistic expression. What is needed, and what few programs supply, is a natural means of drawing pictures which does not require the user to be too intimate with BASIC programming.

Sprite definition is a task which was sent to try even the most dedicated programmer. Somehow, you have to visualise a series of 1s and 0s in DATA statements as a sprite. This is just about possible with 8x8 sprites, but 16x16 sprites defeat most mortals, no matter how good their imagination. More often than not, you are forced to use that good old standby, the pencil and paper, to plan your sprite.

Don't get steamed up about sprites — read our review of two new graphics packages

There are all too few pieces of software around which address the problems of graphics and sprite design. Sanyo's light-pen system has an excellent drawing system built in. Unfortunately, to get it, you have to buy the light-pen — not an inconsiderable purchase at around £90. In addition, it lacks a sprite designer.

The Electric Studio's *Sprite Editor* may be of interest to owners of the Sanyo system, mainly because it is one of very few software items to offer light-pen support. As its name suggests, this software is designed to simplify the creation and manipulation of sprites, which you can then incorporate into your own programs with a simple BASIC loading routine.

There are two versions of the program supplied on tape, one of which is for use with the light-pen. If you load the light-pen version, before using the package, you must first

calibrate the pen by pressing it against a white dot in the centre of the screen.

LOAD "EDITOR" will load the standard editor, with cursor control provided by the joystick.

If you don't have a joystick or light-pen, then forget it — the software doesn't provide for the use of cursor keys. As this software is, for the most part, written in BASIC with a couple of machine code routines, if you're desperate and know what you're doing, you can alter the program once loaded. Still, assuming that everybody has a joystick is a major oversight. You have been warned. . .

Once up and running, you are presented with a 16x16 grid and a series of options. Some of these are *icons*, which is simply a way of showing a command option in graphical form, rather than using words.

You select the option you want by first pointing to it then

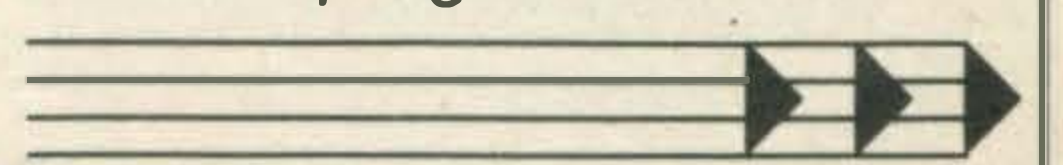
pressing the trigger button. The options that are used most are the pencil and eraser, for filling and erasing grid elements. The whole grid may be erased using another option.

The *view* option allows you to take a look at the sprite every once in a while just to see how it's shaping up.

The more interesting options allow you to mirror, invert and animate the current sprite. *Mirror* reverses the pattern about its centre — from left to right. *Invert* will invert the status of each grid element; those that are on are turned off and vice versa.

Animate is an extremely neat feature, and is indicated with the very appropriate movie camera icon. You are prompted to submit up to 10 sprite pattern numbers for animation. The sequence of sprite patterns is then displayed one after the other.

With this technique it is not difficult to set up sequences of a man running, aliens waving their legs, of whatever else takes your fancy. For added realism, you may move the entire animated sequence left or right to see how it might look in a program. The final



commands are used to COPY, EDIT, SAVE and LOAD sprite patterns.

The package, with some reservations, is relatively straightforward in use. One aspect which is continually irritating, and not at all reassuring, is the screen blanking which accompanies some functions.

To be fair, the designers do warn you that this occurs, but at times it seems totally unnecessary. Why, for example, does the whole screen have to be erased then redrawn, just to erase the grid elements?

This package is designed to edit 16×16 sprites only, which begs the question: what about the poor old 8×8 sprites? The designers don't acknowledge this sprite size, as is clear from the blurb on the back of the box, which claims that you may design 'up to the maximum 64 sprites allowed by the MSX'.

In fact, a maximum of 32 sprites are allowed on screen at one time. However, up to 256 patterns are allowed for MSX sprites, albeit of the ignored 8×8 variety. So the package should really go under the title of *16×16 Sprite Editor*.

It's a shame that these points should tarnish a piece of software that looks good in so many ways, from packaging down to the screen appearance and use of icons. It gives the impression that it is too expensive for what it offers — you might reasonably expect to pay two pounds less.

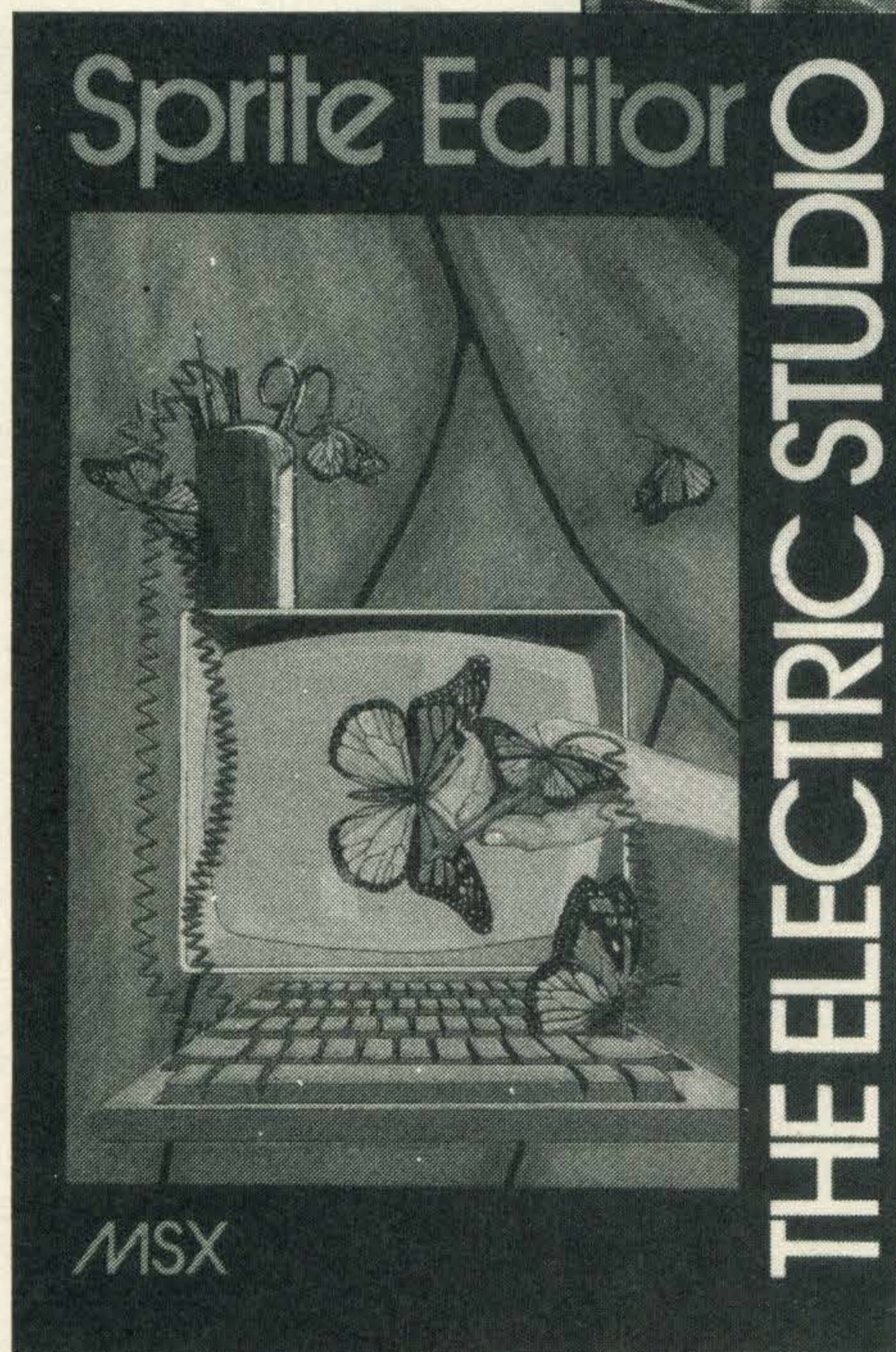
Kuma's *Colour Fantasia* is more aligned to the budding Van Gogh, as its principal offering is a drawing package. It also provides a sprite editor, character editor, a demo program and the promise of 'more than 105 additional colours'.

All things to all men it seems. This is what makes this package very difficult to classify. It is a jack of all trades, and, after you've used it a while, very obviously master of none.

Proceeding logically through the package, you start with an opening demo and title screens, followed by the

SPRITE DESIGN

Kuma's package includes drawing, sprite and character editing facilities



Sprite Editor is particularly useful for Sanyo light pen owners

demonstration menu, the title line of which is displayed accompanied by rather nauseating and quite unnecessary sounds.

You may run through all the demonstrations automatically, or run one at a time. These range from the unimpressive sprites demo, to the interesting possibility of 3-D simulation. Owners of 3-D specs (with one red and one green lens), will probably get more out of this section, as the block letters will appear to leap out of the screen to meet them.

The additional colours

promised are created by the optical illusion of colour mixing. Dots of two different colours are placed in close proximity, so creating various hues of the 15 principal MSX colours.

The editing option, which rejoices in the title *Shapely Design*, allows the creation of sprite libraries and character fonts. These are much simpler in the range of commands they offer than *Sprite Editor*.

You may set or reset a grid element using P or U respectively. Keeping tabs on the progress of your new

character or sprite's shape is carried out with the command A — for assemble. The definition data may be saved to tape for later recall by another menu option.

You have to define both characters and 8×8 sprites in groups of four at a time. For example, if you wish to create four 8×8 sprites, the 16×16 grid must be imagined as a group of four 8×8 grids. It's not a particularly nice way of getting things done — I would have preferred to see only one grid for each sprite I was to design.

The major part of *Colour Fantasia* is the drawing program called *Canvas*. There are two modes of operation — the 32 × 24 text mode, and the high resolution graphics mode.

The former is not that remarkable, offering mainly text screen design, with the ability to load user defined character fonts.

The hi-res mode is the one that most users will make a bee-line to. What worries us is the instruction sheet's introduction to the high resolution section.

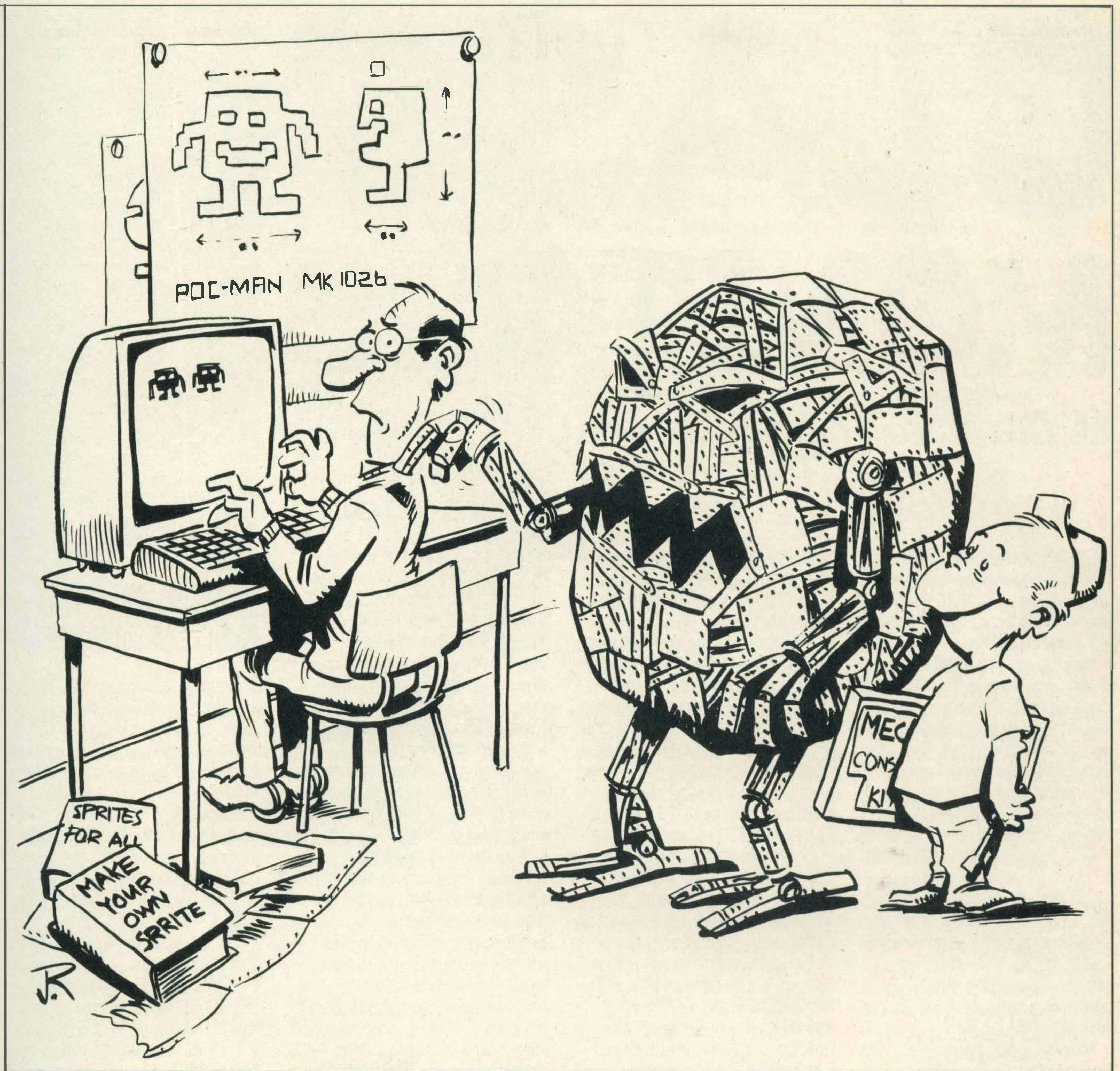
'The MSX microcomputer uses a video (graphics) chip that *fails to produce versatile hi-resolution graphics*' (the italics are ours). This is quite at odds with the sales pitch on the cassette cover — 'Explore the spectacular graphics capabilities of the MSX computers'.

If the hi-res features of MSX are supposedly so bad, we can see no reason to spend £9.95 to have it proved to us.

As for the drawing package itself, there are all the commands and options that you would expect in a graphics package — circles, lines, boxes, and so on, plus the ability to add text. These are clumsily selected by function keys, or eminently forgettable CTRL keys — would you have guessed that CTRL-L meant plot?

Not all of the screen is available to be drawn on: the top and bottom 255×8 blocks are used up by status information on colour and the screen mode.

The cursor is a ludicrous white dot which can be



extremely difficult to see, and, astonishingly, it is not a sprite. It starts off in the top-left, a position where it 'may not be visible' as the instructions inform us. If it may be invisible, then why put it there to begin with?

Diagonal line drawing while plotting is not possible — the designer seems to have overlooked the fact that the cursor keys may return one of 8 directions, not just the four that *Fantasia* seems to respect. As a result, lines that are plotted are invariably jagged.

Screen designs may of course be LOADED and

PRICES AND SUPPLIERS

Sprite Editor: £6.95

The Electric Studio,
PO Box 96,
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LU3 2JP
Tel: 0582 595222

SAVED. BASIC program loaders are included on the reverse of the program tape for recall of pictures, sprite and character data.

This package is expensive, and is of a general quality that would suggest it would be better given as a free, 'in-box'

Colour Fantasia: £9.95

Kuma Computers Ltd
12 Horseshoe Park
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Tel: 07357 4335

piece of software, perhaps as a demo program packaged with computers. As a package in its own right, it doesn't really stand up. Spelling mistakes don't help either.

Basically, it tries too hard to cover a large range of graphics applications and

never quite pulls it off.

The best drawing system around is definitely Sanyo's, which *Fantasia* cannot touch in terms of style and ease of use. Hopefully, Sanyo might 'unbundle' this software from the lightpen package, but this seems unlikely at present.

Sprite Editor is a valiant attempt, and with a bit more work could have been a superb little package. As it stands, it is overpriced and under specified.

Of the two software systems, we might be tempted to look at *Sprite Editor* but would leave *Colour Fantasia* well alone.



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It is generally acknowledged among computer buffs that computers and televisions are incompatible.

Not only is the TV display shaky, but even worse there is often a conflict of interests — just as you sit back to enjoy a spot of alien bashing, the Joan Collins fan club bound in, push you aside and settle down to watch the latest show. The result — conflict.

If all this sounds familiar, then it's time to get a computer-dedicated monitor. But where should you start? Monitors come in all shapes and sizes so before parting with any cash you should determine exactly what you intend to use it for.

Monitors can be divided into five rough groups; TV/monitors, monochrome, standard, medium and high resolution monitors.

Monochrome monitors come with green or amber screens and can be picked up for less than a £100. Although

perfect for word processing as they are very easy on the eyes, they are pretty useless for games.

Medium and high resolution monitors give excellent screen displays, and are ideal for word processing and graphics display purposes.

Standard monitors give a good display, but are considered by most to be a waste of money. The reason? For about £30 more, you can buy a TV/monitor which gives two functions for the price of one; a standard monitor (in most cases) and a TV.

We say in most cases because sometimes you can pick up a model with a high resolution facility. Of the TV/monitors reviewed here, the Fidelity CTM 1400 and the Philips CT2007 give a standard display, and the Loewe MCP110KT provides a medium-to-high resolution screen. At present, Loewe's monitor display is the exception rather than the rule.

Before looking at the pros

and cons of each of these monitors, let's first reconcile the apparent paradox of a TV/monitor. How come a TV set, which when used in conjunction with a computer produces a picture in which colours lack contrast, are fuzzy, flicker and are generally a pain in the eye, can suddenly become a computer monitor providing a relatively steady display with well saturated colours?

The answer lies in the tortuous route a signal from an MSX micro has to follow before reaching the TV screen, and the way in which monitors avoid it. Most MSX computers generate a PAL composite video signal (CVBS for short), that incorporates three distinct signals: red, green and blue (RGB) combined with a synchronising signal — Sync. (Both the Sony Hit Bit and the JVC HC-7 can generate RGB signals as well as CVBS).

A TV cannot receive the CVBS signal via its aerial

socket until it has been converted into a radio frequency (RF) signal. Once inside the set, the RF signal is converted back to composite video via an Intermediate Frequency (IF) stage and again back to separate RGB signals. The signals are then used to drive the video amplifiers and finally the tube (see figures 1 and 2).

Small wonder, then, that the resulting picture is awful — all that encoding and decoding takes its toll. Monitors bypass this complicated process and a TV/monitor incorporates the two different types of signal circuitry.

All three monitors reviewed here will accept both RGB and CVBS signals straight from the computer. The result is a much clearer, steadier picture.

Philip's TV/monitor started life as a TV, with necessary monitor conversions made later, but the Fidelity and Loewe models were designed with the two functions in mind. Tubes superior to the TV tube are incorporated into the chassis and include refinements such as SCART (also known as Euro connector sockets).

Despite this, the Fidelity and Philips monitors have more in common than the Loewe

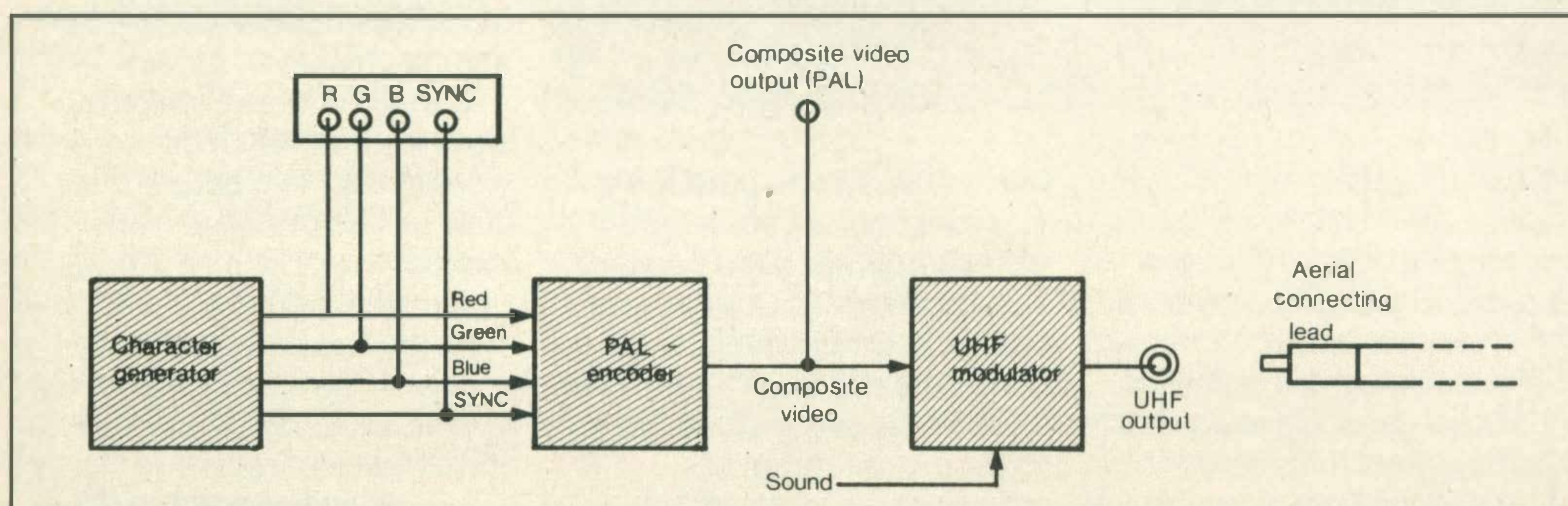
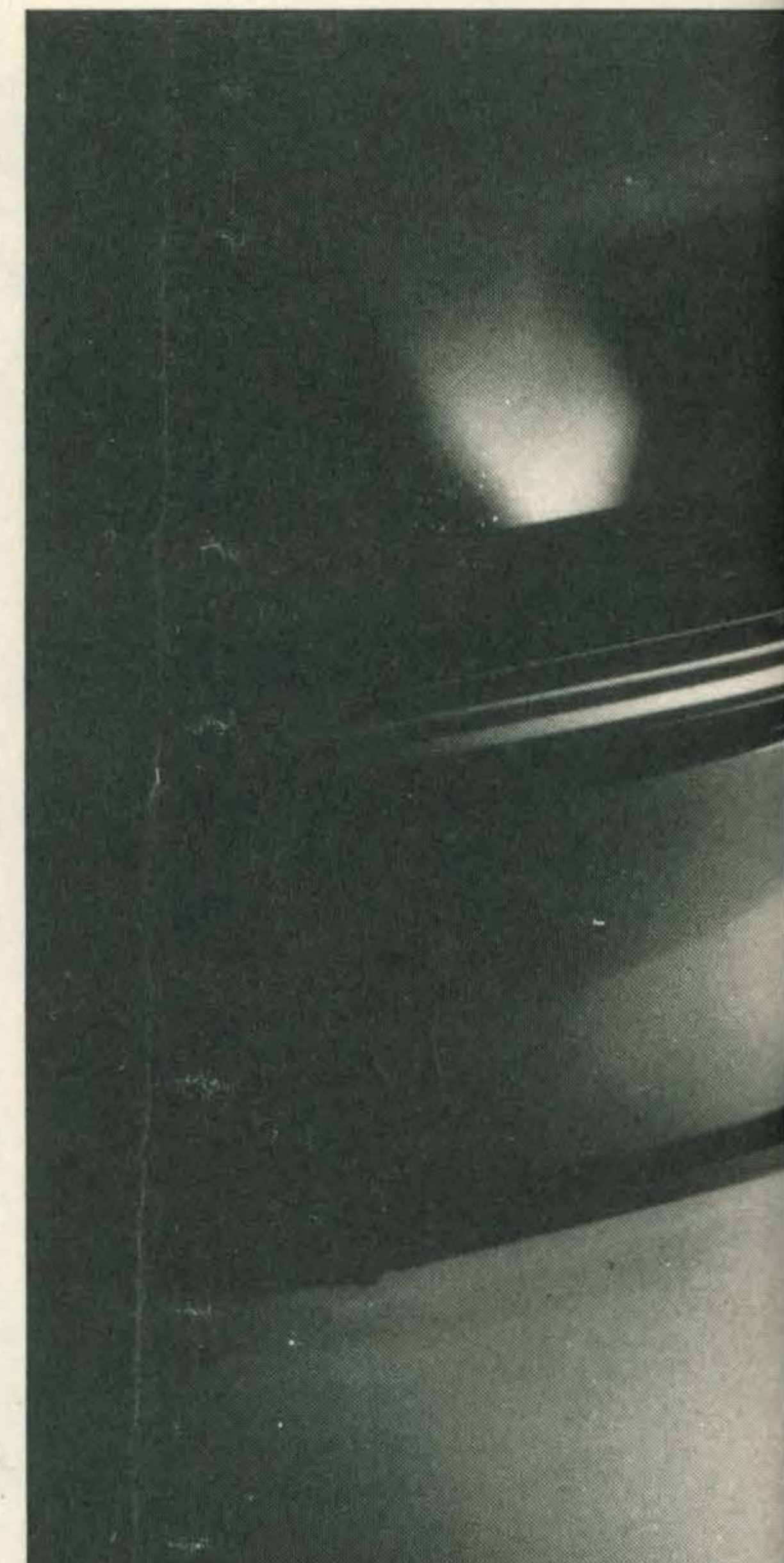
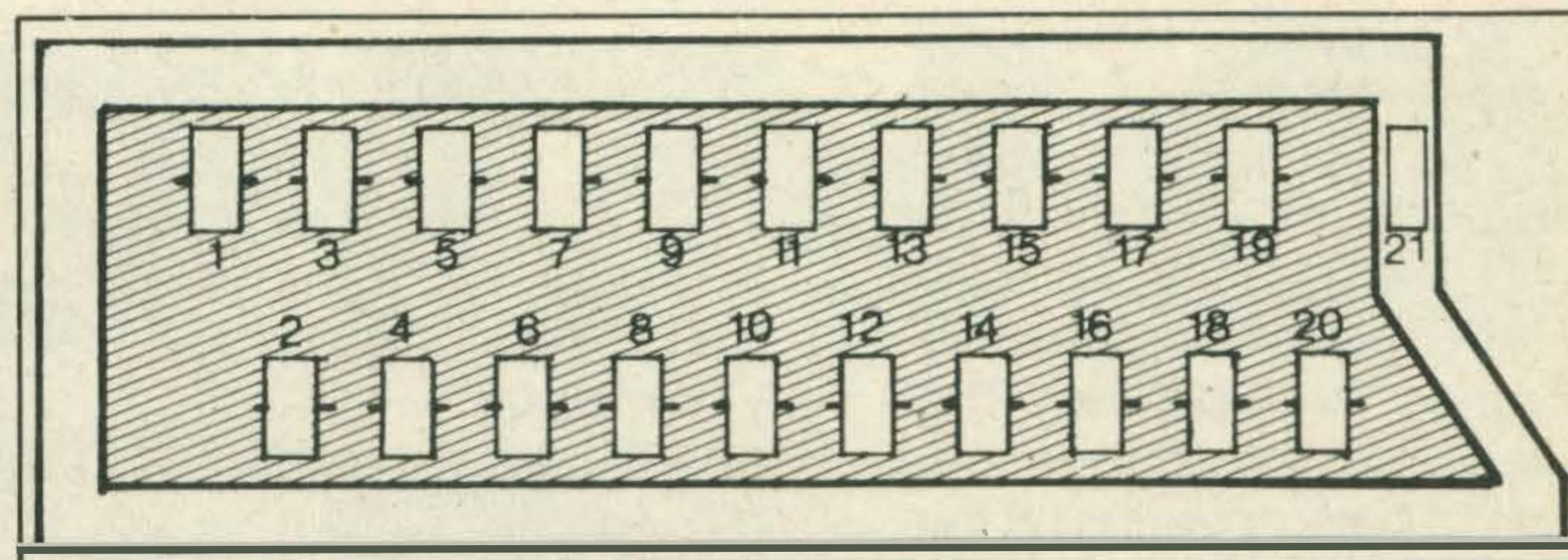
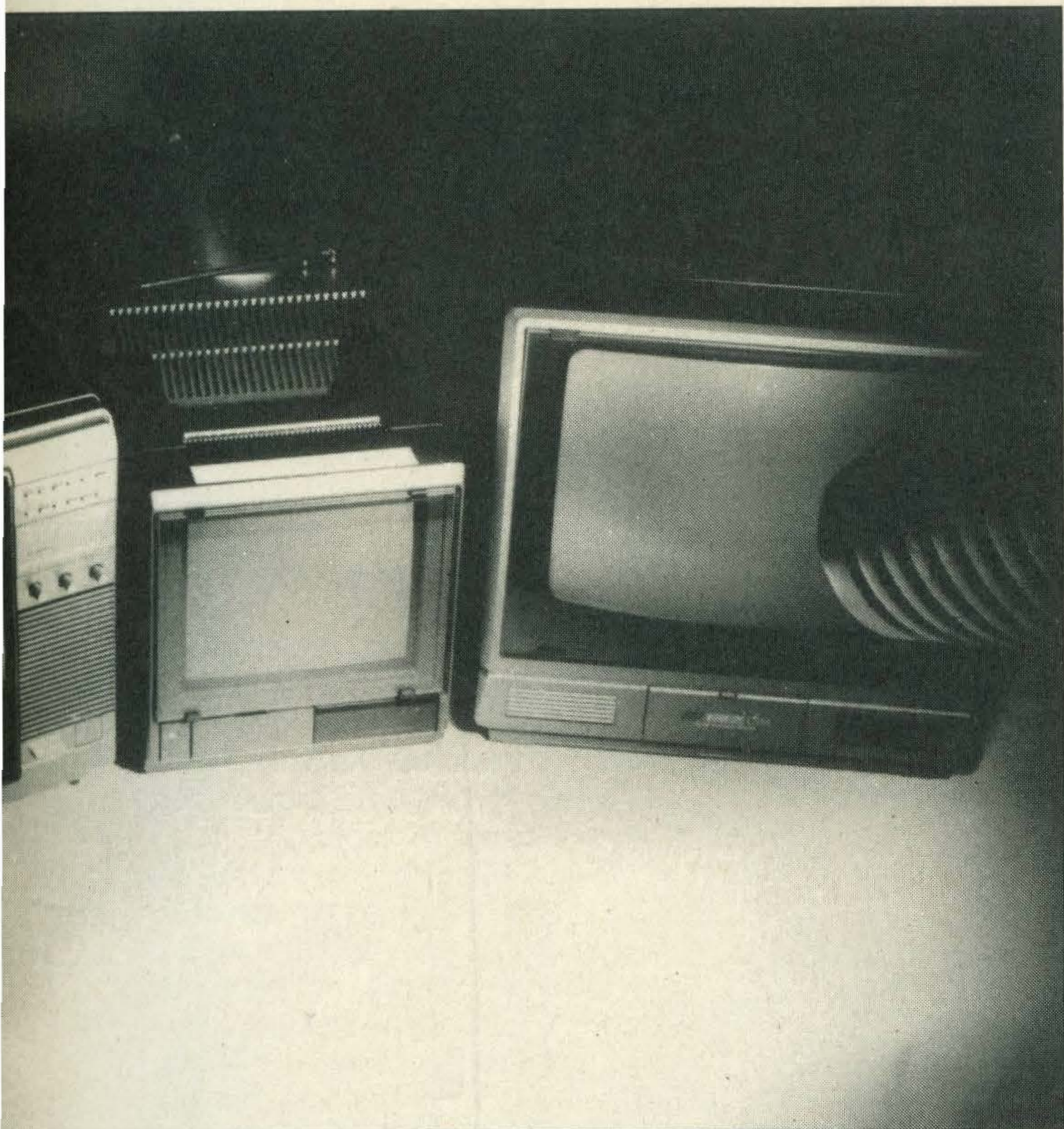


Figure 1: The encoding process in a computer





Pin connections of the SCART socket

- 1 — Audio right out
- 2 — Audio right in
- 3 — Audio left out
- 4 — Audio ground
- 5 — Blue ground
- 6 — Audio left in
- 7 — Blue in
- 8 — Status composite video in
- 9 — Green ground
- 10 — NC
- 11 — Green in
- 12 — NC
- 13 — Red ground
- 14 — NC
- 15 — Red in
- 16 — Blanking
- 17 — Composite video ground
- 18 — Blanking ground
- 19 — Composite video out RGB
- 20 — Composite video in (RGB Sync. in)
- 21 — Shielding pin

then, include a brighter and bigger (more of the display fits into the screen) picture.

Loewe's model is designed to be portable. All three monitors are portables, but the Loewe model is 3kg lighter than the other two and is the only one with a socket enabling it to operate off a 12V battery such as a car battery. This option gives it complete mobility.

Its best feature, of course, is its display. Although 14 inch screens are considered to be best, Loewe's 10 inch screen is, in practice, just as good. Graphics and text take on a new life when displayed on a medium to high screen — a completely still picture with no fuzzing round the edges.

Screen resolution, by the way, refers to the number of pixels (or dots) that can be displayed on one horizontal line of the screen and the pitch

or distance between them. The more pixels across the screen, the higher the resolution and the sharper the display.

A standard resolution display is enough to give a fairly good 40 column display, but isn't suitable for 80 columns. Medium and high resolution displays are perfect for word processing and 80 column work.

Tuning the computer into the Loewe monitor is carried out via a remote control unit together with a station search control and a minute adjustment LED display on the set. Up to 60 channels can be automatically found and stored although the final picture has to be adjusted using the set's fine tuner.

If cable and satellite TV ever become popular, which Vernon doubts as the quality of British TV is so good (!), the set can be adapted with a £300 decoder.

The set's control panel contains contrast, search, storing and fine tuner controls. Everything except the ON/OFF switch is concealed behind a hinged flap. Controls on the remote control unit include channel selectors, volume, colour, brightness, mute and teletext controls. Any adjustments are monitored by the LED.

An RF aerial socket and 21-pin SCART socket are built

model. The latter is in a class of its own and the £380 price tag as opposed to £220 for the Fidelity and £230 for the Philips reflects that.

Loewe MCP 110 KT

Loewe specialises in consumer electronics and originated in Germany about 60 years ago. The company has only just moved into the British market and Tony Vernon, Loewe's sales director, stressed that it only intends to sell its products in specialist consumer electronic shops. 'Loewe is not interested in selling everything off as cheaply as possible,' he emphasized, 'we spend far too much money on R&D

(research and development) getting our products as innovative and sophisticated as possible'.

We were particularly interested in Loewe's 10 inch MCP 110KT because the familiar curved TV tube has been replaced by a flat square tube (FST).

The significance of this is striking if you compare the three monitors' displays. On the Loewe screen the picture appears to be completely flat with no visual distortion. Displays on the other two look like fairground crazy mirrors in comparison. A slight exaggeration maybe, but you get the picture.

Advantages of the FST,

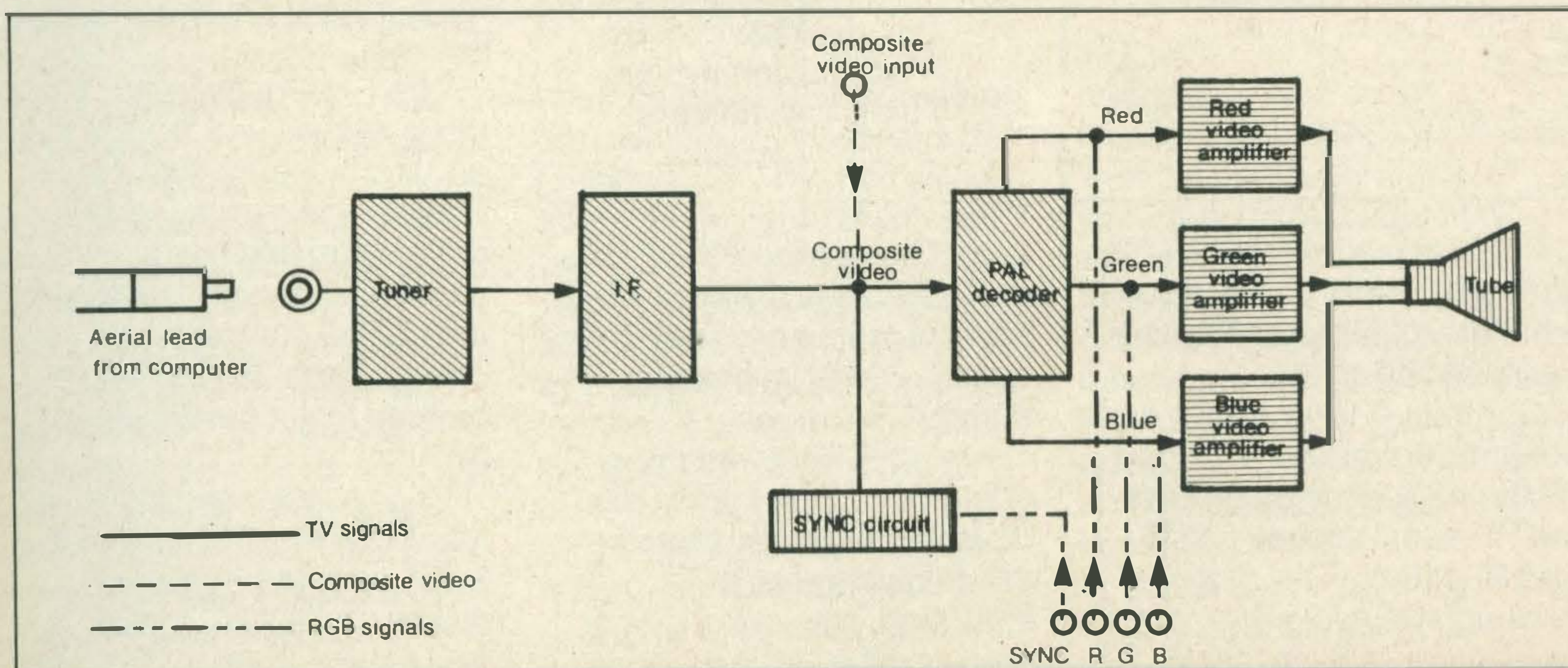
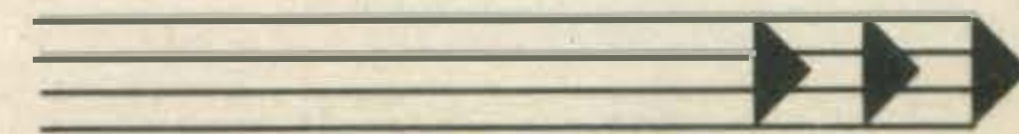


Figure 2: Signal conversion process in a TV/monitor



onto the back of the set. We asked Tim Thomas, Philip's technical product manager for computer monitors, to explain what a SCART socket is.

'The socket originated in France,' he explained. 'The idea was to have one socket on the back covering all the options.'

Apart from covering the computer's audio input/output, CVBS input/output and RGB input needs, the SCART socket enables video and audio cassette recorders, TV games and video cameras to attach to the one socket using different pin combinations (see figure 3).

'One of the advantages of a single SCART socket is that it cuts out the spaghetti syndrome familiar to hi-fi and computer users — lots of wires all doing different things,' Thomas told us.

Funnily enough, although Philips was one of the first companies to show interest in the SCART, cost cutting policies led the company to exclude it from the CT 2007.

Back to the Loewe. Other rear connections include the 12V socket, a DIN 41529 loudspeaker socket and a TV/AV switch. As TV/monitor appearances go, Loewe's set is rather unusual with its greatly elongated back end.

Two 33inch telescopic aerials stick out of the back of the monitor. These operate together with the high gain chassis to utilise even the weakest signals — a good television picture is apparently produced even in poor reception areas.

Decorative grilles cover the set and these, together with the charcoal grey casing, give it a tough business-like look.

Philips CT2007

Philips' TV/monitor is constructed in the familiar upright design.

Situated at one side of the screen are 12 tunable channel buttons. Corresponding tuner knobs are hidden behind a panel flap. A special plastic Philips screwdriver is thoughtfully provided for fine tuning purposes. Colour, brightness, sound controls and the ON/OFF switch are located underneath.

In the looks department, the

MONITOR USES

	Games/ General use	Text/ Business use	Programming
TV/monitor Standard	1	0	0
TV/monitor Med/High Standard Resolution	2	2	2
Medium Resolution High	0	0	0
Resolution Monochrome	2	1	2
	0	2	1
	0	2	2

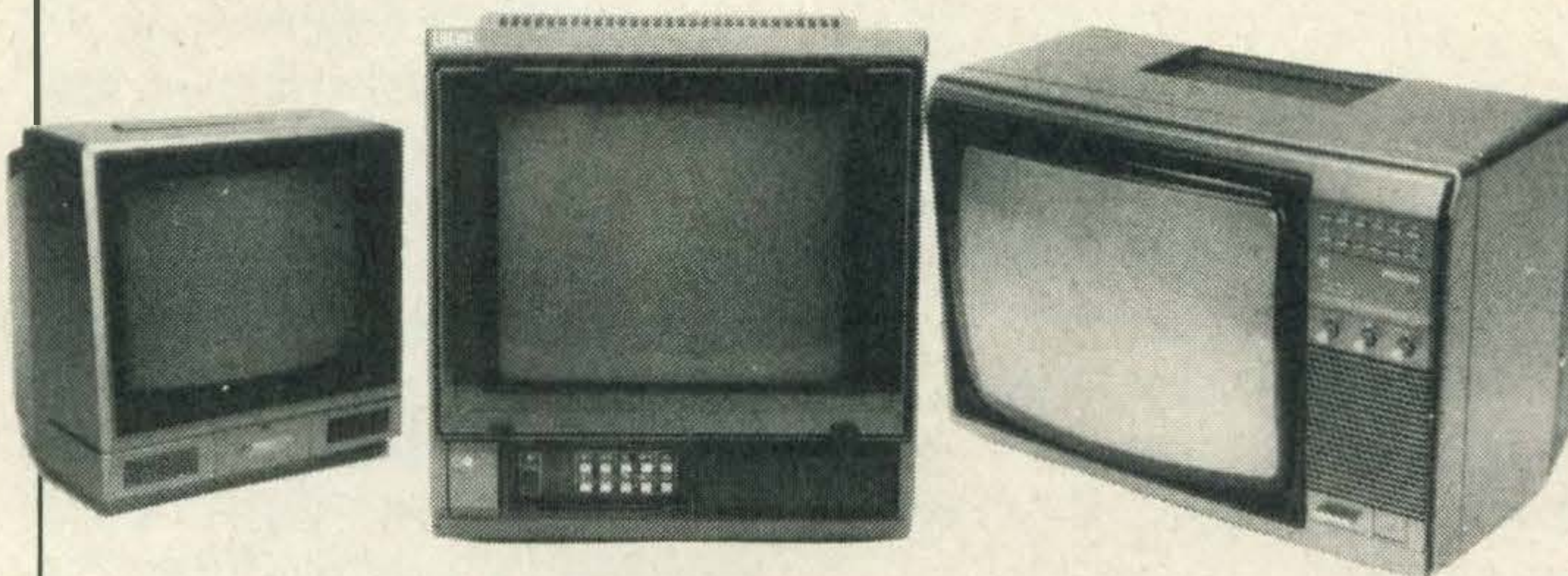
Key: 0 — Not recommended

1 — Fair

2 — Excellent

Bear in mind that these ratings take a number of aspects into account, including price, and are therefore subjective.

SPECIFICATIONS



BRAND	FIDELITY CTM1400	PHILIPS CT2007	LOEWE MCP110KT
Price	£220	£230	£380
Resolution	Standard	Standard	Medium/High
Tube size (inches)	14	14	10
Inputs	SCART, RF	CVBS, RGB	SCART, RF
Outputs	—	Loudspeaker Headphones	Loudspeaker
Connecting leads	—	—	Battery lead
Dimensions (w × h × d mm)	375 × 375 × 390	450 × 330 × 360	245 × 285 × 377
Weight	12 Kg	12 Kg	9 Kg
Colour	Silver grey	Dark grey	Charcoal grey
Comments	Anti-glare screen	—	FST, remote control, 12V battery connection, anti-glare screen

CT2007 is a handsome, large, dark grey coloured set. It has a handle, but is too bulky to be easily carted about.

Contrast, TV/AV switch and volume controls are included on the back edge along with the RF aerial socket, CVBS and RGB 6-pin DIN plugs. Although SCART sockets are more convenient in many ways, Thomas assures us

that, 'The quality of the RGB or CVBS signals with SCART sockets are no better than the quality of signals passing through DIN plugs'.

We have reviewed many games on this set and it has never given us any trouble; the colours are nicely saturated, the sound effects are as perfect as the games allow and although the curved

tube does create some distortion on screen, it isn't that noticeable.

Word processing for long periods could cause eyestrain as the words tend to shimmer slightly. But for games and the odd letter, this TV/monitor gives a more than adequate performance for £230.

Fidelity CTM1400

Fidelity's monitor is the cheapest of the three at £220, and in some ways is the best value.

The 14 inch screen gives a slightly distorted but clear display and a detachable anti-glare screen helps reduce some of the damaging effects of a bright display.

Fidelity claims that the tube is an improved version of its standard TV tube, giving a better screen display. We did, in fact, notice a small difference between the Fidelity and Philips displays. Text in particular appears sharper on the Fidelity.

Most of the controls are concealed behind a hinged flap; eight channel tuner wheels, AFC control, SCART function switch, volume, brightness, contrast and colour controls. An LED channel display is situated at one side together with a single channel selector mechanism. The push button ON/OFF switch is underneath.

SCART and TV aerial sockets are situated at the back. Where this set does differ substantially from the other two monitors is that it doesn't have any output sockets. Both the Philips and Fidelity have loudspeaker DIN plugs, but their omission on the Fidelity is unlikely to be a major drawback for computer owners.

The Fidelity, largest of the three models — 4.5 cm higher and 3 cm deeper than the Philips — is a pretty silvery grey colour and has a concealed handle. It is so well concealed that great deviousness and cunning is needed to get the handle out for use.

Price is the most attractive feature of this TV/monitor. It has an excellent standard display, a SCART socket and an anti-glare screen — all for £220.



READING



WRITING

The choice of a disk drive system for your MSX microcomputer is probably prompted by frustration with the delays and limitations of cassette-based programs and the sudden acquisition of a large amount of cash (not necessarily in that order).

Whatever the reason, if you are now the proud owner of a Sony (the only MSX model so far in the shops) drive you've probably read the manual and can gleefully read, write and copy data at high speed. There's no time off for a coffee now, you know! But maybe you'd like to know a little more about your new acquisition than the manual lets on.

When you start talking about the hardware inside

At last we reveal the mysteries of the disk drive, and how you can control it

your standard MSX computer, the discussion will always be on two levels. The first will be about those items which can be accessed from BASIC or via the MSX BIOS jump table for machine code; these are, by the definition 'standard', identical from one machine to the next, and discussion of them will apply to all MSX machines now and (in theory) for the indefinite future.

The second will be about the other items specific to the actual hardware your

manufacturer used in interpreting the MSX standard — these may only apply to your specific machine now and become obsolete at a future date.

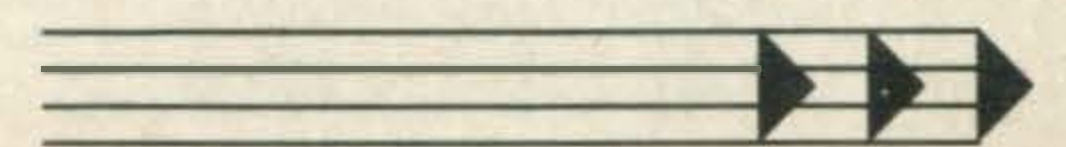
Having bought your machine partly because of this implicit standard, you may well question why anyone would immediately try to negate this benefit.

The way you view this depends on the kind of individual you are: are you the type who buys a new car and

lets the dealer service it, or the type who spends every other weekend 'tweaking' your engine with non-standard parts?

The answer is that your machine has capabilities beyond the standard, and that the inaccessibility of these features is the price you pay for guaranteed compatibility. My own view is that as long as any code you write is for your own personal use and you realise the limitation, then there is no harm in a fuller investigation of your micro's capabilities.

So let's investigate what you can do with your machine and still retain compatibility. Although specifics are mentioned that apply only to



PERIPHERALS

Figure 1 org OD000h

hex	decimal	mnemonic	function
06 04	6,4	ld b,4	;4 sectors
0E F8	14,248	ld c,0f8h	;format type
11 05 00	17,5,0	ld de,5	;start sector
21 00 A0	33,0,160	ld h1,0A000h	;RAM destination
AF	175	xor a	;to clear the carry flag for a READ ;OR use 37h, 55d to set the carry flag for a WRITE operation
3E 00	62,0	ld a,0	;for default drive ;NOTE xor a also loads a to 0 but if you do the write and use scf then this load of A to 0 IS needed so is included for completeness
CD 44 01	205,68,1	call 144h	;to access BIOS
C9	201	ret	;with carry set if error occurred

the Sony drives, the program examples given will work on all drives.

First let's examine some disk drive fundamentals, as for many of you this is your first disk system.

The diskette you insert into the drive is contained in an almost fool-proof rigid envelope and as received from the manufacturer is completely blank. The magnetic surface is similar to cassette tape but in the form of a disk rather than a strip, so access is rotational rather than linear.

A motor spins the diskette at about 300rpm so a particular piece of data reappears under the read/write head once every revolution or every 1/5th of a second. The path traced out in this revolution, for a particular position of the read/write head, is called a track, and if the head is moved sufficiently that it can no longer read the data from the previous trace then another track can be written.

The Sony drive allows 80 such tracks from the outer rim to near the centre of the diskette. The head assembly is linked to a spiral threaded shaft on a stepper motor and by rotating this motor in either direction, the head either steps in or out to a desired position.

Each trace has room for over 6000 bytes of data and with 80 tracks you might think that the drive should have 480,000 bytes capacity. It does, but this is unformatted. There is as yet nothing to tell your disk controller where the information starts.

Way back in the old days, there was a hole punched in the diskette so that by shining a light through it the drive could identify the start position

Figure 2

10	A=&hD000:	rem routine will run at OD000 hex (out of the way!)
20	For l=1 to 17:	rem 17 values to poke
30	read D:	rem data byte to store
40	poke A,D:	rem store it in memory
50	A=A+1:	rem point to next address
60	next l:	rem repeat till all values loaded
70	defusr=&hD000:	rem point to routine
80	print usr(0):	rem call the routine
90	end:	rem OR go look at the date accessed
100	data 6,4:	rem 2nd value is number of sectors to do
110	data 14,248:	rem 2nd value is format type
120	data 17,5,0:	rem 2nd and 3rd values are start sector low and high bytes.
130	data 33,0,160:	rem 2nd and 3rd values are RAM address low and high bytes
140	data 175:	rem clear carry number for READ/use 55 for set carry to WRITE
150	data 62,0:	rem 2nd value is drive
160	data 205,68,1:	rem call PHYDIO
170	data 201:	rem return to BASIC

on the diskette — called the INDEX. These were referred to as hard sectored disks.

The Sony drive uses soft-sectored disks — instead of an index hole, the disk carries a particular sequence of data that the disk drive controller can recognise when it is in search mode. So part of the task of formatting a new diskette is to write this particular sequence of data.

Having established where the 'start' of a circular track is, we could now write user data to the end of the track in one long block, or sector. But this isn't advisable because there would be only 80 sectors available, severely limiting the allocation of available space as the files increased.

At the other end, we could format very short sectors of 128 bytes each and get over 30 of them on every track. This would make allocation of new space very flexible as file sizes increased, but as the same formatting overhead is involved regardless of sector length, the percentage of useable space would diminish.

Consequently, with MSX,

Microsoft has chosen a standard midway between these positions, with sector lengths of 512 bytes each. There is room on each track for nine of these (with some space left over — I said it was a compromise) so the actual capacity of a single sided diskette is 80 (tracks) x 9 (sectors/track) x 512 (bytes/sector) or 368,640 bytes. You get less than this because space is needed for system track code, directory entries and file allocation tables, plus any system files.

So this is what FORMAT generates when you run it on a diskette:

For every track:

1. A sequence of bytes recognisable by the controller as INDEX.

For every sector:

1. A different sequence of bytes to identify the start of the 512 bytes of data following.
2. The actual track, sector and side number so the controller can verify it has found the sector requested.
3. 512 bytes of data dummied to E5 hex and a corresponding cyclic

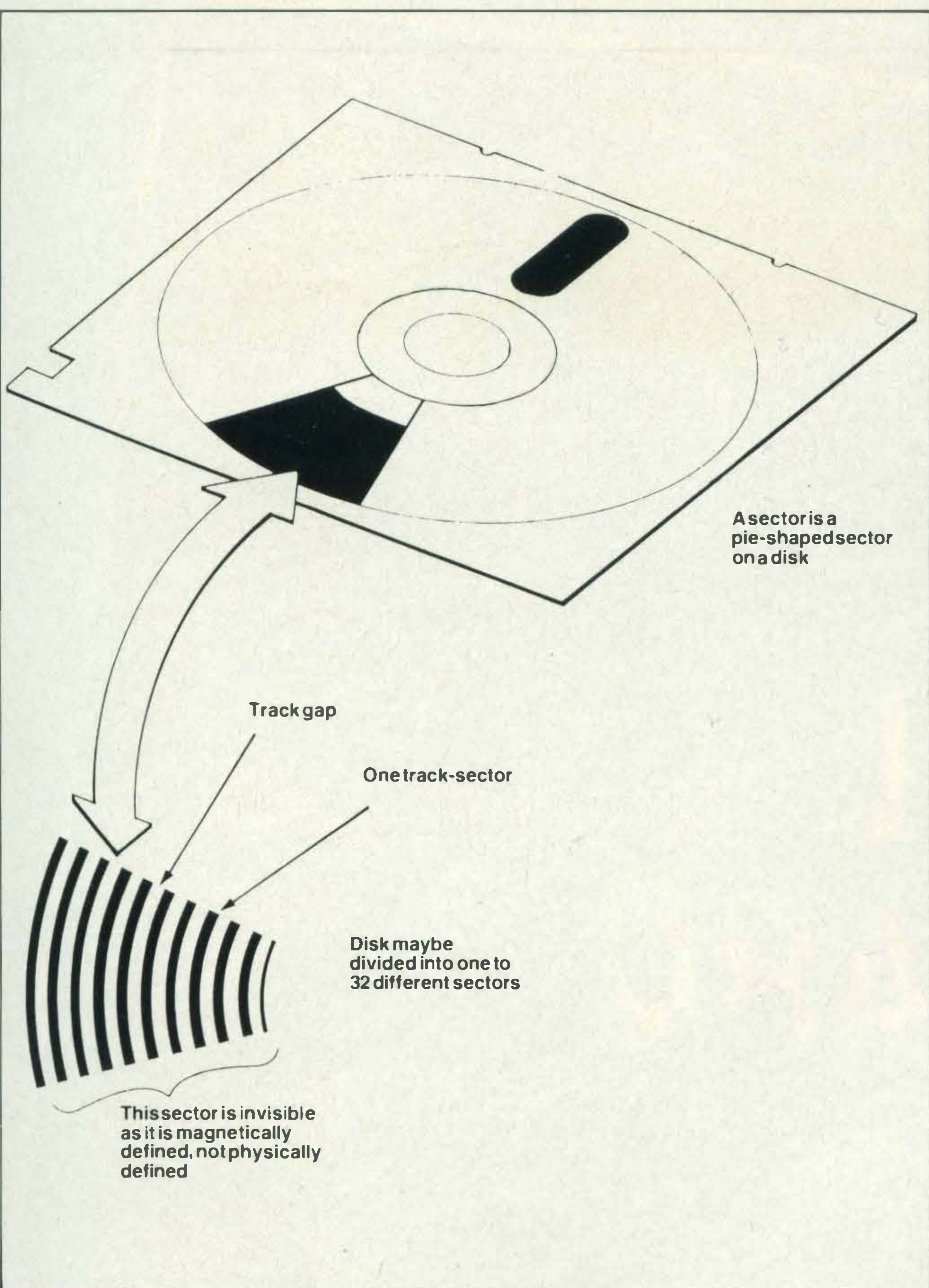
redundancy check (CRC) so that the validity of the data can be confirmed when it is next read.

For the first (system) track:

1. One or more sectors of system code used on power-on initialisation.
2. One or more sectors of directory entries.
3. One or more sectors of file allocation tables (FATs).

The directory entries show file types, sizes, creation dates and the first sector address. The FAT shows where to find all the sectors that make up the file. The system code searches for a file MSXDOS.SYS and loads it if present.

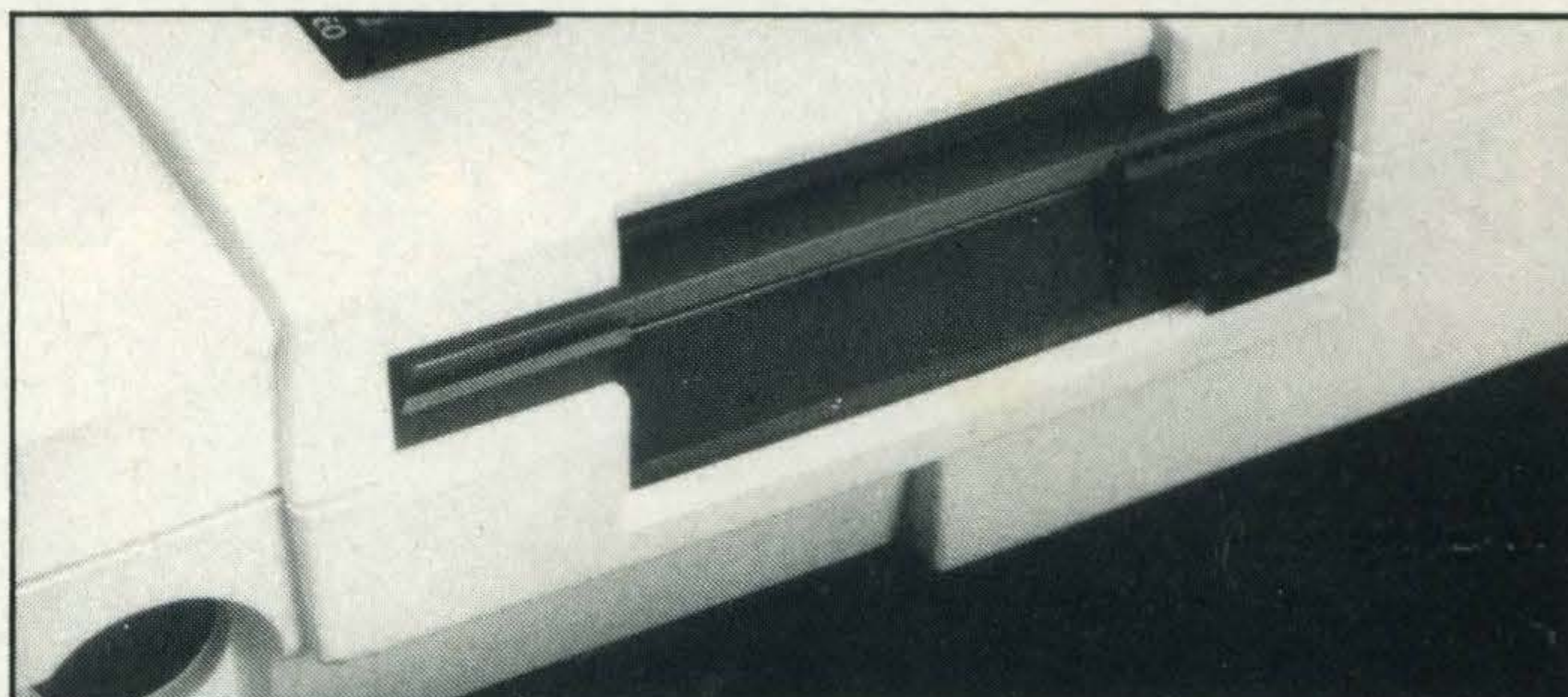
As for hardware, apart from the disk rotation motor and the head stepper motor, there is the Western Digital floppy disk controller chip, type WD2793, memory mapped at 7FFX hex in the disk interface page of memory. In the interface cartridge on the end of the cable is a ROM with enhanced disk BASIC as well as a crude version of MSX-DOS needed to load in the current version of MSX-DOS on disk.



The routines in this article are based on the Sony HBD-50 (above) — the only currently available disk drive for MSX



Spectravideo's first drive was a 5.25 inch model. The track and sector configuration can be very different from a 3.5 inch drive



The drive built in to Spectravideo's new X'Press machine is a 3.5 inch model, completely compatible with the Sony drive

As a user, this can all be transparent to you, but you can do more than disk BASIC or MSX-DOS allows and still comply with the standard.

There are only two genuine MSX disk handler entry points. One of these formats the disk and cannot accept different parameters so will not be discussed further here. The other is at 144 hex in the BIOS jump table and points to a routine called PHYDIO.

PHYDIO requires the following entry parameters in Z80 processor code:

1. Set carry flag to perform a WRITE — clear carry flag to perform READ.

2. Register pair HL points to a start address in RAM where data is to be read to/written from.

3. Register pair DE points to the sector to start access at.

4. Register B is the number of sectors required.

5. Register C is the format type.

There are four at present:
 F8:9 sectors/track single sided
 F9:9 sectors/track double sided
 FA:8 sectors/track single sided

FB:8 sectors/track double sided

6. Register A is the drive number. 0 means the default drive so use this unless you have two disks.

As your drive is almost certainly 9 sectors/single sided, a typical piece of code to read, say, 4 sectors starting at sector 5 (the start of the directory information) into RAM could be as in the listing in figure 1.

WARNING! The power of this simple routine will quickly become apparent as it is possible to write anywhere on the disk, erasing precious programs. So don't attempt the write portion until you are confident of what you're doing.

Until then, either use a spare rubbish disk or keep the write protect tab on. Also, by specifying too many sectors to read you can easily overwrite the stack and crash the system. (320K will *not* load into your MSX at one go!) So just read a few sectors.

You could assemble or load the routine in figure 1 with a machine code monitor. Or, because it's a short routine, you could type it in and run it

from BASIC, as in figure 2 (omit the REMarks for brevity).

You can modify this basic routine to be a fairly powerful disk tool. Space prevents this here, but you could make it easy to enter various sector values and start sector numbers. Then write a simple BASIC monitor to display the code you've read-in in hex (and ASCII as well so you can see any text present).

If you do this with the program in figure 2 unmodified, you will see blocks of text and code, each 32 bytes long. This is the directory information area, 32 bytes per file, entry of file name, file extension, creation date, file size etc.

Other interesting sectors to peek at are sector 0 (the system start up code) and sector 3 (the File Allocation Table or FAT) curiously coded at 3 nibbles (half bytes) per K of code.

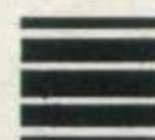
You could even expand this to read, say, 16K bytes (32 sectors), request a disk change, write the 32 sectors

back and repeat until the end of the diskette, thus accomplishing a complete single disk copy without regard to program content (it would copy the entire disk even if attempts had been made to protect programs).

This demonstrates the two-edged sword of an MSX standard. There can be *no* anti-pirate protection mechanisms within the standard because the standard guarantees that the above copy routine will always work on *all* machines and *all* software.

Elaborate protection mechanisms do exist and can be made to work with MSX systems, but direct access of the disk control carries the penalty of incompatibility with later releases of disk drive hardware. So any hardware revisions would necessitate new software.

This gives you the basic tool to examine your diskettes at the sector level whilst maintaining MSX compatibility.



BUSINESS

An open MSX laptop computer is shown from a high-angle perspective. The screen displays the words "ALL ABOARD" in large, bold, yellow capital letters. The laptop is dark-colored with a keyboard and a trackball visible. The background is a dark blue gradient. The entire scene is framed by a white border.

**ALL
ABOARD**

**MSX with extras —
that's Spectravideo's
X'Press, the latest micro
to come our way. But is
it enough? We find out**



THE X'PRESS

Spectravideo was the company largely responsible for defining the MSX standard in the first place. But it hasn't been all that visible in the home micro market since the system was launched. And sales of the company's SVI-728 machine have been disappointing in this country, although somewhat more exciting abroad.

But now Spectravideo seems set to grab a fatter slice

of the action with an extremely interesting new machine — the X'Press — which has abandoned the games playing, standard feature approach. It is, indeed, the most highly specified and versatile machine we've seen to date — with the possible exception of Toshiba's HX-22, which is more a promise than a reality at the moment.

The X'Press is expected to sell for around £400. But that actually turns out to be rather good value. For a start it's got

a built-in 3.5 inch disk drive. When you remember that the Sony drive costs around £350, you could say that the Spectravideo computer itself costs only £50!

Other additions to the standard specification are a built-in RS232C interface (saving you another hundred quid) and, we are assured, a built-in 80 column card.

In fact the 80 column facility was not included in our review



machine, as it was an early pre-production sample. But we are promised it will be on the final production version. It's not yet known if the machine will default to the 80 column screen, or if the switching between 80 and 40 column formats will be done by software or a hardware switch.

This is not the same as the 80 column modes expected with MSX2. Those will be selected from software, probably using the normal SCREEN command. The X'Press simply incorporates Spectravideo's current 80 column card into the machine — the machine's software remains the same.

If 80 columns sounds business-like to you, you'd be absolutely right. That's the effect Spectravideo is after. And it's underlined by the inclusion of MSX-DOS and CP/M system disks, both containing various utilities and programs.

Although Spectravideo doesn't want to restrict the machine to business users, this seems to be where its greatest appeal will be. If the projected retail price of around £400 turns out to be correct, it makes the X'Press a very cheap base for a business system, though a little pricey for a home or games micro.

All you need to add for a full business system is a printer, a monitor and possibly a second disk drive, should you find you need it. And, of course, you'll need some software. The whole thing could cost well under £1,000, if you shop around and don't need state-of-the-art peripherals.

Spectravideo hasn't announced an official launch



The keyboard layout is slightly cluttered, but the overall impression is one of a clean and neat machine

date yet, but you should see the machine in the shops before Christmas. The company wants to sell it through office supplies shops and business computer wholesalers as well as the more traditional home computer retailers. This has a lot to do with the perceived market for the computer, and Spectravideo's lack of success with its previous model.

'We'd love to do volume sales to the general public,' Spectravideo's Keith Newman told us. 'But with the current nervousness about the home computer market in general, and MSX in particular, we really can't do it.'

The information we've been getting from Japan and elsewhere suggests that the business market is where the major MSX companies are looking next, especially with MSX2. That's because the home computer boom seems to be over, but the low-level business market is expanding

Why else would there be rumours about IBM getting involved? So how does the X'Press fit in? Well, let's start by looking at what it offers.

The machine has just one cartridge port, albeit a pretty prominent one, which seems a little strange at first. But if you were to plug an RS232 adapter and a disk drive into another MSX machine you wouldn't have any cartridge ports left at all! The cartridge port, incidentally, isn't fitted with a reset switch, though it's difficult to think of a reason why this should matter.

Adding a second disk drive doesn't change the situation either, as there is a dedicated drive port on the back of the machine. As the disk operating system is built into the machine, the second might not need to be an MSX one — information is scarce on this at the moment. That would make fitting a second drive much cheaper.

The general styling is quite impressive, and should appeal

to home users without alienating the more serious business ladies and business gents. The machine is finished in off-white plastic and, although it goes quite a long way back, the overall effect is trim and neat.

The keyboard takes a little getting used to. It doesn't quite have the cluttered appearance of the previous Spectravideo machine, but then it doesn't have the numeric keypad either. The keys are quite responsive, although the tops are a little on the small side.

The cursor control keys are smallish too, and huddled clumsily against the main ones, looking a little like an afterthought. But they feel good, and actually work rather well for moving a cursor around a word processor, and similar serious uses. However, you certainly wouldn't want to use them for games.

Some of the editing keys are too small — the ENTER key, for instance. And finding the STOP key in a hurry could be a little difficult. Strangely, the STOP key is much bigger in the pictures of the machine on Spectravideo's brochure. Presumably that's the oriental version, but it makes us wonder why they changed.

Also, the function keys are part of the top row, instead of being separate. Fortunately they're larger than the average key. But combine all this with minimal use of colour — the main keys are slightly off-white, the rest slightly more off-white — and you get a

USE A MONITOR

There's one thing to bear in mind when using 80 column screens. You can't really just plug in your standard TV set as the resolution is too low. Even many TV/monitors have low-resolution tubes.

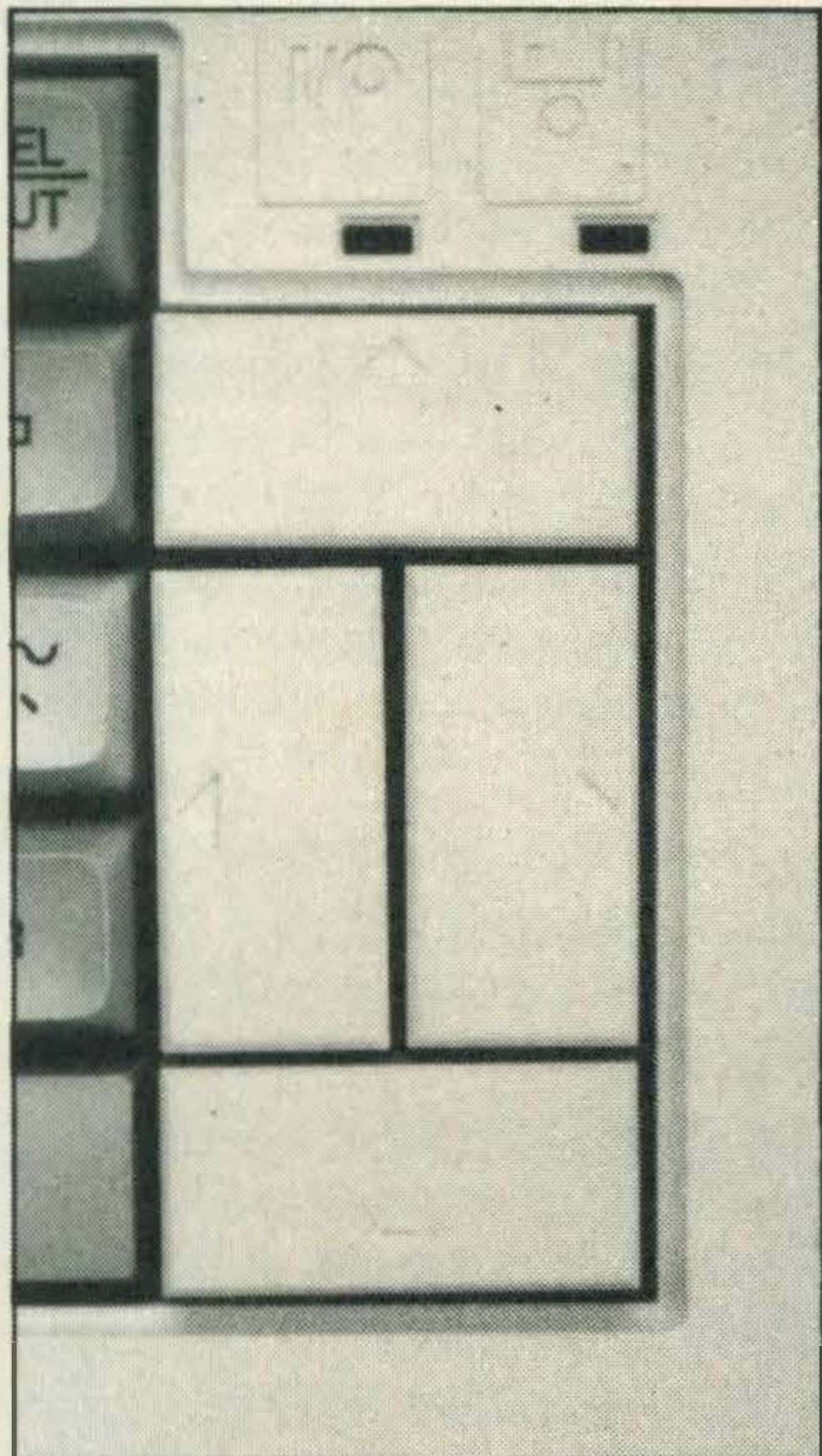
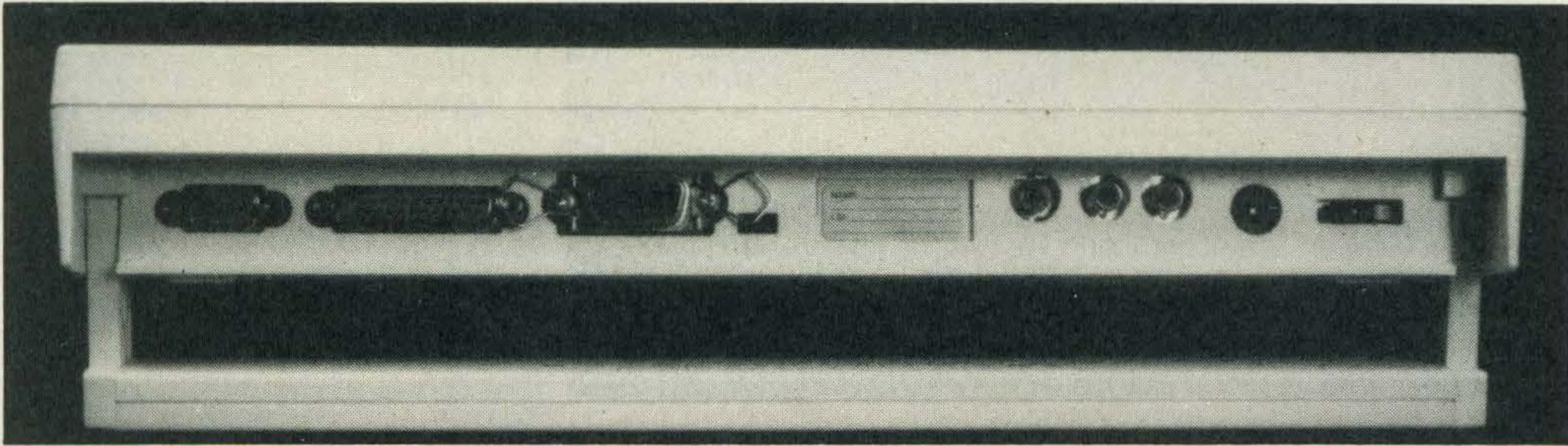
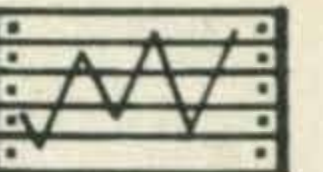
Although you might be able to read 80 column text on a TV, it will cause a lot of

eyestrain. You really need a proper monitor with a very steady picture and resolution high enough to define the letters sharply.

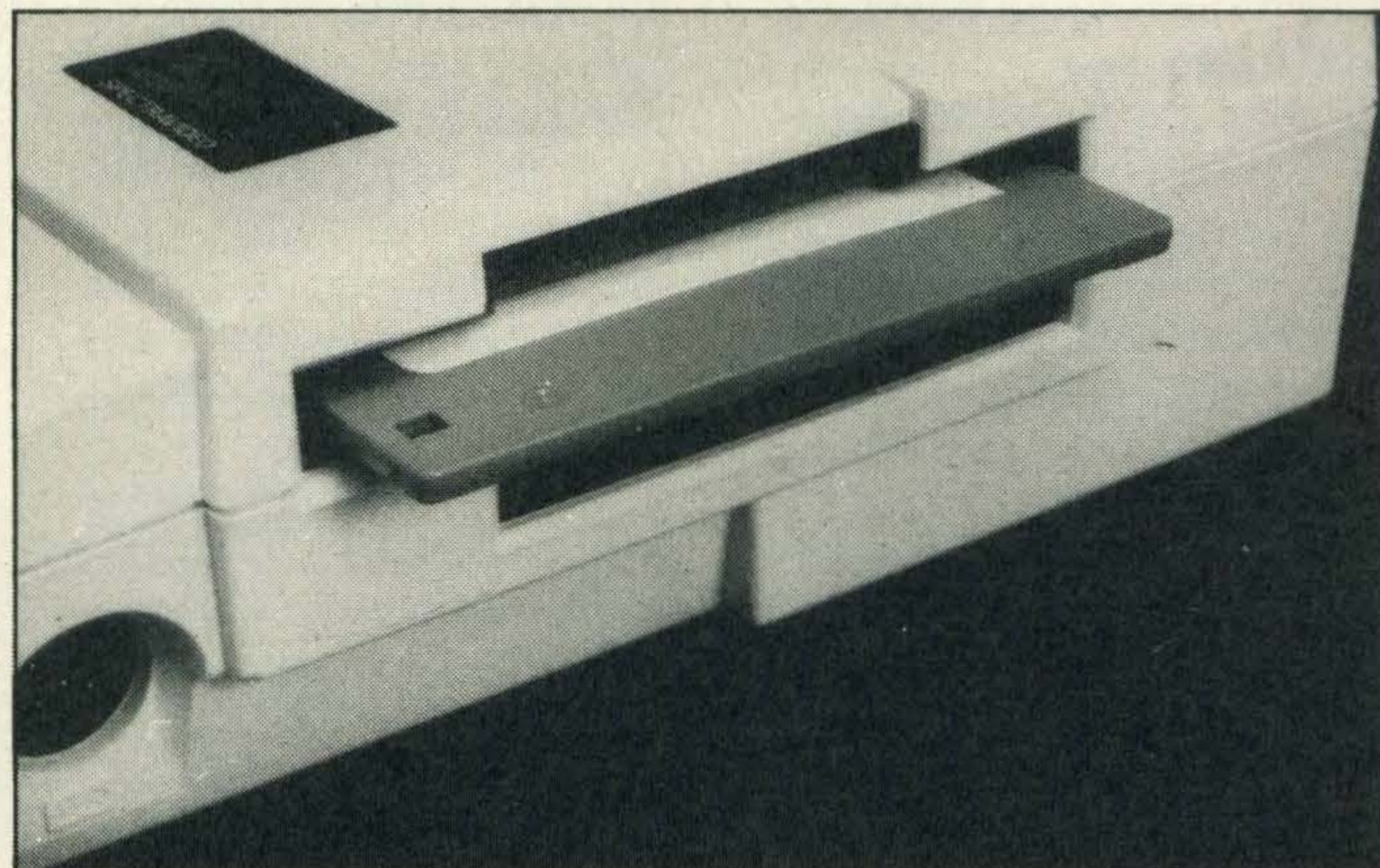
If you're going to do a lot of work with the 80 column screen, especially with business packages involving a large amount of text and figures, it is worth forking out on a green or amber screen monochrome monitor.

This not only gives you the resolution and steadiness you need, but the colour is also very relaxing. You'll find you can do a lot more work, with less strain and effort, if you have a decent monitor.

If you have a mono monitor for the business packages, you can always plug the machine into a colour TV for playing games.



Above: The rear panel folds down to provide a good typing angle, while revealing an impressive array of connections. Left: the cursor cluster is cramped but has a good feel to it. Below: The disk drive is the best bit. It's well placed and easy to use



keyboard which is slower to use than others we've seen.

Of course, as with any keyboard, once you've got used to it, most of the problems — like not being able to find a key or hitting the wrong one — disappear.

Above the cursor keys are two red LEDs. One is the main power light. The other is the disk busy light, which lets you know when the disk is spinning. It's well-placed, and that makes using the disk easier.

The right hand edge of the machine is taken up by the two joystick sockets, a standard cassette port and the disk drive. The latter has a well-placed eject button which protrudes only when the disk is inserted, so you can tell at a glance if there is a disk in the machine.

At the back a handle folds out and down, propping up the back of the machine and

slanting the keyboard for a good typing angle. And unfolding the handle also uncovers a row of ports.

Looking at the back these are (left to right) an RS232C D-plug; another, larger D-plug for the second disk drive; a standard MSX Centronics printer port; RF video output (for use with a TV); audio and video composite monitor sockets; and finally a socket for the power supply, with the main ON/OFF rocker switch alongside. All of these are covered, and so protected, when the handle is folded up, which could be useful when carrying the micro around.

On that subject, the idea of lugging around a mains powered micro which has no integral screen may seem a little pointless. But there may be times when having finished doing your accounts at the office, you want to take the machine home, plug it into the

TV, and play some games — or carry on doing your accounts!

Alternatively, you might want to take the machine round to a friend's house. This is where the built-in disk drive really scores, as it cuts down on the amount of gear you have to lug around. Spectravideo is obviously serious about this transportability aspect as the company supplies the machine with its own, neat carrying case.

One major omission is a reset button. Swapping between CP/M and MSX BASIC or MSX-DOS means turning off the machine and restarting it with the appropriate disk inserted. A reset button would be much easier to use, and probably safer for the machine, than the main power rocker switch on the back of the micro.

Power is supplied by a

separate transformer. This seems a bit clumsy, but, from Spectravideo's point of view, makes the machine easier to adapt for different countries. And as the power lead is held reasonably firmly by the micro, there's no real disadvantage for the user.

In spite of the fact that there is no transformer in the micro, it still gets quite hot on the left hand side. The hot area is well away from the disks, and so shouldn't melt your valuable programs and data. And some of the overheating may be a result of it being a prototype sample.

Even so, we were surprised. Fortunately, Spectravideo has included a large cooling grille in this part of the case, and we've encountered no problems as a result of overheating.

Pleasant drive

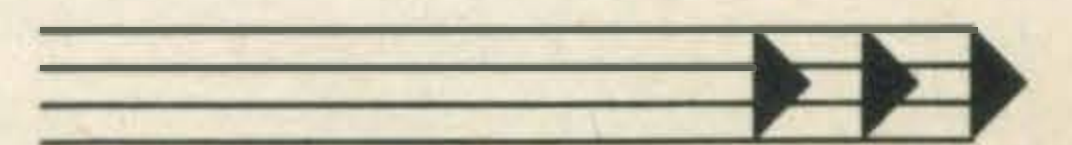
On the whole, the disk seems to operate well, even though it rattles a little noisily at times. However we did get the 'Disk offline' error message a few times.

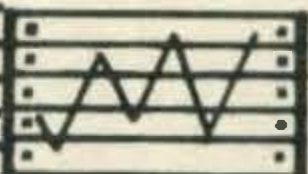
This usually occurs when you try to access a disk without having first inserted one. But even with a disk in place, the machine sometimes failed to notice it. Again, this is almost certainly because we were using an early, pre-production sample.

The positioning of the drive is good — it's out of the way when you don't want it, but conveniently placed for fast use. And it's well-protected. The main slot has a hinged, sprung flap which prevents dust from entering when the drive is empty.

Disk access times seem reasonably fast — certainly up to Sony's standards. And we had no problem reading files recorded with the Sony drive. In other words, it's all pretty straightforward.

It is interesting to see that Spectravideo finally opted for a 3.5 inch drive. The company's previous drive unit was 5.25 inch, although it didn't make much of an appearance in this country. However, the larger drive didn't seem to quite fit in with other MSX manufacturers.





Now the only company with plans to introduce anything but 3.5 inch is Sanyo. That company has a 5.25 inch drive in the pipeline. This is probably an attempt to cash in on the business market where 3.5 inch disks are seen as the exception rather than the rule, although that's changing rapidly too.

The provision of MSX-DOS with the X'Press marks the official arrival of this long-awaited operating system, although we've had a glimpse of it on the Aackosoft program disks. What's interesting is that Aackosoft is having to change its disks because MSX-DOS may be supplied only with disk drives, and not incorporated into software packages.

The MSX-DOS version supplied with the X'Press is 1.01 (the Aackosoft programs use 0.26), and we've no reason to suspect that it isn't a full implementation.

If you have the MSX-DOS system disk in the drive when you switch on, the machine automatically boots up into this system. You can easily return to MSX BASIC by typing BASIC in response to the DOS system prompt. Similarly, getting back to MSX-DOS is as easy as typing CALL SYSTEM.

MSX-DOS is supposed to be file compatible with the industry standard MS-DOS (as used by most popular 16 bit business micros). Indeed the system as a whole certainly seems almost identical, with the same commands and methods of working.

We attempted to load ASCII text files, created on an Apricot, into the two word processors at our disposal — *Aackotext* and the memo writer supplied on the MSX-DOS disk. Neither attempt worked, unfortunately. That's not to say that it's impossible — simply that it's not as easy and straightforward as some people make out it should be.

Still, MSX-DOS is destined to become an important operating system. It's easy to use and versatile enough, though many home programmers might prefer to stay with MSX disk BASIC.

Of course the operating

SPECIFICATIONS



Spectravideo X'Press

Main RAM: 64K
Video RAM: 16K
ROM: 32K

Keyboard: 73 key, full travel Qwerty keyboard

Data storage:

One 3.5 inch disk drive
Interface for second disk drive
Cassette interface

Video interfaces: UHF TV output, composite monitor output

Screen modes: 40 and 80 column

Cartridge ports: One

Parallel port: One Centronics type

Serial port: One RS232C

Joystick ports: Two, standard MSX

Bundled software: MSX-DOS disk with memo-writer, disk manager, spreadsheet and database. CP/M 2.2 system disk with various utilities. MSX disk BASIC on-board

systems don't stop there. You also get CP/M version 2.2 with the X'Press. That means a large amount of professional business software is already available for it, avoiding the problem which has so far dogged the progress of MSX — poor software availability.

In fact there is a large amount of public domain (that is, free) CP/M software around, and it's a popular operating system amongst bulletin board users. Indeed, several boards have been set-up purely for CP/M users. So the X'Press should slip into the marketplace rather more easily than other MSX micros.

As we've already said, there was no 80 column facility on our test sample. For that reason it was not possible to test the commercial CP/M software which we had available. But there should be no trouble with the machines which eventually arrive in the shops.

CP/M is hardly the best operating system around. Its syntax is often rather awkward and it's starting to look rather dated. But it's still handy to have because of all the

software available. The CP/M disk is something of a bonus, rather than an essential feature.

In addition to the two operating systems already mentioned, you also have MSX disk BASIC. This is something we've already seen on the Sony disk drive, and as with that unit it's built-in.

Turning on the machine without a disk inserted, or typing BASIC in MSX-DOS, selects MSX disc BASIC, giving access to all the standard commands and features we all know and love.

In many cases the commands are identical or similar to MSX-DOS. Unfortunately there are enough differences to cause confusion. This, of course, is not a drawback with the X'Press — it applies equally to any machine running these operating systems.

Some differences are obvious. In MSX disk BASIC, for example, you type FILES to see what is contained on the disk. CP/M and MSX-DOS both use the command DIR.

Other differences are more subtle. The COPY command

is very similar in both disk BASIC and MSX-DOS. But with the former you have to use quote marks around the filename, which isn't true of the DOS.

All this could lead to confusion if you're trying to work with all three operating systems, so we can see many people just sticking to the one which suits them best.

Fortunately each system is backed up by an excellent manual. The documentation supplied with the X'Press is generally very good. You get thorough and well laid-out manuals on the three disk operating systems, a small, handy reference manual of CP/M commands, a BASIC reference manual, and a machine manual.

The last two were only at the original copy stage when we saw them, but seem more than adequate. The disk manuals were complete, and are pretty standard examples of their type — that is, quite good.

However, we had no documentation for the software package supplied with the MSX-DOS disk, and the people at Spectravideo seem to be unclear as to whether this will be supplied in the final package.

So what does it all add up to? Well, when you consider the price it's very impressive. You get everything that the standard MSX micro gives you, plus a lot more — the best bit being the built-in drive.

Even if you never use the 80 column screen, MSX-DOS or CP/M it still works out at good value. What it needs now is some backup by Spectravideo. With adequate promotion the Spectravideo X'Press could do a lot of favours for both the company and MSX.

WHO TO CONTACT

If you have any queries, or want more details, contact:

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Mitsubishi ML-50JY Joystick	£12.95
Toshiba RS-232	£99.95
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The Pre-computer Book

by F A Wilson
Bernard Babani £1.95

This is the sort of elementary title that many new computer novices will enjoy browsing through as it's cheap (£1.95), pocket-sized and very easy to read. As the title suggests, it's aimed at new computer owners or those contemplating buying a micro and wanting to know a little more before taking the plunge.

The book goes right back to basics; defining what a computer is and what it can do for you before attempting to explain what makes it tick. When the author introduces the binary system he includes plenty of examples and diagrams to hammer home the information.

As all the chapters are linked, and each one reinforces what has been said in the preceding chapter, you'd benefit most by reading it in

sequential order. As there are only 78 pages it's not going to take the average reader long to get through it.

The chapters are short and the author has made great use of such titles as 'Chatting it up' and 'The Bare Bones of BASIC' which may add to the book's appeal for some. In the appendix there's a quick revision of exponentials and scientific notation (12.345×10^3) which is useful as most people's general arithmetic tends to suffer with the ravages of time.

Like most books these days, there is an appendix at the back with tables that look impressive but are not likely to be used that much.

Wilson sums up his book by saying that: 'We are not all summoned to be computer intellectuals. If the book has helped the reader to decide that he or she has not received the call, well and good. But if the call has come, well and much the better.'

What more can I say?

VIRGIN

New books are coming into the MSX Computing office thick and fast, so tear yourself away from your MSX computer, put

An Introduction to BASIC Programming Techniques

by S Daly
Bernard Babani £1.95

I had an idea I was going to enjoy this book as soon as I read the author's first paragraph: 'This is based on my own experiences in learning BASIC'. Straightaway I felt an affinity with the author and took comfort in the knowledge that he too was once a beginner, and that his wasn't a book written by yet another self-proclaimed expert trying to teach BASIC and making a quick buck in the process.

And as this is aimed at a general audience and not just MSX computer owners, the author points out that programming languages do vary from machine to machine. However, most features are common and once they've been mastered you should be able to understand the BASIC manual for your particular machine.

Derek Ellershaw and Peter Schofield
VERY BASIC BASIC
The first 15 hours on your
MSX

The Pre-computer Book

F. A. WILSON

ROM? RAM? SYNTAX?
BITS? BYTES? BUGS?
PEEK? POKE? LOOP?

An Introduction to BASIC Programming Techniques

Very BASIC BASIC

by D Ellershaw and P Schofield
Century Communications, £2.95

This is the sort of title that should be standard issue with every computer in addition to the manufacturer's own reference manuals. So many first time computer buyers find themselves completely baffled when the novelty of playing games wears off and they start trying to write a BASIC program.

The book is MSX-specific and is split into four sections. The first one, called 'Pre-programming', outlines the keyboard and examines simple commands like PRINT and TAB. This provides the reader with a springboard from which he can go onto programming techniques and actually writing some simple programs.

All the programming examples are presented in the form of a quiz, game or self-questionnaire which adds to

the book's appeal and just goes to show that learning how to program can and should be fun.

Once you've mastered the techniques of programming the authors reveal in the third section how to make use of a printer and data recorder. However, I get the feeling that they are not keen on the latter as they claim that exchanging programs by swapping printouts is cheaper than swapping cassettes. But loading tapes is a lot faster than all that typing!

In the final section you are taken a little further into programming and shown how to use conditional statements and how to adapt programs to suit your own requirements.

The book's only shortcoming is that it doesn't pay enough attention to MSX's music and graphics capabilities. It doesn't go much further than saying: 'It's amazing what you can do with colour!'

Writing Software For Profit

by A J Harding
Virgin Books, £4.95

If you've often flicked through computer magazines, looked at the listings and thought, 'I could write better programs than that', then this latest title from Virgin could put you on a more profitable track.

The author has spent a number of years accepting and rejecting a number of home-written programs submitted to his publishing company so he's definitely qualified to give advice.

He starts off by saying that the computer industry is a mess and that you need to watch out for the 'cowboys'. A start that might put a few readers off!

Having got that off his chest Harding gets down to the facts and

OUT

your feet up and read this month's machine specific and general book reviews, courtesy of Julia Alexander

Anyway, back to the book! Daly kicks off with an explanation of line numbers and then illustrates their use with a simple three line program.

Chapter two manages to cram all the necessary information required on arithmetic statements, loops, READ statements and branching in the space of six pages. Daly certainly doesn't believe in wasting space or confusing the reader with unnecessary details.

The rest of the book is just as concise with plenty of sample programs to run, preceded by short explanations just in case you're confused. And in case you've forgotten anything along the way, chapter six gives a review of the main points already covered.

Daly wraps up the book with several appendices, including a library of seven programs, test questions (and answers) on each chapter and a glossary of computer terms.

would have thought that as this title is aimed at potential software authors they would already have a machine — otherwise what's the point of buying, let alone reading, this book!

Anyway, Harding discusses at length various categories of software ranging from arcade games and utilities to full blown business software. But he warns against home authors attempting to write the latter unless they are brilliant accountants who also happen to be brilliant programmers. He does concede, though, that some home authors have written some very good spreadsheets.

The most useful section is chapter five which gives advice on the writing and documentation of programs. It

To be honest, it's only the few lucky ones who have their software accepted by software houses and make small fortunes. Most home authors are content to see their

A Programmer's Guide to The MSX System

by C I Burkinshaw & R A Goodley
Sigma Press £7.95

This is not a book for the raw beginner, says the blurb on the back cover — and a quick glance of the contents confirms the statement.

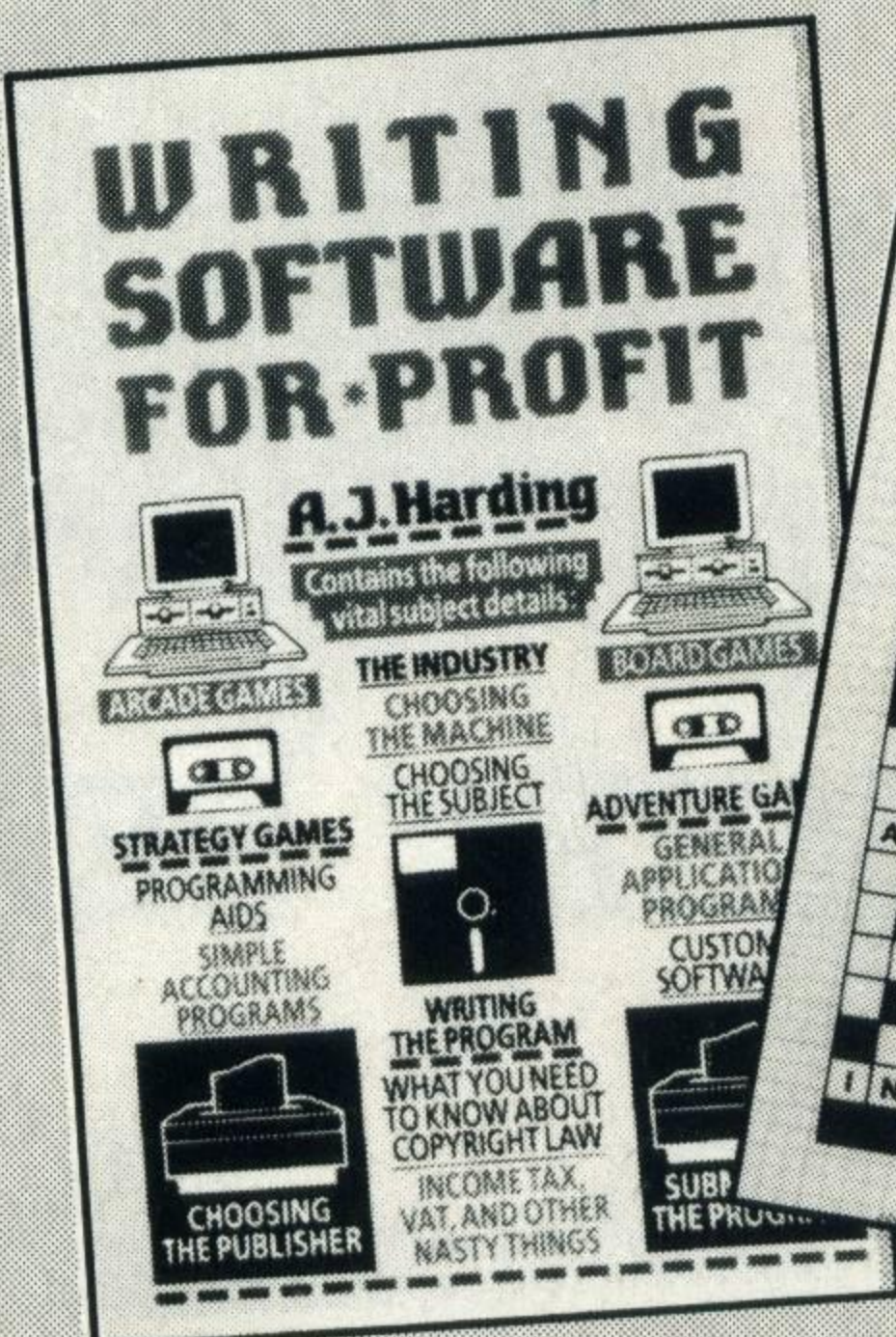
So who is it aimed at? After skimming through the chapters I am left with the feeling that this is written for people who know that they want an MSX text book of some description, but not sure what exactly they want one for.

My second impression is that the authors don't really know who they're supposed to be focusing on. One minute they are discussing assembly language and in the next breath it's hardware. As for the appendices, I'm not convinced that this is the right place to include extracts of Texas Instruments' technical manuals

describing the architecture of the TMS9118 video display processor. However, if you're a technical whizz-kid or an experienced programmer this title may well appeal. Once you get beyond the technical stuff there are some interesting chapters on memory organisation, display modes, the vdp and sound chips. There is also a useful chapter on MSX BASIC vocabulary — even the most experienced programmer can forget the basics.

And if you're keen to produce your own musical compositions, the chapter dedicated to the programmable sound generator (PSG) takes you through the noise and tone registers.

This is a difficult book to get into and isn't exactly bedside reading. But if you're already a proficient programmer this will give you an insight into how to write more high performance programs.



Computer Terminology Explained

by I D Poole
Bernard Bahani £1.95

Yet another title dedicated to enlightening computer users by explaining computer terminology in a light and easy manner. However, this book succeeds where others fail as it doesn't beat about the bush, or bog the reader down with so much jargon that he needs a computer dictionary to understand it!

Instead, the author has produced concise and in most cases very brief explanations for most of the common terms that are likely to be encountered by home computer users.

As well as the absolute basics, like the difference between ROM and RAM, Poole also explains terms that are more commonly used in connection with mini and mainframe computers. For instance, did you

know that a bus driver is an electronic circuit used to transmit signals onto a data base and that Forth isn't a Scottish river but a high level language?

Also included is a BASIC reference guide at the back of the book. It is really a quick brush-up on some of the more general BASIC commands and functions. The author stresses the point that each manufacturer has its own form of BASIC, so the book can only be a general guide.

My only criticism is that there are several pages that tend to have more 'creative' white space than text. Under the letter K the author includes four definitions and has left out the two most commonly used terms K (1024 bytes) and KEYWORD.

In only 80 pages the author has covered most of the terms that newcomers are likely to come up against. For £1.95 it's cheap and worth buying as a reference book.




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CODE AND CHIPS

Last month's foray into the less frequently used Z80 machine code instructions very nearly completed this machine code series. But there is one aspect of microprocessors, essential to every system, that we have yet to take a close look at. This is the interrupt system.

The casual programmer is unlikely to ever need this lowest of low-level functions, but if you intend using machine code as a serious programming tool, you'll need to understand just what an interrupt is and how it can be handled.

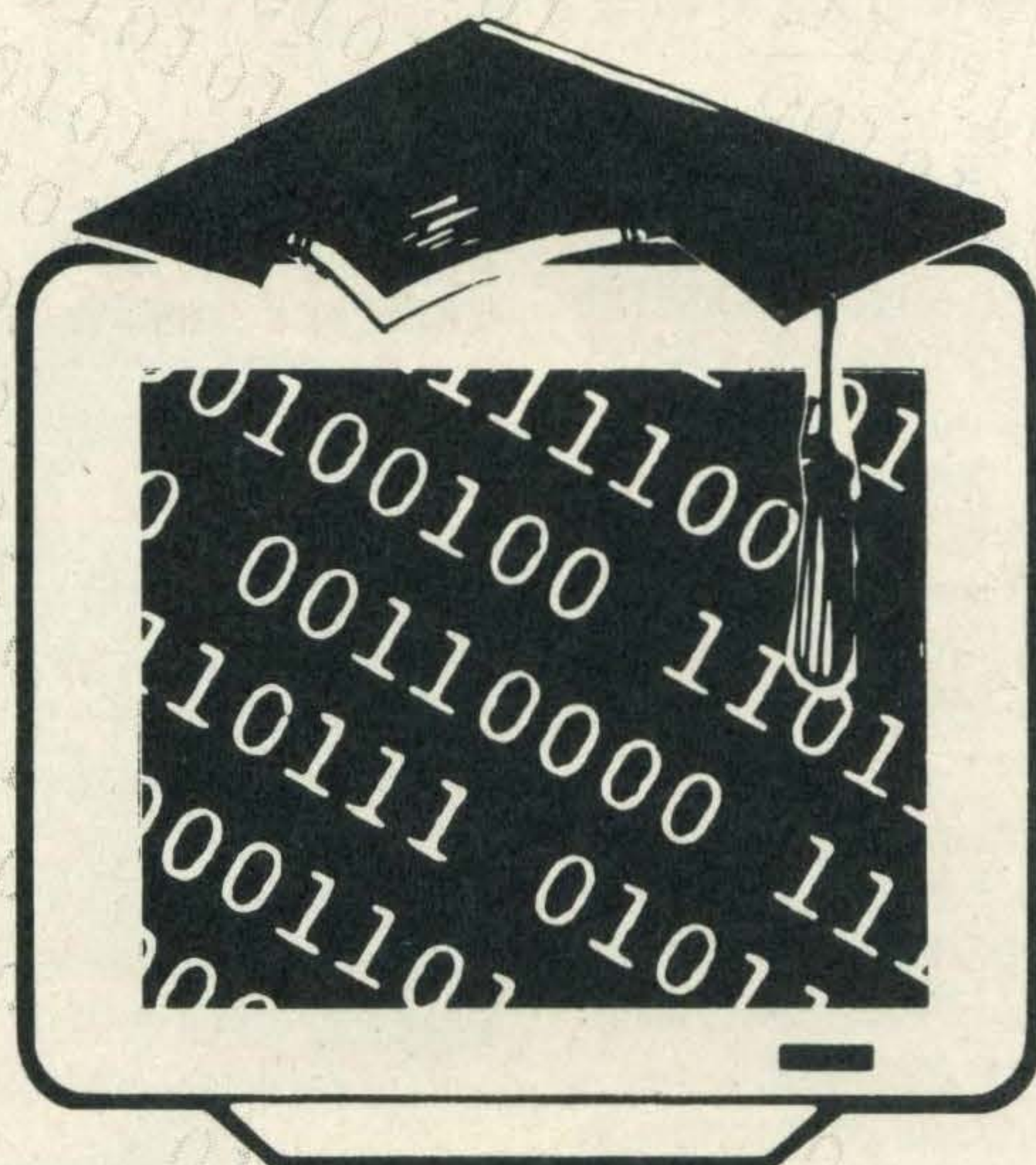
In these days of extremely advanced microprocessor design, an interrupt is a particular case of the general **exception**, but simple 8-bit processors like the Z80 have very few non-interrupt exceptions.

An exception in assembly language terms is not really that much different from an exception in our terms. An exception occurs when something exceptional happens.

This exceptional event may be an attempt to execute an instruction which is not recognised, or an attempt to access memory which isn't present, or maybe a signal from a device outside the microprocessor unit.

In the case of the Z80, there are only two real exception cases. These are **hardware interrupts** and **software interrupts** (more commonly known as restarts on the Z80). We discussed the restarts last month, and noticed that they were in a way an inheritance

Concluding Adam Denning's guide to machine code programming



Part 7 — interrupts

from the earlier 8080 microprocessor design.

Hardware interrupts are rather more complicated beasts, but can also be seen as having a basis in 8080 technology, as the Z80 is capable of **emulating** the way an 8080 handles interrupts.

But we still don't know what an interrupt is! Let's do it the easy way. You're watching *Star Wars* on television for the fifteenth time and it's just getting to the good bit when the man at the BBC pops up and issues a newsflash. This disturbs you for a while, and your attention is diverted. After the newsflash, though, the film

continues, and you soon get back into the flow.

That, essentially, is an interrupt, but they tend to cause a Z80 rather less annoyance than a newsflash during your favourite film would cause you. This is because a Z80 system is almost always designed to cope with interrupts. But where do these interrupts come from, and how does the Z80 know that it has been interrupted?

There are a couple of special pins on the microprocessor which are labelled **NMI** and **INT** on the manufacturer's data sheet.

Whenever a pulse arrives on one of these pins, the Z80 takes it as an exceptional event. The signals on these pins will usually come from devices inside your computer, such as the peripheral interface adapter which controls the printer.

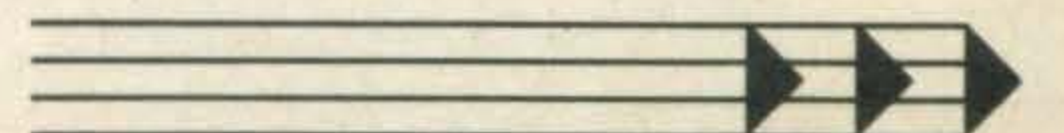
If you have an extended system, with disk drives, say, then the signal may come from the floppy disk controller chip inside the disk interface unit.

Wherever it comes from, this signal will only occur when the device sending it wants the Z80 to do something to it. Depending on the importance of the device creating the interrupt, the signal may be designed to arrive on the **NMI** pin or the **INT** pin.

The difference between the two pins is that interrupts transmitted via the **NMI** line cannot be ignored by the Z80 (**NMI** stands for 'non-maskable interrupt') while those on the **INT** line can be ignored in certain circumstances.

Whenever the Z80 gets an **NMI**, it saves the current program counter contents on the stack and jumps to memory location #66. It executes the instructions from this location onwards until it reaches an instruction telling it to end the 'NMI service routine'. This instruction has the mnemonic '**RETN**'.

NMIs are generally used only for the most serious of reasons, such as imminent power failure or the interrupt from a disk system which doesn't use **DMA** ('direct memory access' — very

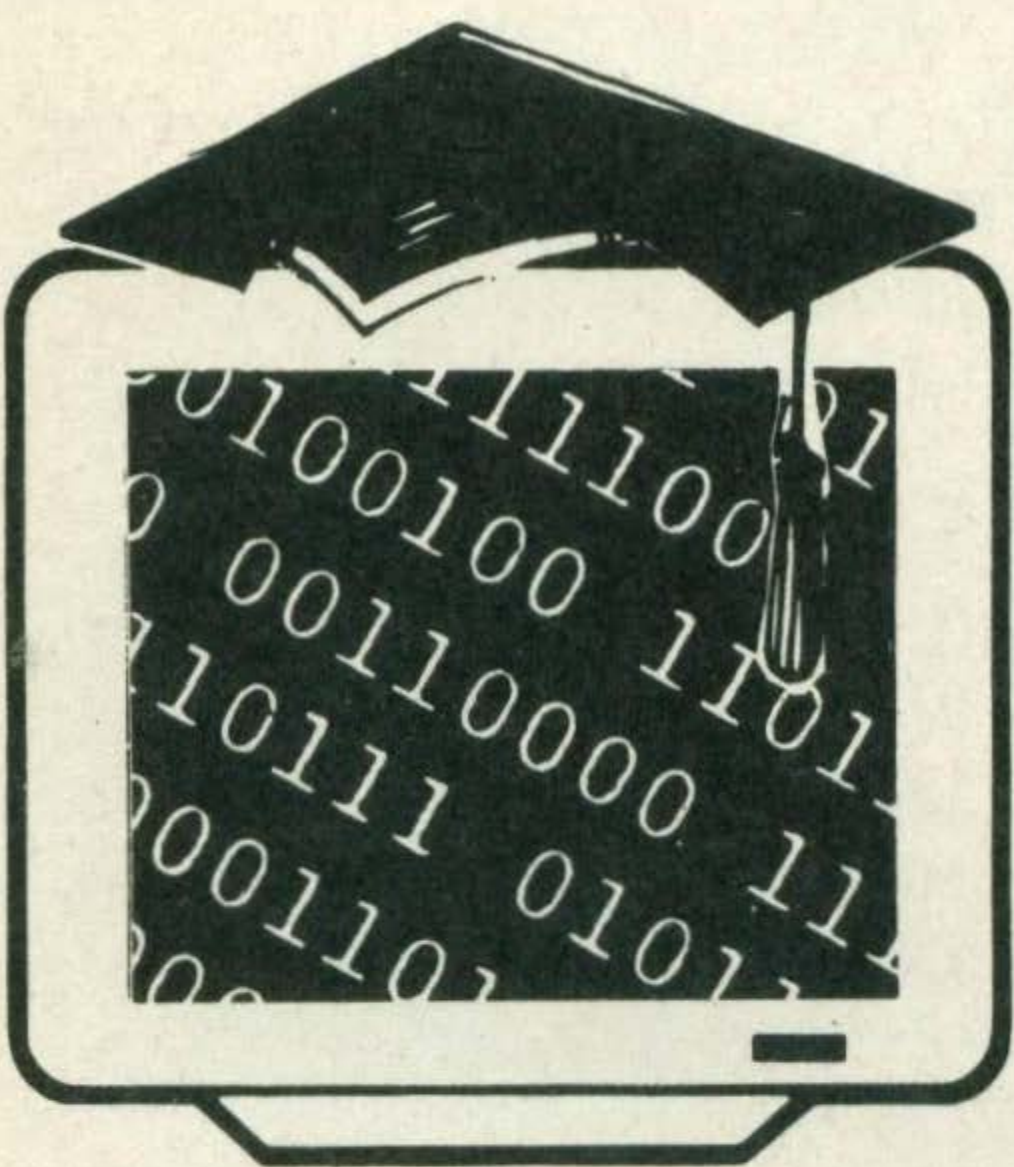


complicated!).

INTs, on the other hand, cope with every other interrupt occasion, which means they have to cope with a host of different situations. Suppose for instance that our computer system had four devices outside the Z80 which could create an INT. The Z80 must, therefore, have some way of telling which particular device generated the interrupt, or it wouldn't be able to deal with it very effectively.

The Z80 has three different ways of dealing with an interrupt. The particular mode in operation is selected and altered by execution of an 'IM' instruction. IM stands for 'interrupt mode', and the three modes are IM0, IM1 and IM2.

Interrupt mode 0 is the 8080 emulation mode, as it causes the Z80 to handle INTs in exactly the same way as the 8080 does. In this mode, the interrupt generator puts one of the eight restart addresses onto the data bus, and this instruction is executed by the Z80.



'Interrupt mode 2 is widely used on other Z80 systems such as the Spectrum to display digital clocks'

The disadvantages with this system are obvious. The restarts are the only 'software interrupts' the Z80 has, so if they have to be grabbed by external interrupts their usefulness is reduced. Also, there are only eight possible addresses which can be jumped to, and as these addresses are so low in the memory map they are

generally in ROM where the programmer can't alter them. Finally, the Z80 always jumps to the RST 0 address when it is reset, so this interrupt is effectively made unavailable to the external interrupt system.

The next interrupt mode is selected by IM1. This is intended for systems on which there are only one or two interrupting devices, as it causes an RST 38 instruction to be executed upon assertion of the INT line.

Versatile

The final interrupt mode is more fun. This is interrupt mode 2, selected by executing an IM2 instruction. When the Z80 is in this mode and it receives a maskable interrupt, a number of things happen.

The program counter is saved, of course, so that the machine can get back to what it was doing prior to the interrupt once the service routine has been completed. Then eight bits of data are read from the data bus and the least significant bit is forced to zero. This is combined with the value in the internal I register to give an **interrupt vector** address, such that the eight bits in I form the eight most significant bits of the address.

The program counter is then loaded with the contents of the interrupt vector and execution of the interrupt service routine begins at that address.

Although interrupt mode 2 is by far the most versatile of the modes available, it also occupies the most processor time to get started. As always, it's a trade-off between versatility and speed.

In general, a service routine for INT-generated interrupts ends with a 'RETI' instruction, which is similar to 'RETN' and 'RET' but is designed for maskable interrupts.

Interrupt mode 2 is widely used on other Z80-based systems such as the ZX Spectrum to display digital clocks and to extend the system. Like the Spectrum, MSX machines generally run in interrupt mode 1, so an interrupt always causes the code at address #38 to be executed. This adds a 50th of a second to the timer and

```

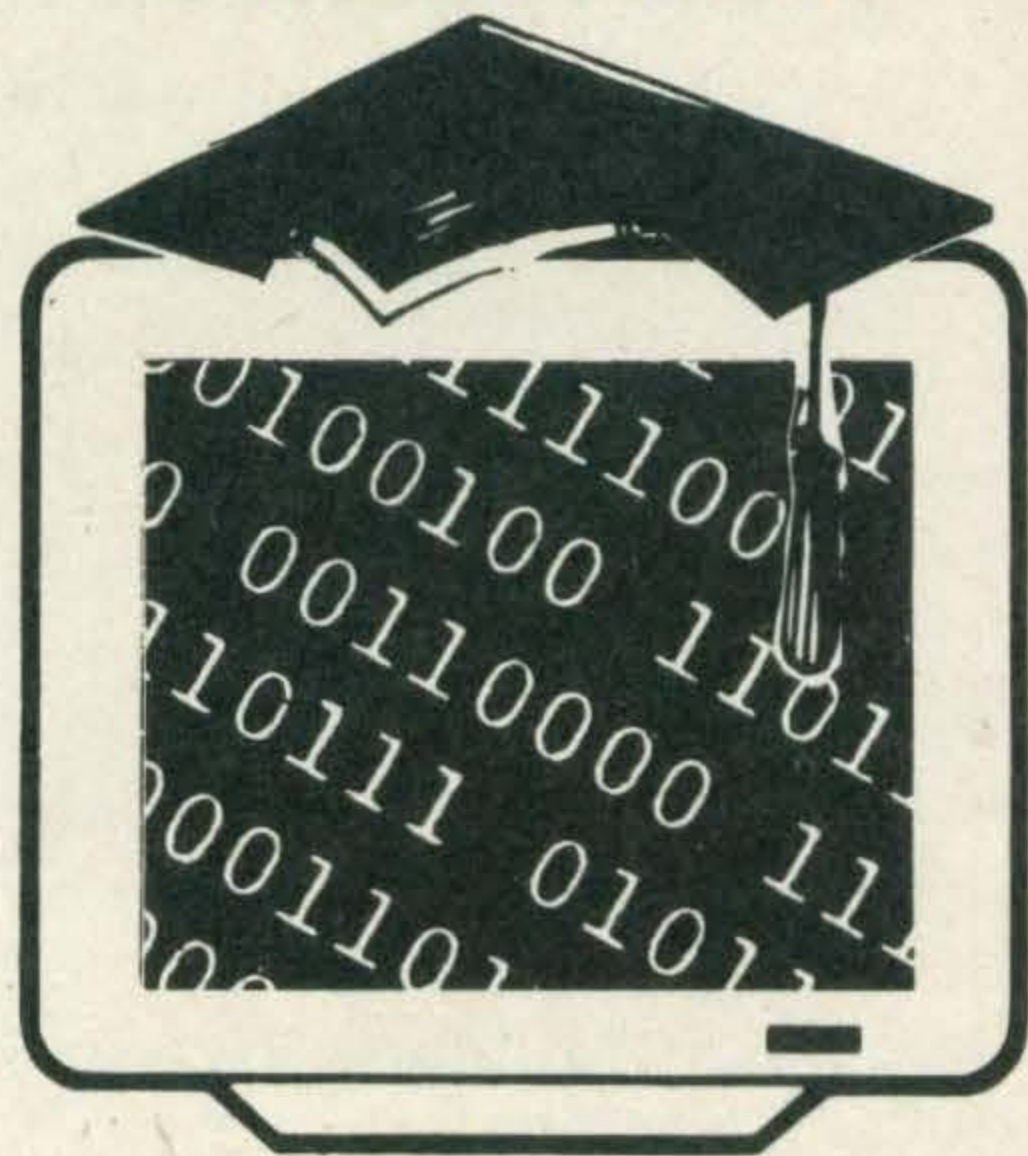
ORG #C000
DI
PUSH AF
PUSH BC
PUSH HL
LD HL,REGMEM
LD A,I ; save I register
LD (HL),A
LD HL,A,R ; save R register
LD (HL),A
INC HL
INC HL
INC HL ; save SP + 8
LD (REGMEM+2),SP
PUSH IX
POP BC
LD (HL),C ; save IX
LD (HL),B
INC HL
INC HL
PUSH IY
POP BC
LD (HL),C ; save IY
LD (HL),B
LD HL
INC HL
POP BC
    
```

Figure 1: This useful short program allows you to examine a register's contents at any time you want to in the program

scans the keyboard. As the interrupt controls the timer, it is clear that the Z80's INT pin is connected to the system clock which is derived from the 50Hz mains supply.

It would be possible to run the system in mode 2, but this would require a bit of hardware and is beyond the scope of this series.

The Z80 can be forced to



'The Z80 can ignore INT-style interrupts by executing a 'DI' (disable interrupts) instruction'

ignore INT-style interrupts by executing a 'DI' (disable interrupts) instruction, and the obverse with 'EI' (enable interrupts). Remember that if you do write a program which disables interrupts, the clock will not be updated and the system won't read the keyboard for you — you'll have to do it yourself. This is easy enough, of course, as all you need to do is execute an RST 38 instruction.

To round things off, we're going to write another program which will consolidate all we have learnt and discovered through this series. But don't worry — it isn't too complicated.

The purpose of the program (see figure 1) is to save all the register values in an area of memory each time it is called, so that we can examine register contents simply by calling it at any time in the program. We can even call it from BASIC to see what the interpreter does with the registers.

It may not be a very exciting program, but it does give us an opportunity to use the DI and EI instructions and to see most of the Z80's addressing

```

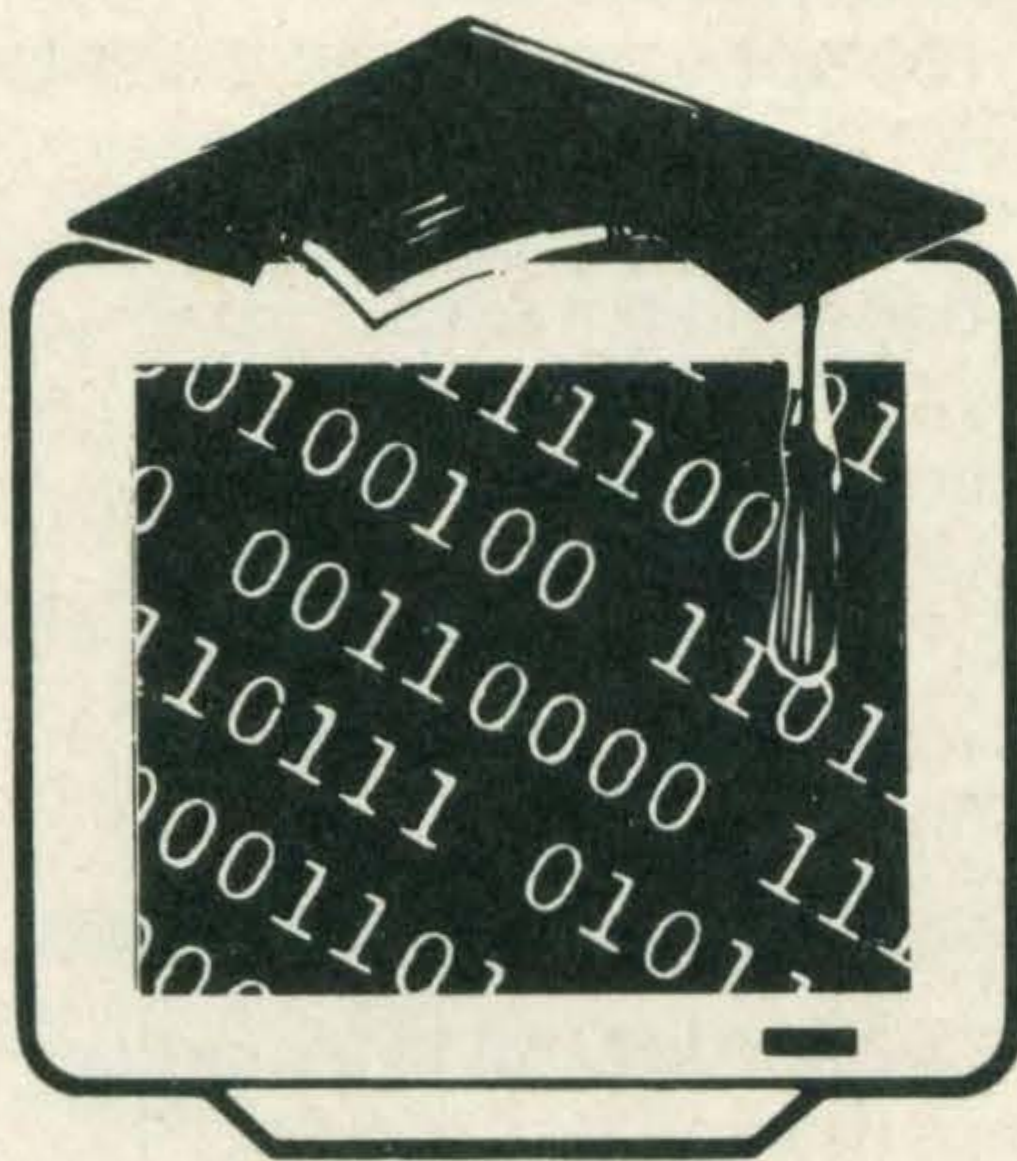
LD (HL),C
INC HL ; save L
LD (HL),B
INC HL ; save H
LD (HL),E
INC HL ; save E
LD (HL),D
INC HL ; save D
POP BC
LD (HL),C
INC HL ; save C
LD (HL),B
INC HL ; save B
POP BC
PUSH BC
LD (HL),C
INC HL
LD (HL),B
LD HL,(REGMEM+2) ; save AF
LD BC,8 ; adjust saved SP
ADD HL,BC
LD (REGMEM+2),HL ; and re-save
LD HL,(REGMEM+8) ; retrieve HL ...
LD BC,(REGMEM+12) ; ... and BC ...
EI
POP AF ; ... and finally AF
RET
REGMEM: DEFS 16
    
```

modes in operation in one program.

We disable the interrupts at the start of the routine simply as a precaution; the MSX ROM's interrupt routine (RST 38) does not actually affect any registers, so there is no real need to execute DI. However, there are numerous commercial programs which incorporate interrupt routines which do *not* preserve all the registers. The precaution is therefore worth taking.

The program, which is best considered as a subroutine, stores first the I and R registers in memory, and then proceeds down through SP (the stack pointer), IX, IY, HL, DE, BC and AF. The stored value of the R register is almost entirely meaningless, as this register has its contents altered constantly by the system.

Notice that we add 8 to the stored stack pointer value before leaving the routine. This is because when we store the stack pointer's value in memory, it will not hold a true value as we have pushed three two-byte items onto the stack (AF, BC and HL), and there is also the return address above this. By subtracting 8, we arrive at a



'You will recall that we execute machine code programs from BASIC by calling the USR function'

value for SP which corresponds with the value it had immediately before the call to this subroutine was made.

The EI instruction just prior to the final RET is very important, as the interrupts are disabled for the duration of the routine. If we did not re-enable them, the system would never call RST 38, so we would not be able to type

anything at the keyboard.

One aspect of machine code programming which is specific to MSX machines is passing values to and from the BASIC interpreter. You will recall that we execute machine code programs from BASIC by calling the USR function. This function always returns a result, but unless we take steps to send a value back, the function's result is undefined and of no use.

Back to BASIC

How do we return values to BASIC from a machine code routine? Well, when a machine code routine returns to BASIC, the system looks at the value held in memory location #F663. If the value in this location is 2, 3, 4 or 8, it assumes that there is a value to return.

#F663 = 2 indicates that there is a 16-bit integer to return, #F663 = 3 says there's a string, #F663 = 4 indicates a single precision floating point number, and #F663 = 8 indicates a double precision floating point number.

When a value is returned in this way, we must ensure that it is stored at a particular group of locations. These are:

Integer: #F7F8 = low byte
#F7F9 = high byte
such that integer = low byte + (256 * high byte)

String: #F7F8 = addr low
#F7F9 = addr high

Such that addr = addr low + (256 * addr high), and 'addr' is the address of a 'string descriptor block', formatted as follows:

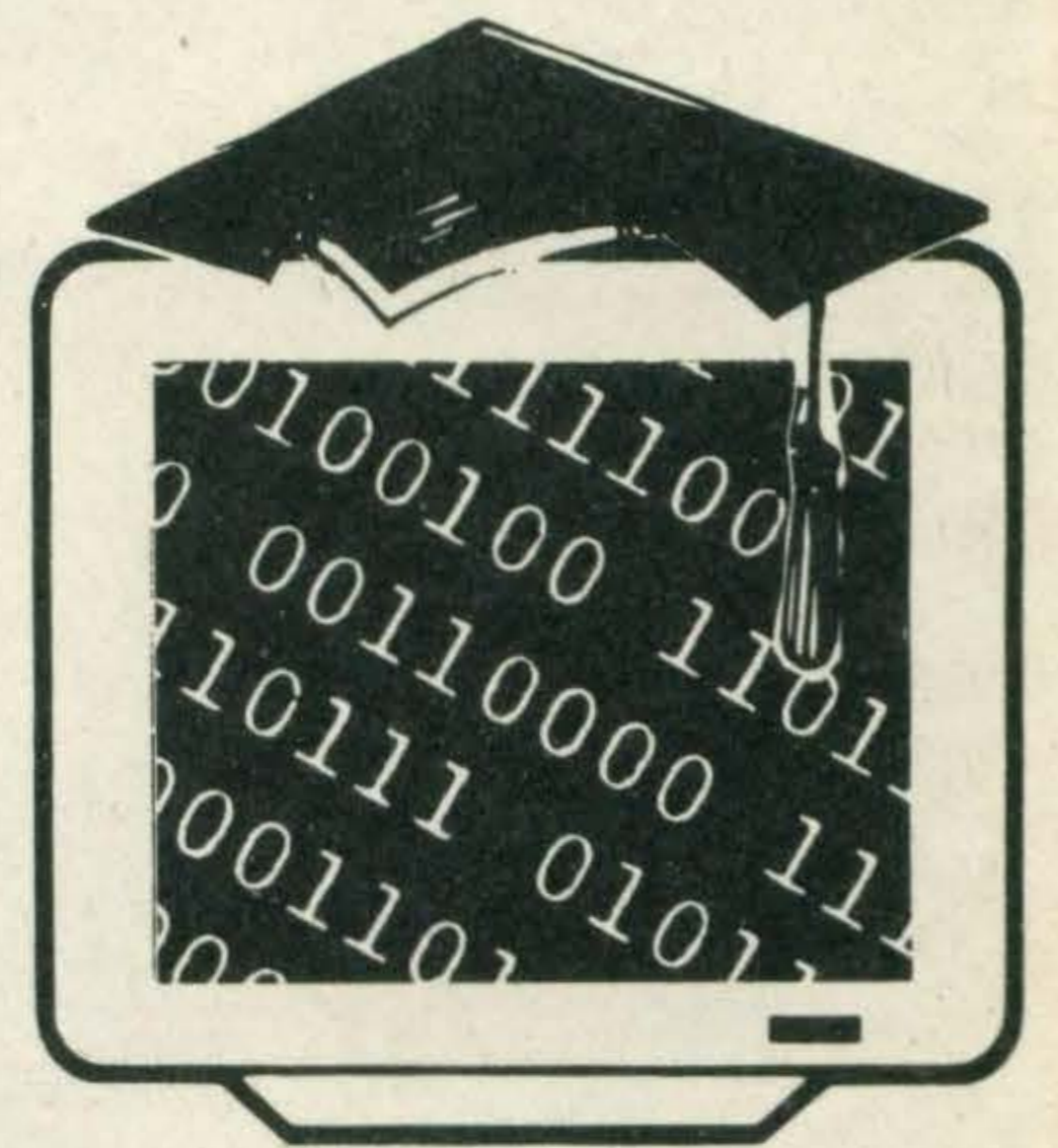
byte 0: string length
byte 1: saddr low
byte 2: saddr high

where 'saddr' is the address of the first character of the string, and each further character is adjacent to this in memory.

Single precision: #F7F6 to #F7F9 holds BCD ('binary coded decimal') representation of number

Double precision: #F7F6 to #F7FD holds BCD representation of number

Dealing with BCD representations of floating point numbers is a little complicated, and would not normally be considered by programmers until they are fully conversant with number



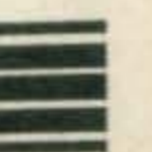
'It is very easy to manipulate variables with lightning speed in a machine code program'

systems. Integers and strings, on the other hand, are easy to handle, and it is often useful to be able to return these sorts of values back to BASIC.

The same mechanism allows us to pass the values of variables or constants to a machine code routine, as the USR function formats #F663 according to the type of variable passed. If the variable has a value, the requisite storage locations will be set to contain that value.

By writing a routine to check the value held in #F663 and react appropriately, it is easy to manipulate variables with lightning speed in a machine code program.

This brings the series to an end, and by now you should be confident enough to begin developing your own routines. We must stress once again how important it is that you buy a good assembler and debugging monitor if you intend to do anything serious with Z80 assembly language. Without these tools, you are fighting a battle which you have very little chance of surviving. It'll put you off machine code for life — not the idea at all!



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Those of you who buy MSX RS232C interfaces, either from JVC or Kuma will find an invitation to join MSX-NET enclosed in the box.

MSX-NET is a Telecom Gold based network intended purely for MSX micro owners. We will be providing information on the NET (full details to be announced soon). But it is also an excellent way for you to contact us. It saves all that messy and unreliable business with ink, paper and stamps, and it's a lot faster. So if you have a question, a problem or simply something

to say, you can send us a few lines.

Any interesting messages or questions will be printed in *MSX Computing*, unless you specifically request otherwise. We'll try to get back to you as soon as possible with the answers to your technical queries, although difficult ones may take a little time, and impossible ones a little longer.

MSX-NET is also a good way of telling us what you would like to see in the magazine, what you think is wrong, and, of course, what you think is right! And any tips you have to pass on to other MSX micro users will be gratefully received.

So how do you do it? For a start, you have to log on to Telecom Gold, system 83. Then go to the MAIL system, write your message and address it to our mailbox — MSX013. We'll be checking the box several times a day, so your words won't go unheard.

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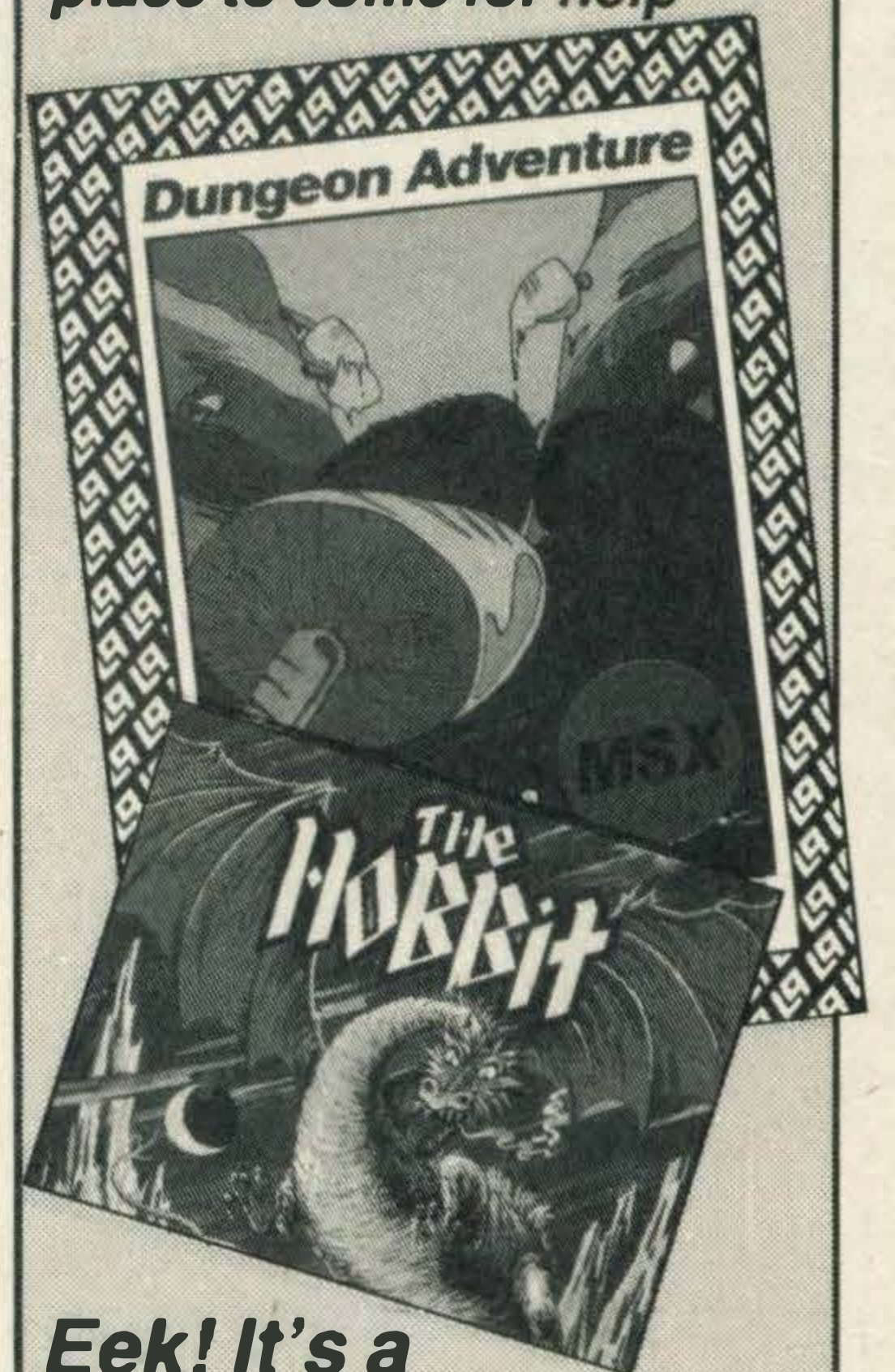
NEXT MONTH

MIDI magic

We put the first MSX MIDI interface and its accompanying software through its musical paces

Real adventure!

Next month sees the start of our regular adventure column. So if you can't get out of the Hall of the Mountain Kings, or are trapped in the Goblin's Dungeon, this is the place to come for help

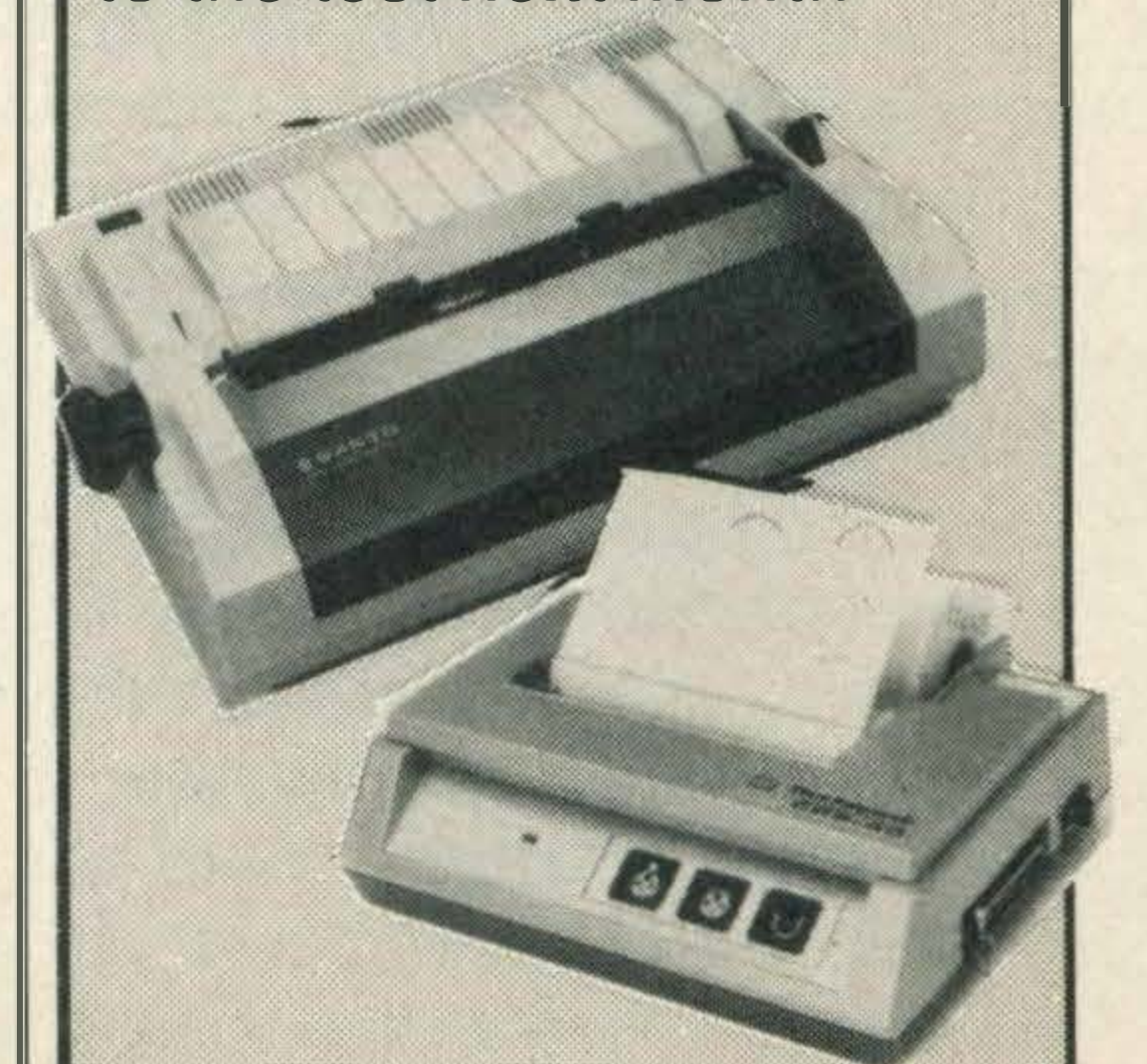


Eek! It's a mouse . . .

We take a look at the first MSX mouse to arrive from Japan — is it the answer for business software users?

Testing

Two very low cost printers — one a daisywheel, the other a printer/plotter — are put to the test next month



COMPETITION

WHAT YA
GONNA WIN?

You've seen the movie, now play the game! The 50 winners of this month's competition will each win a copy of the MSX version of *Ghostbusters*, the top-selling Activision game you'd have to pay £11.99 for in the shops.

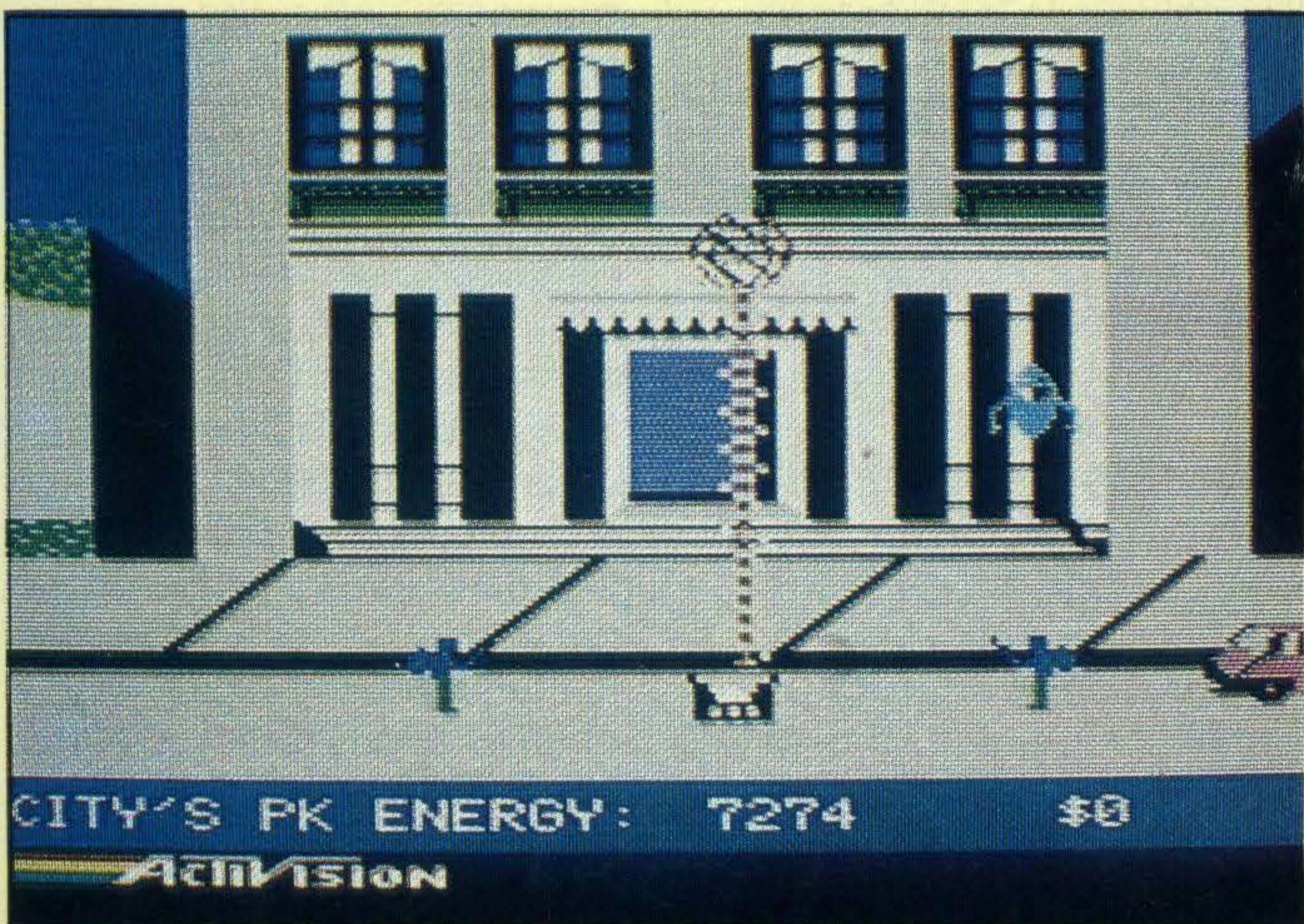
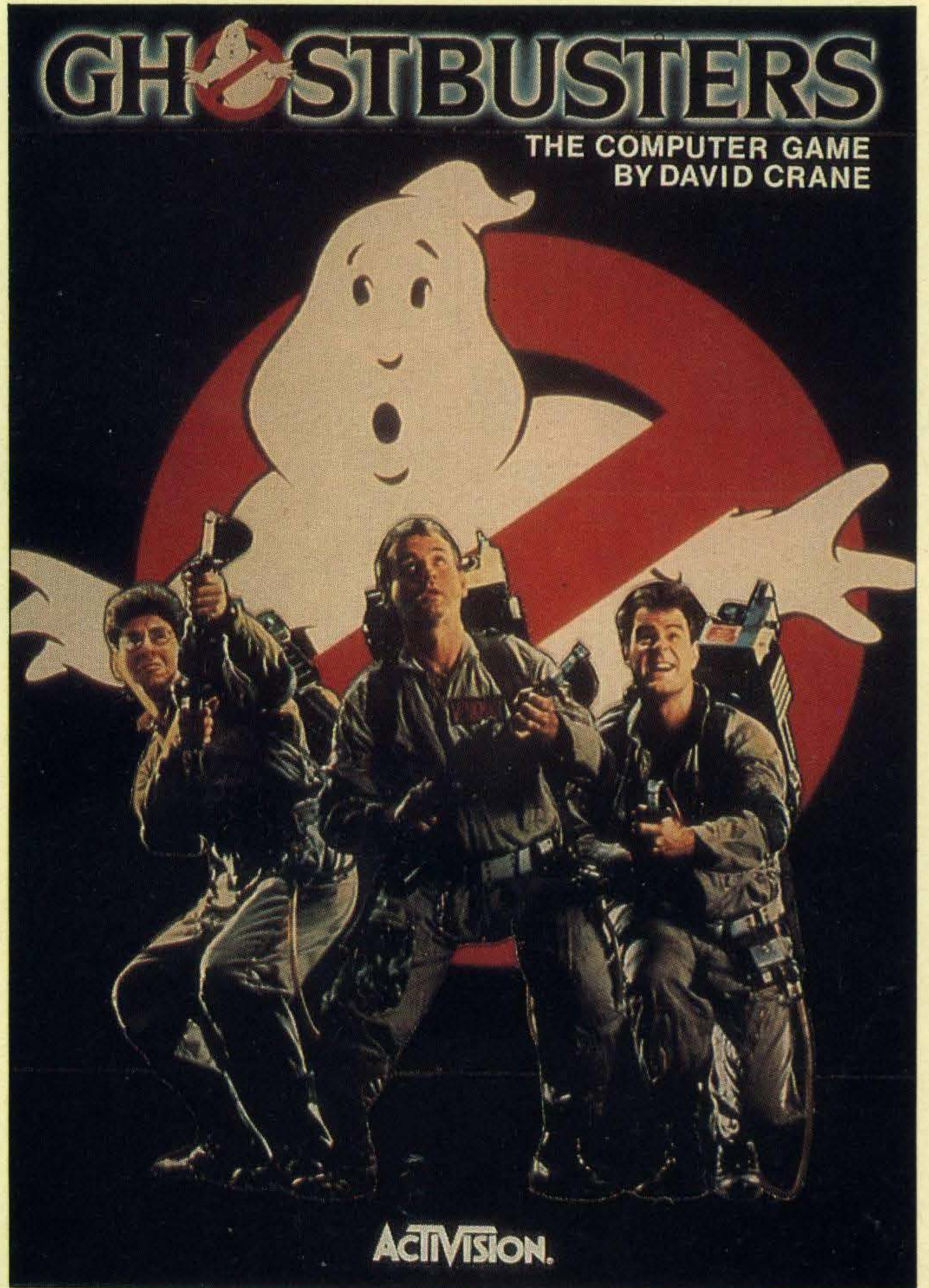
What do you have to do? It's simple — just see how many words you can make out of the word 'Ghostbusters'. The only rules are: no plurals, no proper names, and all words must be at least four letters long.

The 50 highest scoring entrants will win the prizes, so list your words on the back of a postcard, together with the total, and send to Ghostbusters Competition, *MSX Computing*, 38-42 Hampton Road, Teddington, Middlesex TW11 0JE, to reach us no later than Friday 30th August.

Remember to include your own name and address — you'd be surprised how many people don't!

RULES

1. The judges' decision is final and no correspondence will be entered into
2. No employees of Haymarket Publishing or Activision (UK) Inc or their families may enter
3. The winners' names will appear in the November issue of *MSX Computing*



WINNERS

Here are the 10 winners of the June Binatone competition:

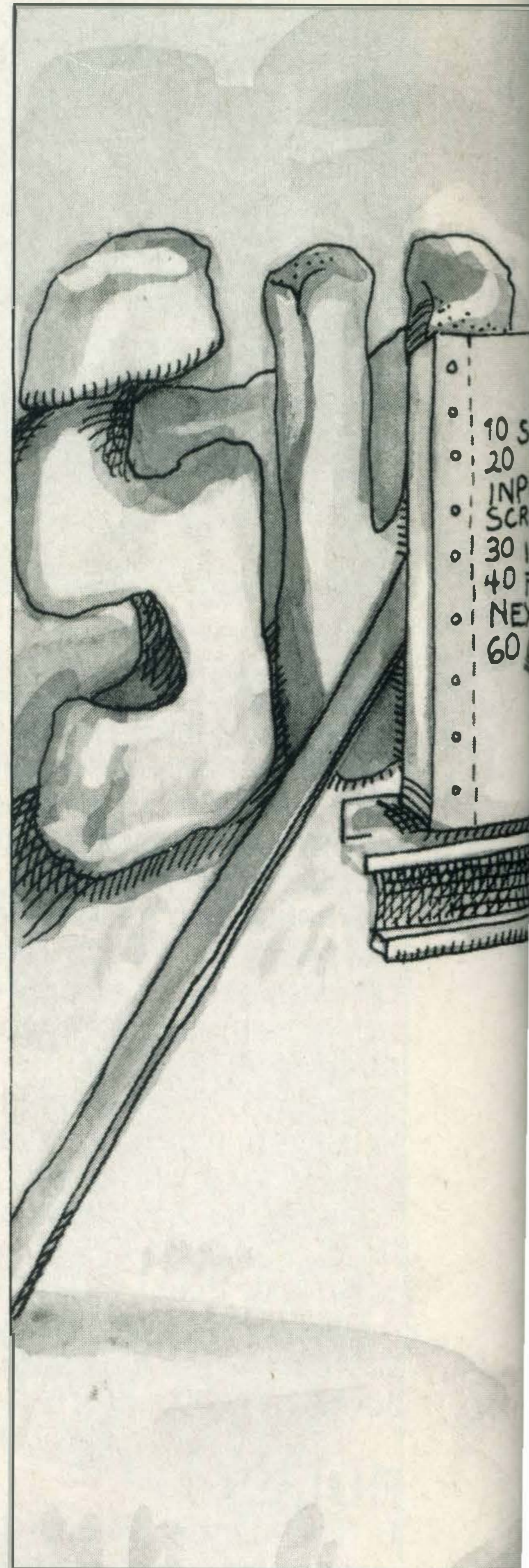
John Simmons, Southampton; David Styles, Erith; S Walker, Leicester; P Jeram, Bognor Regis; Elizabeth Waters, Havant; Stephen Daine, Cleethorpes; A.E.A. Jambol, Bristol; P.O. Godfrey, HMS Ariadne; A Hinkly, Coulsdon; Philip Cox, Derby.

Congratulations to you all. Your data recorders are in the post.

The correct answers were:

10,20,30,40,70,100,150,160,170.

A CHANGE OF ROUTINE



In the JUNE feature on loops and decisions, we used a number of musical examples, because music frequently has this 'circular with variations' quality. This month it is the turn of pictures to take the stage. A picture is worth a thousand words — which is a good recommendation.

There are other special characteristics about pictures on your home computer, however, which help to illustrate this month's feature on subroutines particularly well.

Suppose you want to create simple pictures on your MSX. Let's look at a short program to investigate this:

Subroutines mean tidier programs. This month, Tim Markes shows how careful structuring can stop you tying your programs in knots

```
5' ** Pictures [1] **
10 SCREEN 1:PRINT
"Line=1 Circle=2"
20 INPUT "Picture" ;Q:
SCREEN 2
30 IF Q=1 THEN
LINE (30,50) — (150,50)
40 IF Q=2 THEN
CIRCLE (100,100), 50
50 FOR T=1 TO 1000: NEXT
60 GOTO10
RUN
```

Remember that SCREEN 2 is the high resolution graphics screen — 256 pixels wide by 192 deep — so the top left pixel is at co-ordinate (0,0) and bottom right at (255,191).

We have to switch to this screen mode (or the lower resolution SCREEN 3) for the

graphics commands to become effective. The delay loop in line 50 is needed to preserve the picture for a few moments, before the program reverts to a simple TEXT screen.

The simplest form of LINE uses absolute (rather than relative) co-ordinates: so LINE (X1, Y1) — (X2, Y2) will draw a line from point X1, Y1 to X2, Y2. Tricky stuff! To draw a circle with centre at co-ordinates X, Y and radius R — just CIRCLE (X, Y), R. Why not modify the above example to check your understanding of LINE, CIRCLE and explore the SCREEN 2 (256 × 192) layout? The simple structure of our *Pictures [1]* program is



easy to understand:

```
10 Text screen: code list
20 Picture?: graphics screen
30 IF Q=1 show a LINE
40 IF Q=2 show a CIRCLE
50 delay loop
60 GOTO 10
```

Bear in mind that the above lines are only notes, not the program itself. The program is also easy to test and change — providing you are only dealing with two picture options, a single LINE or a CIRCLE.

Suppose, however, you want to enhance your program to include several lines or circles of different sizes. Or maybe you want to include

'We can use the same subroutine to achieve different results. This is the most powerful use of the subroutine system'

much more complex picture options which would require more graphics commands and a longer menu. This is where the programming technique used in *Pictures [1]* becomes inappropriate. Say you wanted to introduce this:

```
45 IF Q=3 THEN show a HOUSE!
```

Well IF certainly allows you to put several instructions on the same line, but more than a couple looks crowded. If you tried to build a house in the 200 odd characters available on the line 45, it would be a primitive house and a very messy program indeed.

It is just possible to include

an enhancement like this using GOTOs, but the program would lose its structure and become difficult to understand and maintain — don't even consider it!

This is the time — *before* the program becomes spaghetti-like, but tasteless — when you should rewrite using subroutines. Like this:

```
05 *** Pictures [2] **
10 SCREEN 1:GOSUB70
20 INPUT"Picture"
   ;Q:SCREEN 2
30 IF Q=1 THEN GOSUB 100
40 IF Q=2 THEN GOSUB 200
50 FOR T=1 TO 1000: NEXT
```

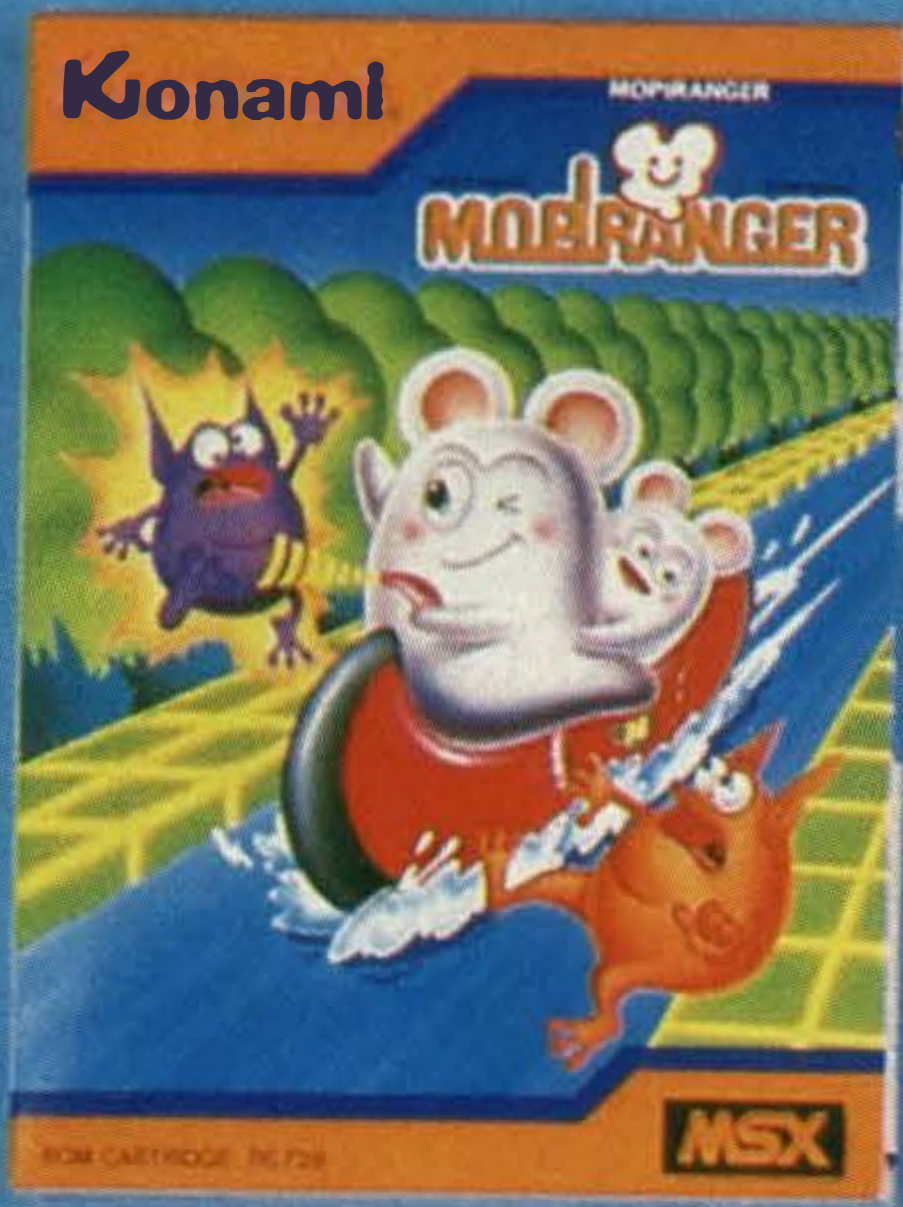


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```

60 GOTO10
65 *** Subroutines! ***
70 ** Picture menu *
80 PRINT "Line=1 Circle=2"
90 RETURN
100 ** Picture 1 *
110 LINE (30,50) — (150,90)
120 RETURN
130 '
200 ** Picture 2 *
210 CIRCLE (100,80), 50
220 RETURN
    
```

Notice that the program has retained its logical structure (lines 10-60). The sequences for printing the initial picture code menu and drawing individual pictures have been rewritten as subroutines.

Although there are a few extra program lines in total, these three short subroutines can now be enhanced to a considerable degree without affecting the simplicity of the original design. Let's check how GOSUB and its partner RETURN work.

GOSUB tells the program to jump to a specified line number in your program and RETURN causes a jump back to the instruction immediately following the (most recently issued) GOSUB. The operation is very similar to RUN and its partner END, but GOSUB is issued within a program.

The other crucial difference is that RUN clears all variable settings, whereas GOSUB does not alter a thing. You can even use GOSUB at command level. Try testing the three subroutines in *Pictures [2]* using these entries:

```

GOSUB 70
SCREEN 2: GOSUB 100
SCREEN 2: GOSUB 200
    
```

Notice that the pictures will only last for a fraction of a second. To preserve them, either get nifty with your STOP key or include a delay loop.

This ability to test sections of your program independently is a very important bonus. When your mind is blown and your routines refuse to work, be thankful that you wrote well structured programs with plenty of subroutines. You will won't you?

Although *Pictures [2]* is a great improvement on *Pictures [1]*, something still doesn't feel quite right. If you

want to add a large number of picture options, the number of IF statements (line 30,40) is going to go up proportionately. Always assume that your computer has a neat solution to any repeated process like this, if you look hard enough.

What we need is an instruction which will, depending on the value of Q, GOSUB to the corresponding program line number in a list (of line numbers). Here it is:

```
30 ON Q GOSUB 100, 200
```

This single line can now replace two of the original lines (30 and 40) and enhance the program in the process — what a bargain! We can now develop and add any number of picture subroutines to the program.

Providing the relevant SUB address is added to the ON Q GOSUB list of line numbers (and the picture menu updated), the new program will work immediately. The general form of this instruction is ON <expression> GOSUB <list of line numbers> and there is a similar version for GOTO — check it out, it can be very useful.

If the value of <expression> is greater than the number of entries in the GOSUB list, the program just proceeds to the next instruction. Try some invalid picture codes to confirm that the logic of *Pictures [2]* is still intact.

There is sufficient justification for advocating GOSUBs on the grounds of improving program structure, elegance and maintainability alone. An even more powerful reason, however, is when a similar sequence of program lines is needed at more than one logical point in the program.

Rather than include (and type in) the sequence twice, it is much more economical on

'Assume your computer has a neat solution to any repeated process'

'This ability to test sections of your program independently is a bonus'

program space and patience to write the sequence as a subroutine and GOSUB/RETURN to/from it at the various points in your program.

The final program of the month, *Flowchart* will actually draw a flowchart (slowly) showing how a typical subroutine system works. Naturally it also uses subroutines itself. You can see (lines 390,400) how the same subroutine is entered from different points in the program.

```

300 *** Flowcharts! [1] **
310 SCREEN 2
320 P=20: S=5: E1=4:
E2=16
330 X=35: Y=5
340 PRESET (X, Y)
350 FOR N=1 TO
P:COLOR15
360 PSET STEP (0,8)
370 P=36—N: PLAY "N=P;"
380 FOR T=1 TO 350: NEXT
390 IF N=E1 THEN
GOSUB500
400 IF N=E2 THEN
GOSUB500
410 NEXT N
420 FOR T=1 TO 2000:
NEXT
430 END: *** or RETURN **
440 '
500 ** Subroutine Picture *
510 SX=X+60: SY=Y+20
520 LINE — (SX, SY)
530 FOR C=1 TO S
540 PRESET STEP (0,8)
550 P=72—C: PLAY "N=P;"
560 COLOR 15: PSET STEP
(0,0)
570 FOR T=1 TO 350: NEXT
580 NEXT C
590 LINE — (X, Y+N*8)
600 RETURN
    
```

Try RUNNING this first and watch as a typical program (length P) calls a subroutine (length S) at two points (E1 and E2) — with sound effects, of course! The position of the picture on the screen is determined by the settings of X (across) and Y (down).

Now consider this: if line 430 is changed from END to

RETURN, this program can itself be a subroutine of a higher level program. By assigning other values to P, S, E1, E2, X, Y and then entering (GOSUBbing) the routine 'late' at line 340, we can draw a different pictorial example of a subroutine system alongside the first. Like this:

```

430 RETURN: ' (or END)
700 *** Flowcharts! [2] **
710 GOSUB300
720 P=12: S=18: E1=3:
E2=7
730 A=140: B=5
740 GOSUB340: END
RUN700
    
```

So, providing we incorporate suitable variables, we can use the same subroutine to achieve different results. This is the most powerful use of the subroutine system and variables used for this purpose are often called *subroutine parameters*.

Here is word about some of the less familiar instructions in *Flowcharts [1]*. PRESET (X, Y) sets the X, Y point on the screen to background colour (this is merely to fix a reference point for subsequent instructions). PSET (X, Y) plots a point in current foreground colour. Wherever you see the qualifier STEP (lines 360, 540, 560), the co-ordinates are RELATIVE (to the current screen position) — rather than absolute. If you leave out the 'from' co-ordinates (lines 520, 590), the LINE will be drawn from the current screen position. All these instructions have other options — including colour — so check them out in your manual if you want to expand or enhance the program.

Simple computer pictures are ideal subjects for programming with subroutines. Now you know how to draw lines (and circles), why not add a house to your picture menu? Remember that a house is mainly just a larger version of a window in a different position.

And if you write your house subroutine with suitable variables as parameters, you can create many different designs and sizes on the screen at the same time. Have a GOSUB!

MSX

Having some trouble getting hold of software? Don't worry, our new service will whisk top quality tapes and ROM cartridges to your machine.

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On the next page, you'll see a list

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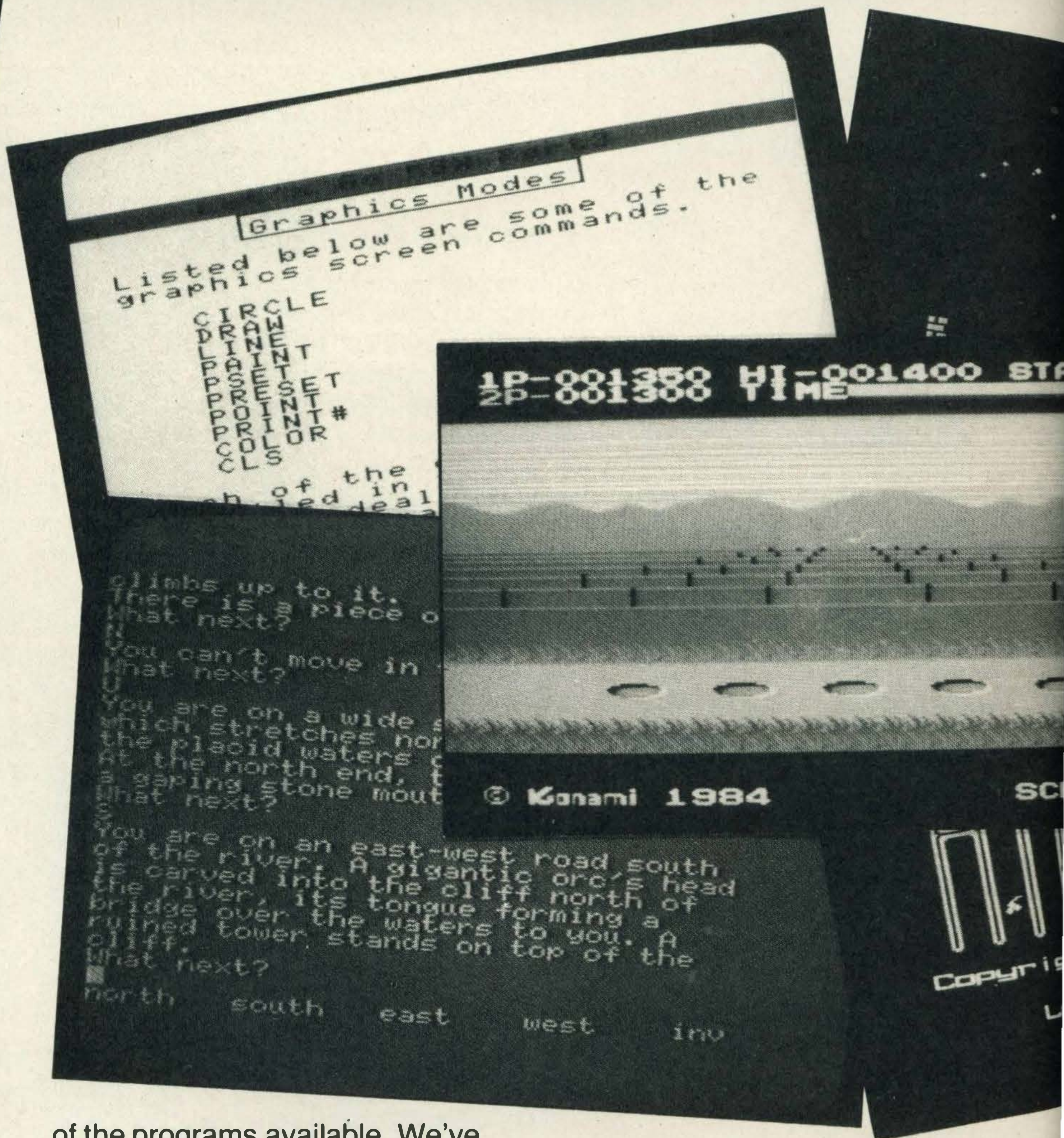
There's something for most tastes in our selection, but if you think there are any glaring omissions, then please write and tell us. We'd also like to know all your high scores, so we can publish a league table.

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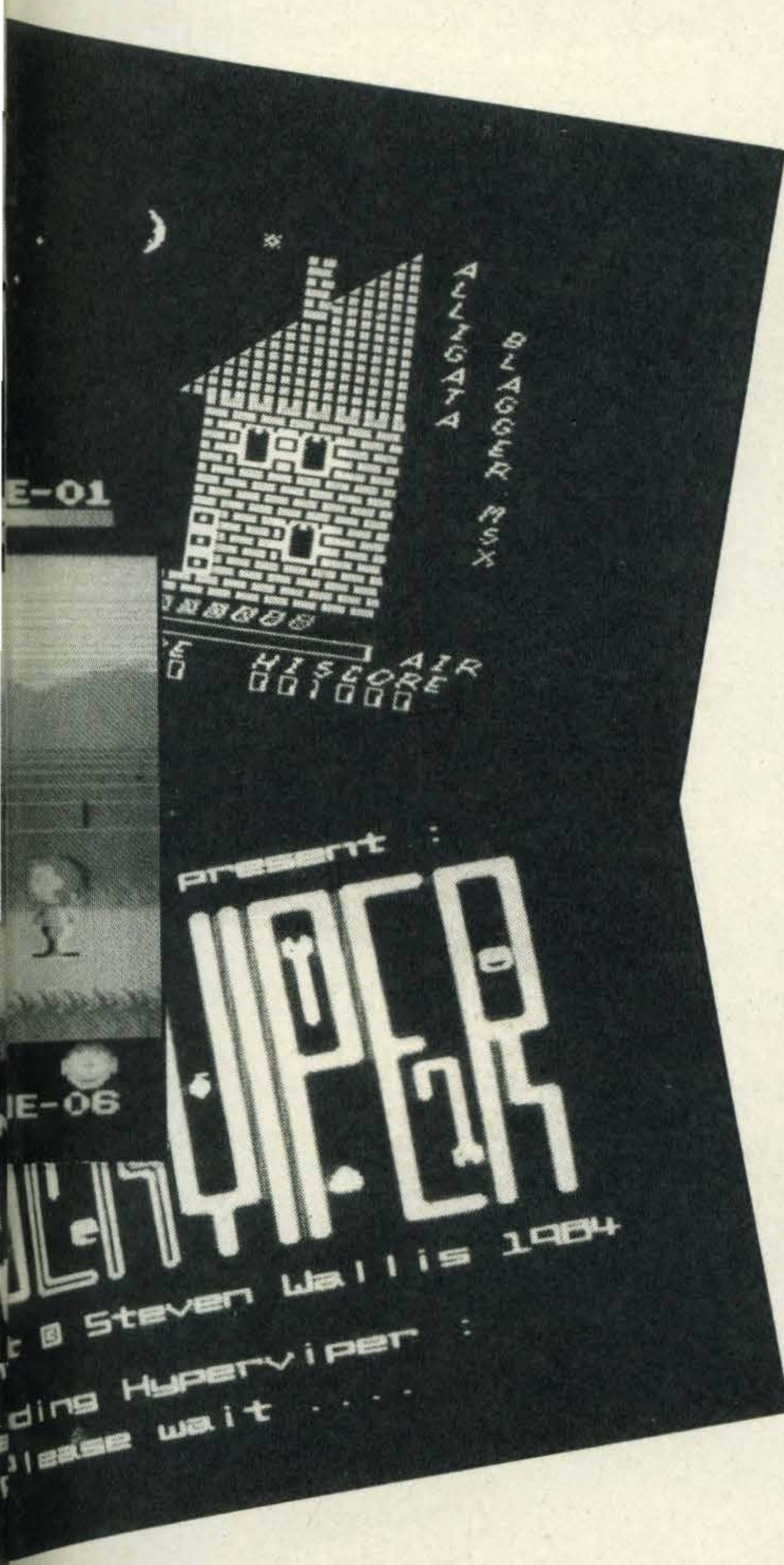
other readers on how to solve them. We reckon that adventures are really popular, judging by your response so far, so get those letters rolling in!

A word about the way we've listed the titles on offer. The name of the program is followed by the name of the publisher, the price, a quick description, and the date of the issue in which we reviewed it. The price is all you need to pay — it includes postage and packing (except for overseas readers) and VAT. The price is exactly the same as it would be in your local retailer.

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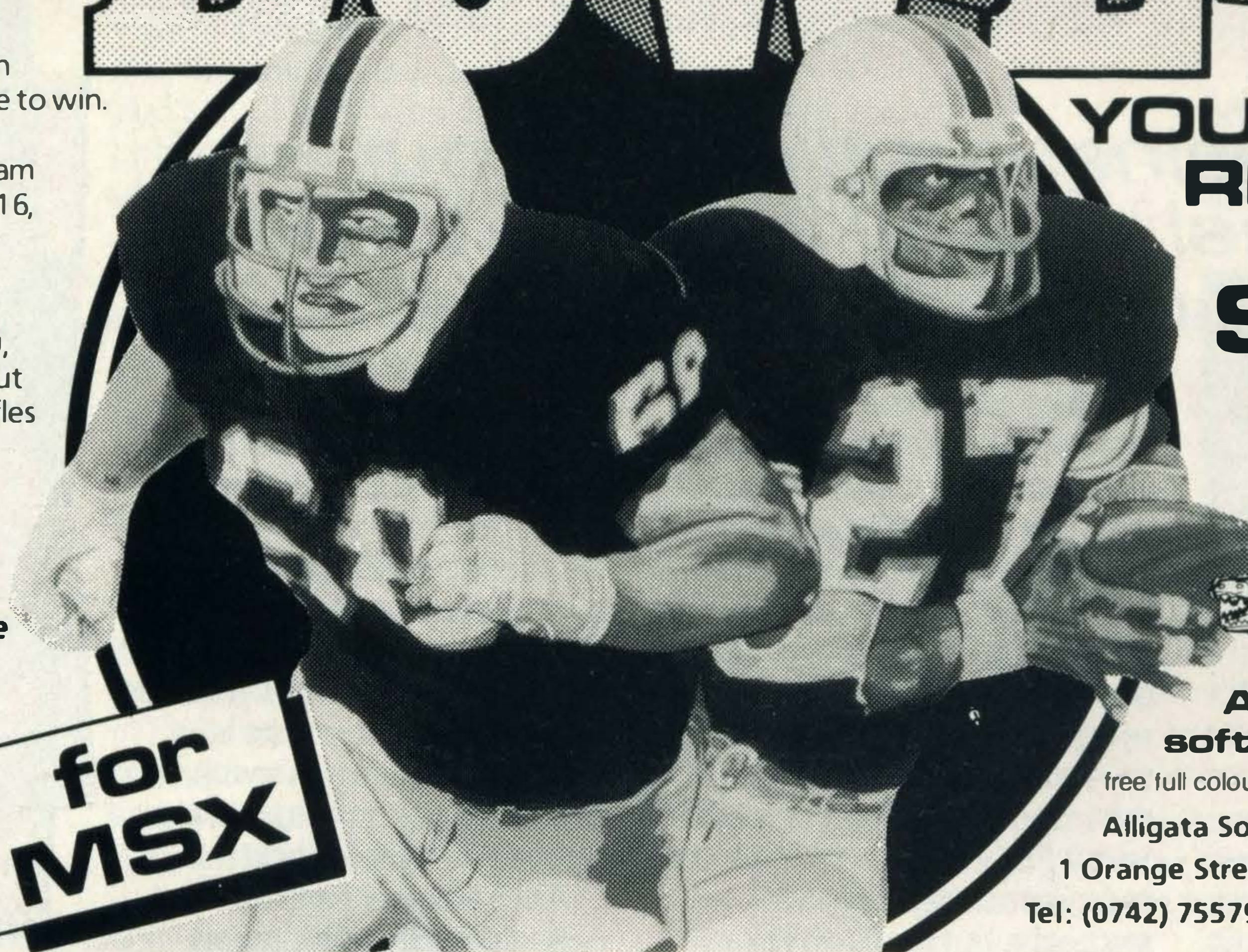
The huddle breaks, the game plan set, tension builds, the team spreads on the 45 yard line 16, 25, 45, hup!!

All hell breaks loose, where's the ball. A white blur streaks along the byline 35, 30, 25, 20, 15, the ball barrels out of a mass of human muscle rifles through the air, the crowd grows still, the quarter back leaps, human and leather projectiles converge, thwack, **TOUCH DOWN!!!**

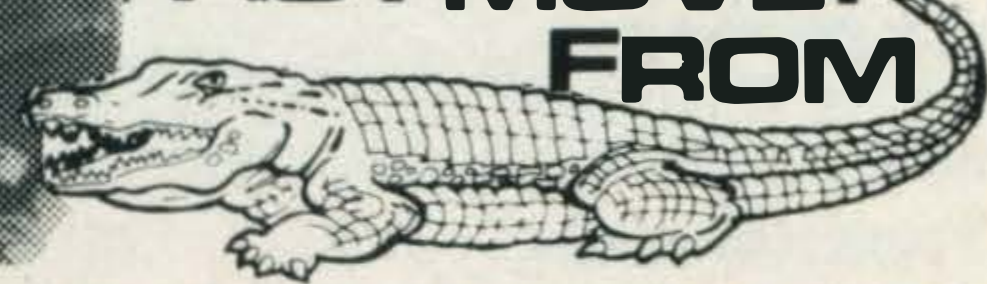
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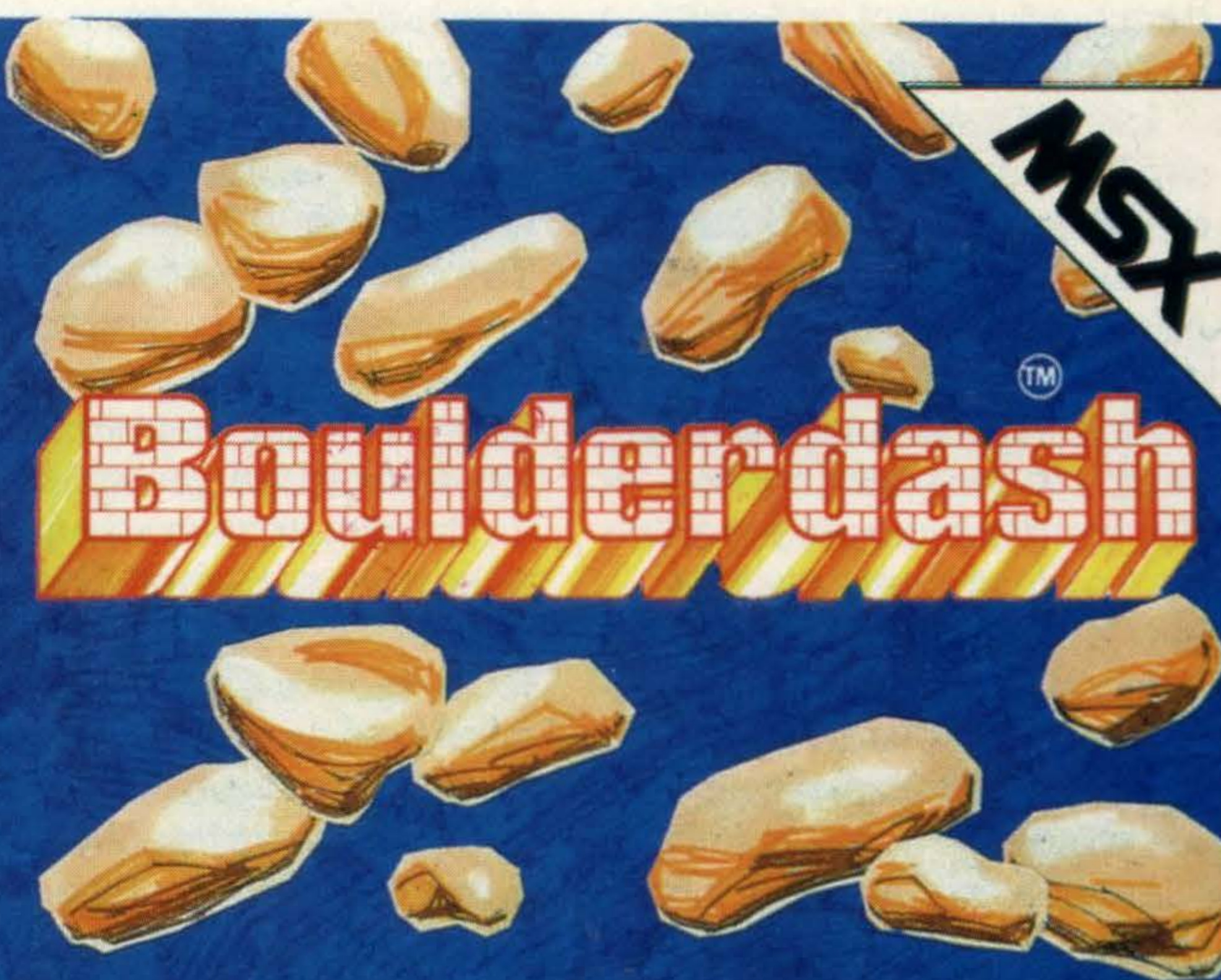
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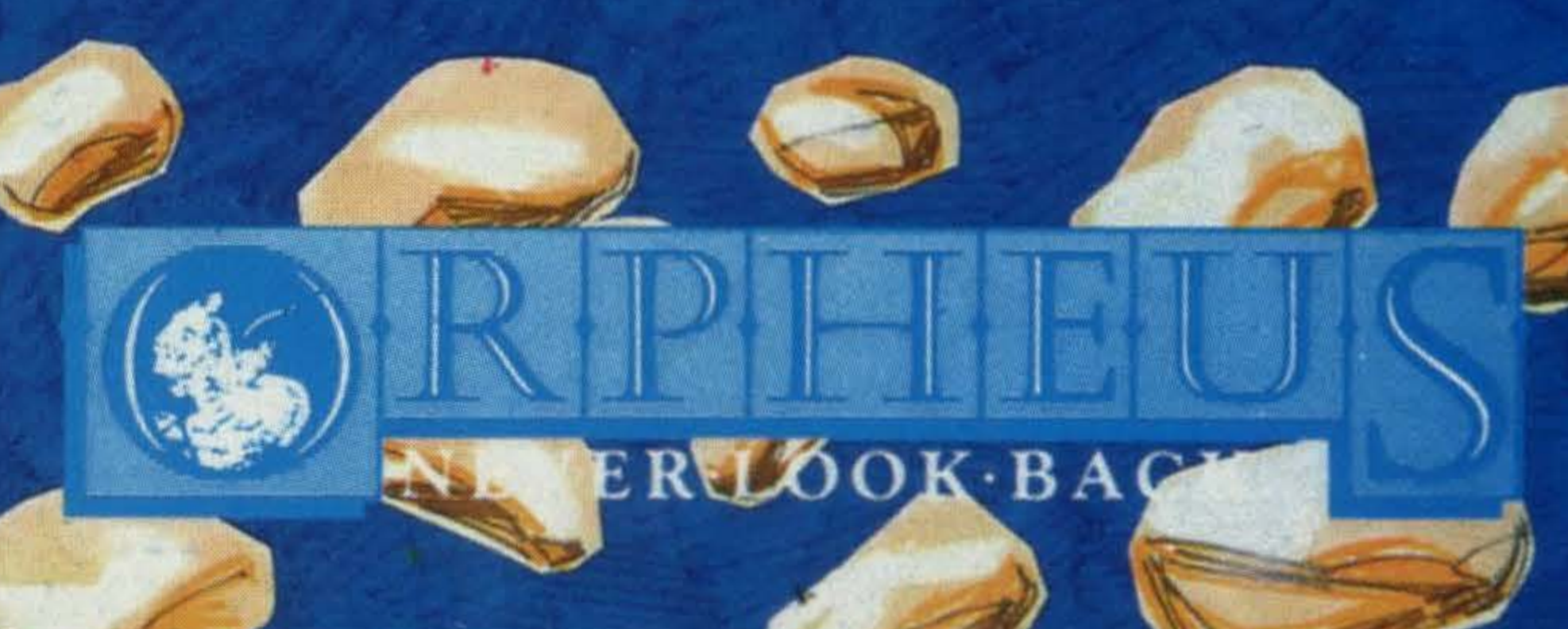
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Software Scene

Games, business, utilities — our review panel puts all the very latest MSX software through its paces

ICICLE WORKS

Supplier: State Soft (07073) 28181

Type: Arcade

Format: Cassette

Price: £7.95

Boulderdash became an immediate success when it first came out in America on the Atari games system. Since then the idea has been borrowed, bought and imitated by many.

Icicle Works's theme is similar to *Boulderdash*, but is not an exact replica. State Soft has added a few clever ideas of its own and the result is extremely amusing.

At first glance, *Icicle Works* seems to be a rather poor *Boulderdash* cousin; the little man's movements are slow and the screen scrolling is jerky and inefficient. But don't be put off because it is one of the most addictive games we've seen in ages.

Thirteen screens add variety, but before you go onto any of these, one of the four first screens has to be negotiated. The player

controls a little man with either a joystick or cursor keypad and starts off in a screen which is empty except for a key.

Picking this key up activates the entrances to the four levels. You start off with 160 seconds, but moving into a room immediately lowers the time allowance. The time awarded varies from level to level. For instance the nearest room concedes only 53 seconds, but the furthest screen allows you 100 seconds for completion.

Some of the time limits are just too short. For instance on screen three you are allowed an impossible 34 seconds. The best idea here is to try and choose a good route, making the most of maximum time limits and mapping the locations in the game.

The aim in each screen is to assemble an object. The type of object varies from level to level, but the parts are always scattered around the screen in disguised or visible form.

Each level is fraught with danger; snowballs, polar bears, penguins and iced water to name a few. The snowballs are everywhere and digging out their foundations

causes them to topple down, à la *Boulderdash*. If your man is unfortunate enough to be underneath he loses one of his four lives. Extra lives are awarded after a set number of points have been won.

Pushing a snowball aside is possible but if the man is trapped beneath an avalanche your only option is to commit suicide — very messy!

As the object parts are collected, they are pieced together on a separate part of the screen in the bottom right hand corner — helpful as it indicates how many bits you still need.

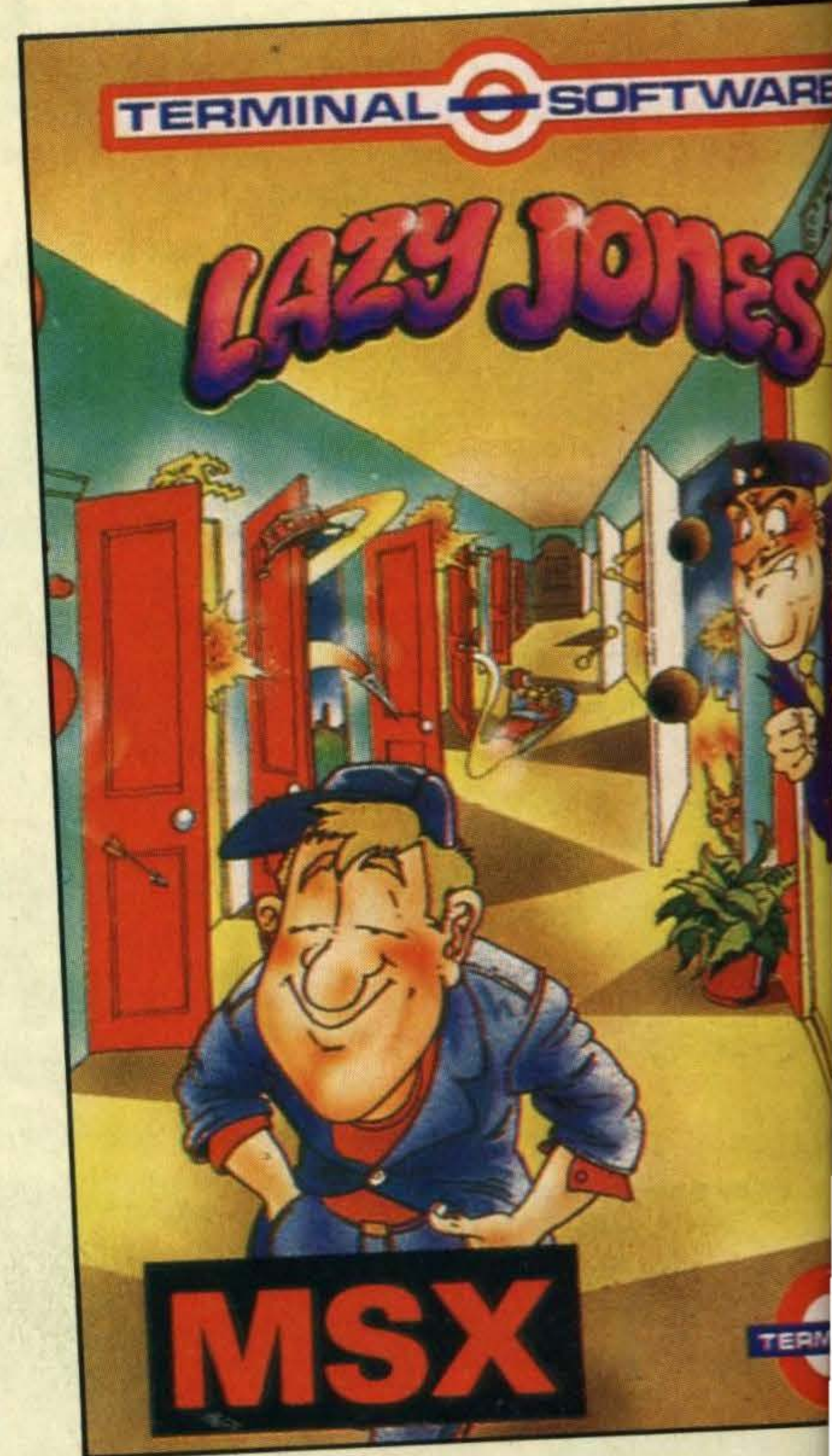
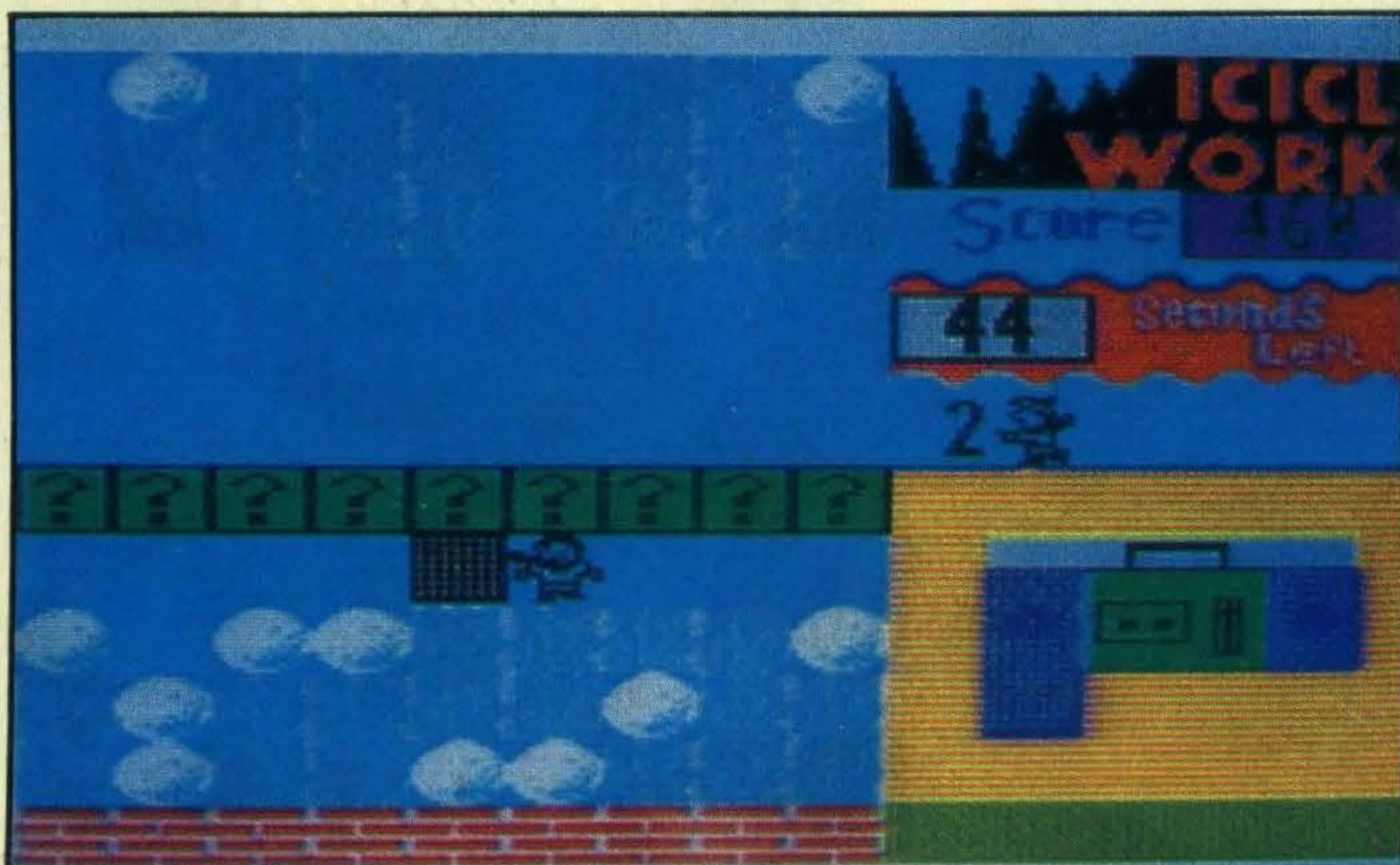
Contact with a polar bear or penguin is lethal. Killing them with a falling snowball is the best plan — a dead penguin changes into a cache of toy parts.

Iced water is another hazard to watch out for. Removing a snowball plug releases the flow and once it starts nothing can staunch it.

Magic grids hide toy parts and the only way to collect them is to drop snowballs from above, then rush underneath to open the traps — great fun.

Although *Icicle Works* isn't quite up to the programming quality of *Boulderdash*, it is great fun. Once you're over the initial disappointment of the man's jerky slow movements, it is almost impossible to pull yourself away.

Graphics: Jerky
Sound: Snappy but repetitive
User Appeal: Initial disappointment changes to addiction
Conclusion: Flawed but fun



LAZY JONES

Supplier: Terminal Software 061-761 4321

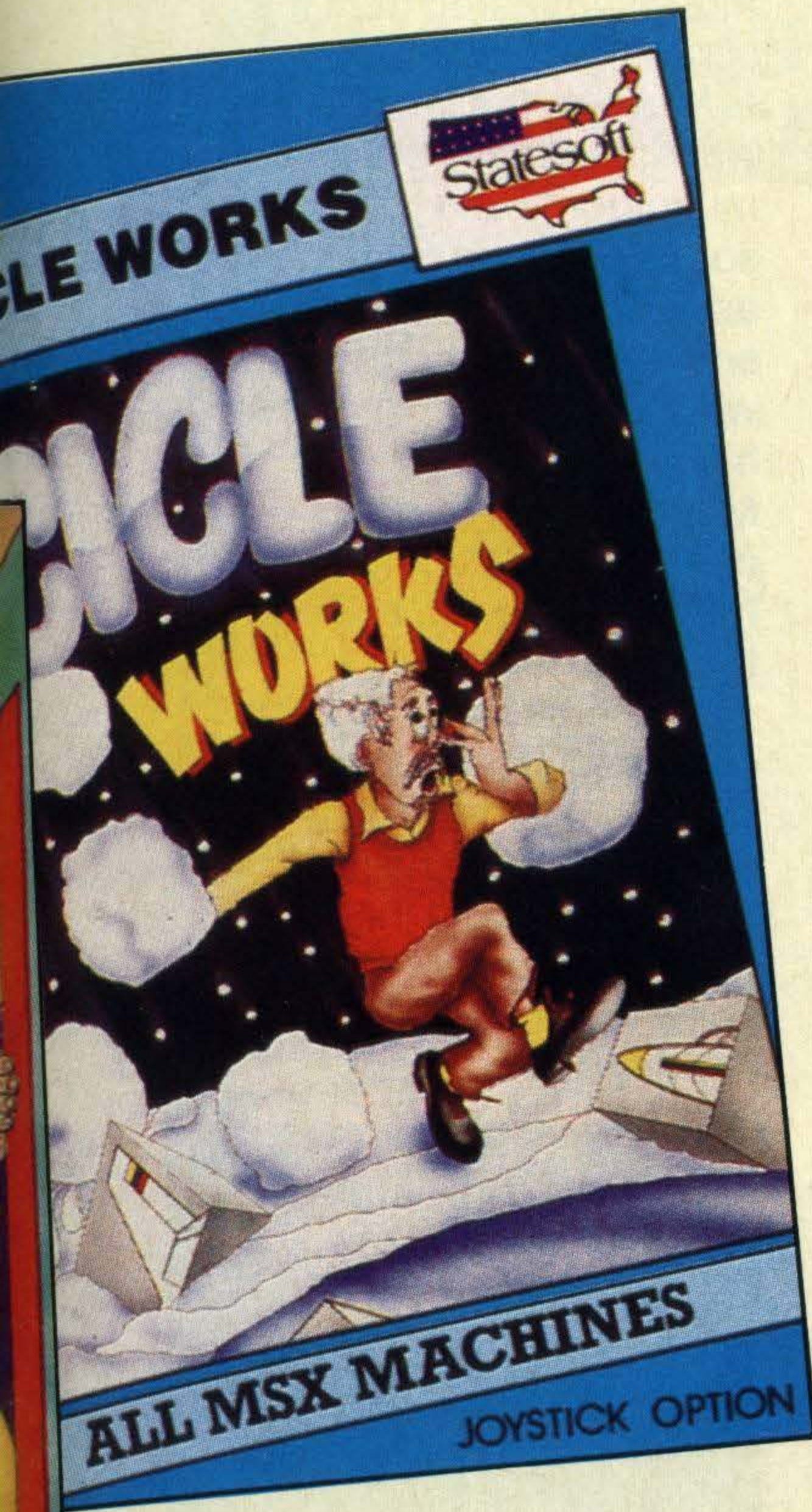
Type: Arcade

Format: Cassette

Price: £8.95

Lazy Jones is so lazy that, when faced with the prospect of work he promptly has a heart attack. His only aim in life is to play computer games. So when he sees his manager, the manager's ghost or even the cleaning trolley — anything that might mean work — he rushes into a hotel room to play.

Helping Lazy Jones in his incredibly lazy life is the main purpose of the game. Jones is currently employed in a hotel containing 100 rooms. The hotel has three floors, each with six doors leading off. Lifts connect each of the floors. All



danger's way, and you get a few seconds' rest.

We were very impressed with this program because each room houses a completely different game giving you, in effect, several games within the game itself.

The graphics are superb — they're colourful and unusual and the sounds are tuneful and jolly. There is an option to turn the sound off, but it does complement the game well.

In Turk you have to shoot forks at a turkey-bearing conveyor belt, while at the same time avoiding flying telephones. A time limit regulates the time spent on the game and a score board tops up points.

With Res Q, Lazy Jones controls a manned helicopter as he flies around a maze-like jungle rescuing rabid gorillas. In Outland, revolving space craft descend on a bright red space landscape — unless you can annihilate them first.

As soon as the game is finished, whether the time runs out, or he gets splattered, Lazy Jones returns to the hotel corridors to face his troubles once again. Luckily, Lazy Jones can have up to nine lives, so there is a good chance of visiting every single hotel room.

Lazy Jones, although slightly more expensive at £8.95 than many computer games, offers a lot more than most and is a must for any game player's collection.

Lazy Jones has to do is dive into the hotel rooms one by one, play the games concealed therein and win lots of points.

But life is never so simple — patrolling each of the platforms are the manager, his ghost and the dreaded cleaning trolley. Using either a joystick or keyboard, you have to help Lazy Jones jump over these objects of terror or dash into one of the hotel room doors.

Most of the rooms contain either an exciting arcade game or something more mundane such as a toilet, bed or brooms.

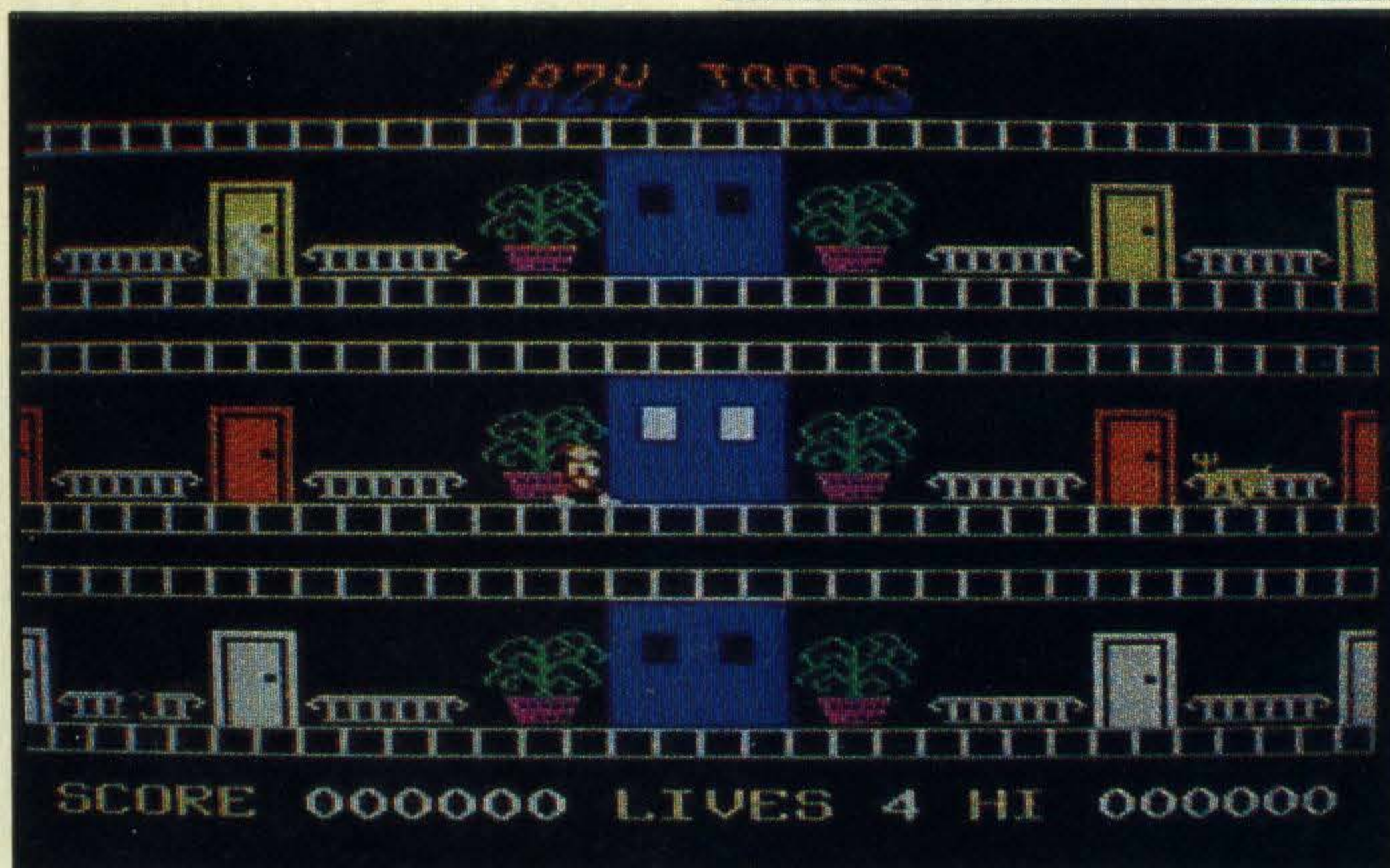
If he pops into one of the latter rooms, no points can be gained, but at least he is out of

Graphics: Original and appealing

Sound: Enhances game play

User appeal: Anyone could play it

Conclusion: A professional program



MIDNIGHT BUILDING

Supplier: Panasonic (0753) 34522

Type: Arcade

Format: Cartridge

Price: £18.80

Some very secret key documents lie hidden on the first floor of a huge business complex. You, an infamous ace industrial spy, find yourself with the daunting task of finding these documents.

Of course industrial spies never carry out their missions in broad daylight, so the raid takes place at midnight.

As well as having to fumble around in semi darkness, the situation is made even more difficult by your insistence on climbing down through the roof. Since the secrets are hidden on the first floor, your quest consists of a struggle down through eight floors.

Each floor is represented on screen as a blue maze, full of corridors and dead ends. Five white keys lie in various positions throughout the maze. The two other important locations to look out for are the red safe and the exit down to the next floor.

By rushing round the maze, your spy, clad (rather unsuitably for a midnight raid) in a red costume can collect all five keys. As the keys are taken, they appear below the screen. Also indicated on screen are the score, floor number and the number of lives left — you start with five.

But, life for a spy being no bowl of roses, you have three athletic security guards to contend with. While rushing around the maze looking for the keys, a square of light which haphazardly grows and shrinks, surrounds you. This light illuminates the bit of maze that you are in at the time, but doesn't help you to negotiate it.

Some clever programming has gone into *Midnight Building* because the guards can't see or sense your presence until they are in the light surrounding you.

While key searching, the best policy is to try and keep the guards out of your light.

Unfortunately you have no means of getting rid of them, but Panasonic has thoughtfully provided you with four stun bullets. Use these when cornered.

Once all the keys are collected, touching the red safe unlocks a passage through to the lower floor.

Mazes on each floor get progressively more difficult as you descend, but can be solved if you keep your head. At the beginning of each



maze, before darkness closes in on the floor, you are treated to a full view of the maze. It only lasts for a couple of seconds, but memorising the key locations and the position of each of the guards will go a long way to keeping your spy alive.

Midnight Building is difficult at first, but negotiating each floor is a knack soon learnt, especially as the keys are always in the same place.

We are told in the accompanying manual that on the final floor, special effects have been prepared, but we must admit none of us managed to get to it.

The maze graphics are fairly boring; every single maze is blue and although the guards do look like men, they sometimes appear to be bitty and incomplete. The spy is responsive to both joystick and keyboard controls and the music helps the game along.

Midnight Building is an exciting, addictive maze game involving a little luck, strategy and ice cool nerve. It does lack visual colour and the music could be more exciting for an £18.80 cartridge, but despite these faults it is a good game.

Graphics: Adequate, but a little dull

Sound: Lacks sparkle

User Appeal: Takes a while to master the game

Conclusion: Enjoyable, but expensive

CLASSIC ADVENTURE

Supplier: Melbourne House
01-940 6064

Type: Adventure

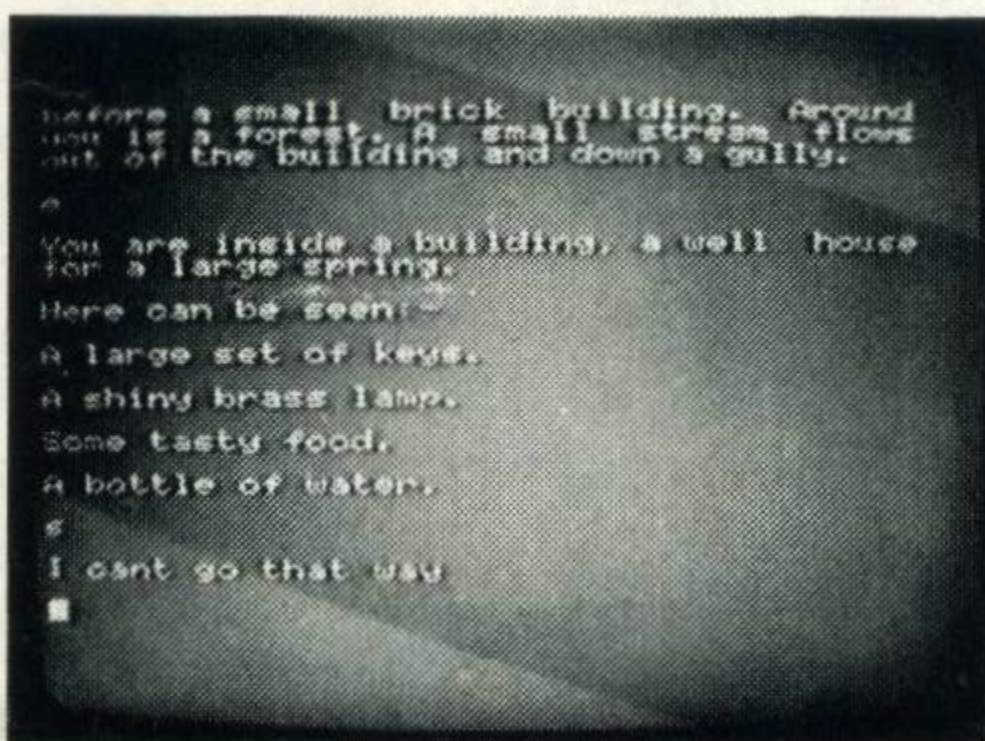
Format: Cassette

Price: £6.95

Adventures have alternately frustrated and fired players' imaginations since the first one — *Adventure* — appeared on a mainframe computer in 1978.

Classic Adventure is Melbourne House's version of *Adventure*. It has added a few ideas and puzzles of its own, but the basic ideas are the same.

Most of the action takes place in the colossal caves. But at the start you find yourself standing in thick forest beside a building — nowhere near any caves. Imagination, initiative, common sense and a little luck will eventually lead you into the magical world of the underground where the fun really starts.



As you stumble around the intricate network, treasures such as gold bars, emeralds the size of plover eggs and ming vases are found lying around everywhere.

There are no written rules in *Classic Adventure*. All the obstacles and puzzles have to be negotiated and worked out by you. In fact it's up to you to discover the rules.

Clues are included in various forms although they are usually provided in the form of cryptic messages. They are occasionally useful in certain circumstances, but of course, you have to find their uses.

Magic is a powerful force in the caves and you must remember that — not everything is as it seems. You have been warned!

Text adventures such as *Classic Adventure* rely entirely on written descriptions. Some of the locations in the colossal

caves are described using pure purple prose, but take care to examine each description as the often intentionally confusing accounts reveal vital directions.

Mapping your progress is vital, although it is often difficult to do so. For example you have to move north to travel from the Hall of Mists to the Hall of the Mountain King, but to return the same way you came you have to go east, even though the obvious way back is south.

Dirty broken passages, oriental rooms covered with ancient oriental cave drawings, cheese rooms filled with holes, black rods with rusty stars, magazines, pillows and tiny beanstalks gasping, "Water . . . water," are just some of the locations and objects to be found in this wonderful mind boggling adventure. Shadowy creatures are forever lurking about in the dark depths and something new is always lying around the corner.

It is impossible to examine anything in this adventure. Commands are usually in two words; GET CAGE, BRIBE TROLL and THROW AXE and once an action has been carried out, the result of that action is printed on screen.

Intense concentration is essential in this game and once you've started, all thought of sleep and sustenance will be driven from your mind. Don't be surprised if you climb down from your chair after a seemingly short adventure session and find that you've been playing for days!

Other MSX versions of this adventure do exist, but Melbourne House's £6.95 price tag is one of the cheapest. *Classic Adventure* is a must for any game player's software library — it will enthrall and entertain for hours and is one of the best adventures around.

Graphics: n/a

Sound: n/a

User Appeal: You'll be hooked

Conclusion: Still one of the best adventures

GALAXIA

Supplier: Kuma Computers
(07357) 4335

Type: Arcade

Format: Cassette

Price: £6.95

Far away in the outer reaches of the galaxy lies a planet inhabited by hundreds of aggressive space creatures. Your blue and purple jet has somehow blown off course and found itself the victim of their alien wrath.

Help is at hand in the form of a mother spaceship, but before docking with it you first have to negotiate the swarming alien onslaught. Your jet is equipped with lasers for this very purpose.

If you can imagine a cross between *Scramble* (without the mountains and cavern landscape) and a sort of horizontal *Galaxians*, you will have a fairly accurate picture of *Galaxia*.

Your jet can be controlled with either a joystick or keyboard. It's possible to redefine the control keys that Kuma has chosen — a useful function.

The battles take place against a background of brilliantly coloured stars and



the occasional moon. Each alien is worth different points; the Rammers, who begin the attack are worth ten each and the Baiters who come last, clock up a hundred points.

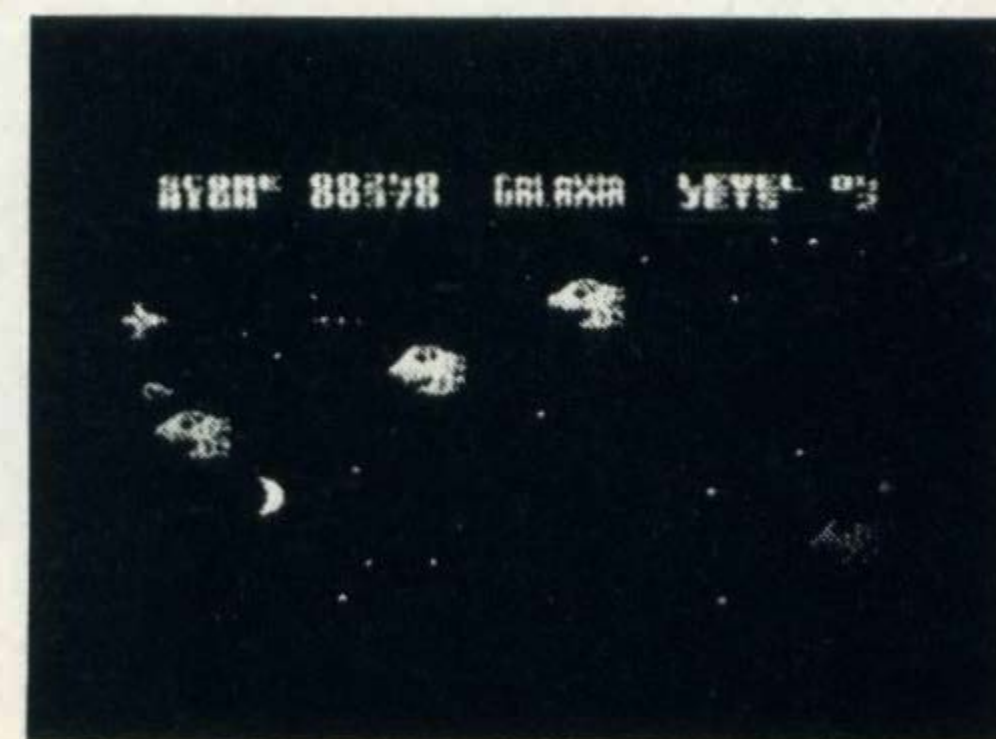
Each of the ten types of alien attack in a different way, and become more deadly as you proceed. Rammers present no real challenge, hence their low worth. They resemble angel fish and move across the screen in formation. Zapping them is no problem, but when the faster moving aliens are encountered, the shortcomings of the jet's firing mechanism becomes obvious.

The problem is your jet will only fire one shot at a time, and if it misses it can't take

another one until the last one has disappeared from the screen.

Mushys, the second alien wave, resemble flying mushrooms and rotate to the sound of a high pitched drone as they move along. Next are some long legged Spiders which jitter about to an even higher pitched drone. Multicoloured Bangers contrast this jittering action by moving slowly up and down in the fourth level.

Bashers are remarkable creatures resembling giant shrew heads and these blow cannon balls at the jet. If you manage to avoid these, the Spores make their attack and spew out bombs at unpredictable angles.



The next attack is almost over before it starts because Darts move across the screen like lightning, even at the slowest of the three game speeds. Zappers fire double darts from the front and Swoopers dive bomb your jet, throwing out fire bombs in all directions.

Last, but not least, are the Baiters which combine all the attack strategies; moving very fast, darting up and down and shooting darts.

If you manage to reach the tenth level, the mother ship looms up. If you crash into it at an odd angle or completely fail to dock, you just pass onto the eleventh level and the Rammers make their attack once more.

Galaxia could be quite a good zap'em game, but the firing mechanism is so slow that killing large quantities of alien swarms is just too difficult. We found it to be a very frustrating game.

Graphics: Interesting alien guises

Sound: Each alien has its own tune

User Appeal: Firing mechanism is too slow

Conclusion: Room for improvement

LARGE & SMALL NUMBERS & SEQUENCES

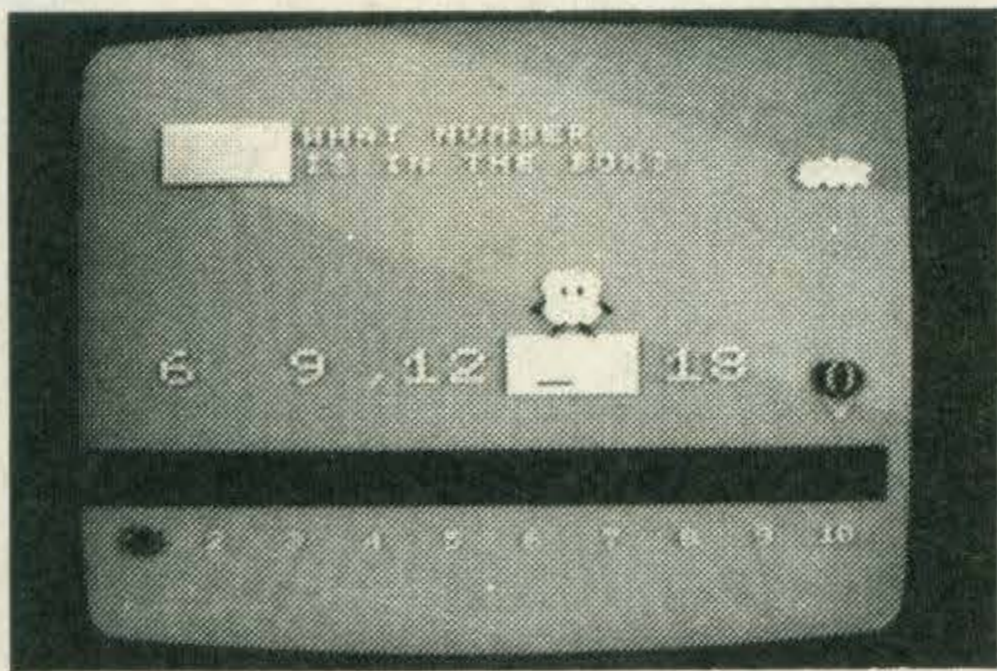
Supplier: Morwood Products (04243) 5840
Type: Educational
Format: Cassette
Price: £7.95

Many of Morwood's titles are under licence from Japan and the give away is that many of the programs use symbols such as happy penguins, smiling suns and rain clouds to reinforce right and wrong answers.

Very few UK software houses inject such enthusiasm into their programs, so it's no wonder that many of the top titles are imports. And Morwood deserves credit for buying in quality educational games.

Although this particular program has been given a rather long winded title, it is an accurate one because the idea is to distinguish between large and small numbers as well as to insert the missing number into a sequence.

Before starting on the exercises, the child is asked to establish how many he or she



would like to try, the level of difficulty and the target number of points he or she thinks will be achieved. For each of these questions, a number from one to 10 has to be inserted. As the program is aimed at five to 10 year olds, some children will need help reading the questions.

Two types of question are presented on screen and for each exercise 10 questions are asked. Representing these questions are 10 numbers listed along the bottom beneath a bright green line.

There doesn't seem to be any set pattern governing which type of exercise is asked first, but they do seem to alternate fairly regularly.

If the sequence questions are posed, a number sequence appears on screen. One of these numbers is missing and the child is prompted by the words 'what number is in the box?' to fill in the missing number. The complexity of the puzzle depends on the level of difficulty chosen at the start.

At level five, the sequences are kept fairly simple, for example $7 * 5 4 3$. On higher levels, sequences such as $31 * 21 16 11$ and $20 * 26 29 32$ are almost guaranteed to give an older child something to think about.

For the large and small number questions, the user is presented with two numbers and is asked which is highest or lowest.

To encourage the kids to get the answers right, a cuddly looking penguin hangs around on screen. Every time an answer is typed in correctly, it jumps up and down. A cross appears on the bird's face if the answer is wrong.

After all the exercises have been completed, a colour coded bar chart indicates how well the child has done; points that were achieved compared to the target number of points. It also breaks down the points lost through error and time wasting.

If too much time is taken in answering the questions, only a few points will be awarded — even if all the answers are right. As well as summing up the player's progress, the program suggests the next target level of difficulty.

Although the title of this program is not the most snappy we've seen, it is a well-designed educational program. It's probably good enough to teach young children something about number sequences.

Graphics: Cute and colourful
Sound: Dreadful series of beeps
User Appeal: Young children may need help
Conclusion: Well designed

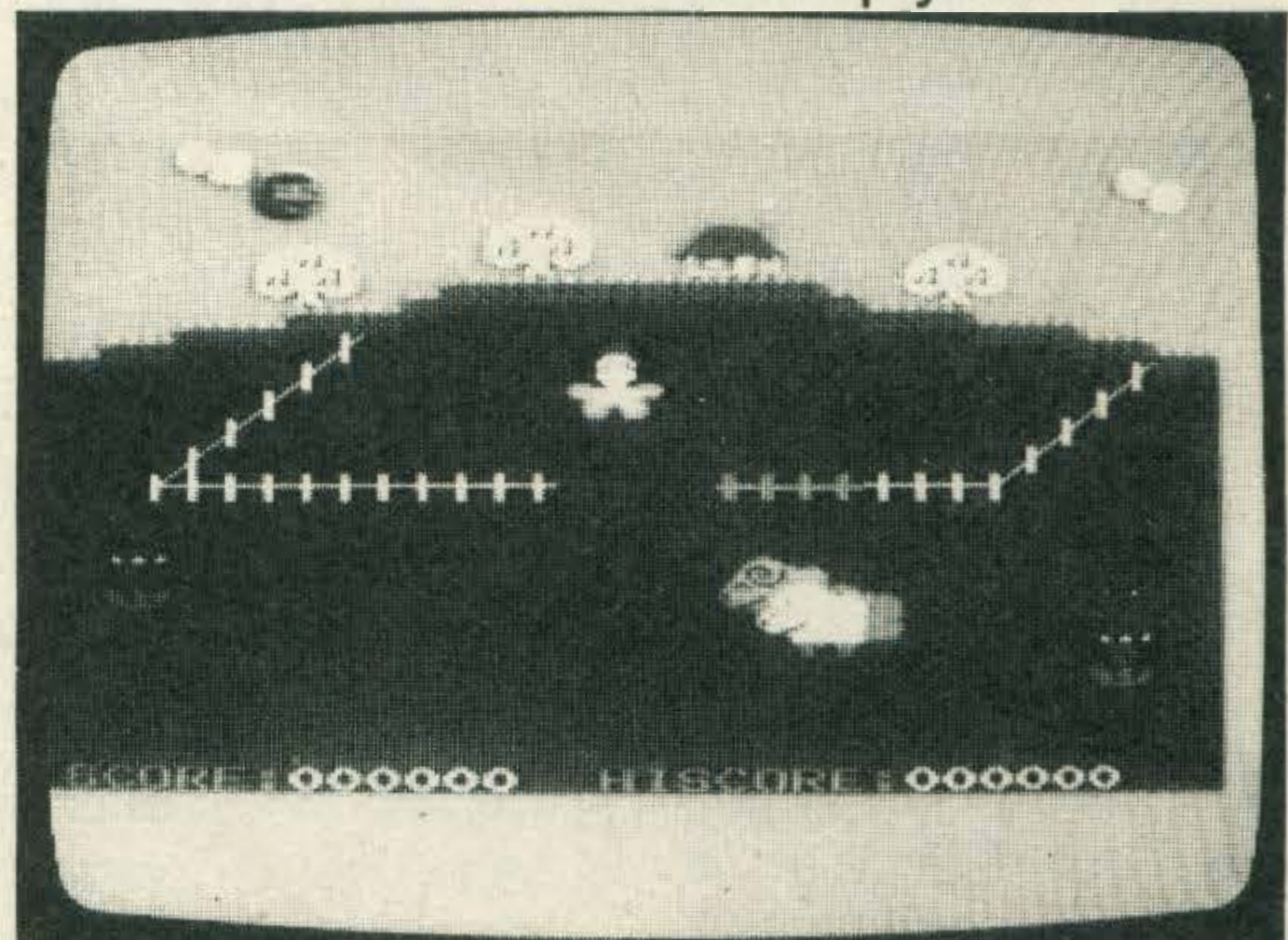
PRETTY SHEEP

Supplier: Hudson Soft
01-458 3310
Type: Arcade
Format: Cassette
Price: £7.95

Japanese programmers seem to specialise in writing arcade games which just ooze with cute characters. *Pretty Sheep* is no exception — even the wicked wolf looks friendly enough to cuddle!

The game's four characters are introduced to you at the start; sheep, boy, girl and wolf.

The first screen presents a colourful rural scene; a little country cottage puffing smoke, clouds, a happy red sun and red tulips dotted around the field. Dominating this idyllic spectacle is a sheep pen.



Boy plays the role of shepherd and by using either a joystick or cursor keypad, it's your task to guide him round the field catching sheep, dragging them back to the pen and shutting them up.

On the first level, Boy has only one sheep to contend with, on the second level two sheep appear on the scene and on the third level, three sheep trot on.

Trapping one sheep in the pen is easy because all you have to do is slide the gate across the entrance. But, if there is a second, third or even fourth sheep to catch, the first sheep will run out while the others are being rounded up.

As only one sheep can be pushed into the pen at a time, the best tactic is to shove one in and to lock the gate while pursuing another one. While you're away the trapped sheep can't get out.

But a word of advice — the penned sheep are likely to pop out while you're trying to push another one in. Once all the

sheep are locked up, you proceed to the next level.

Occasionally, a sheep gets trapped underneath the gate as it shuts. You can see its legs twitching underneath, but fortunately (or unfortunately?) it will either squeeze out or just stay trapped preventing a move onto the next level.

The score and high score are shown along the bottom of the screen. By moving alongside Girl (a difficult task because she hops across the screen like a lunatic kangaroo) you can substantially increase the score.

On the fourth level, a cute purple-nosed wolf appears and opens the gate every time Boy shuts it. This can get extremely annoying as any sheep you've managed to pen

just run out again. In fact level four is absolutely chaotic!

A time limit for each level is set by the sun, which passes from one side of the screen to the other. Time runs out if it reaches the other side.

All activity is accompanied by the same rather monotonous tune which can get a bit irritating. Occasionally the graphics get a bit muddled and look scrappy, especially when characters pass each other or the sheep get trapped in the gate.

Pretty Sheep is an enjoyable, harmless but fun game. You get amusing graphics, bright colours, cute characters and a relatively difficult task to carry out. It's a novel game to play.

Graphics: Cute and cuddly
Sound: Fairly monotonous tune
User Appeal: Extremely simple to play
Conclusion: Harmless fun

REVIEWS

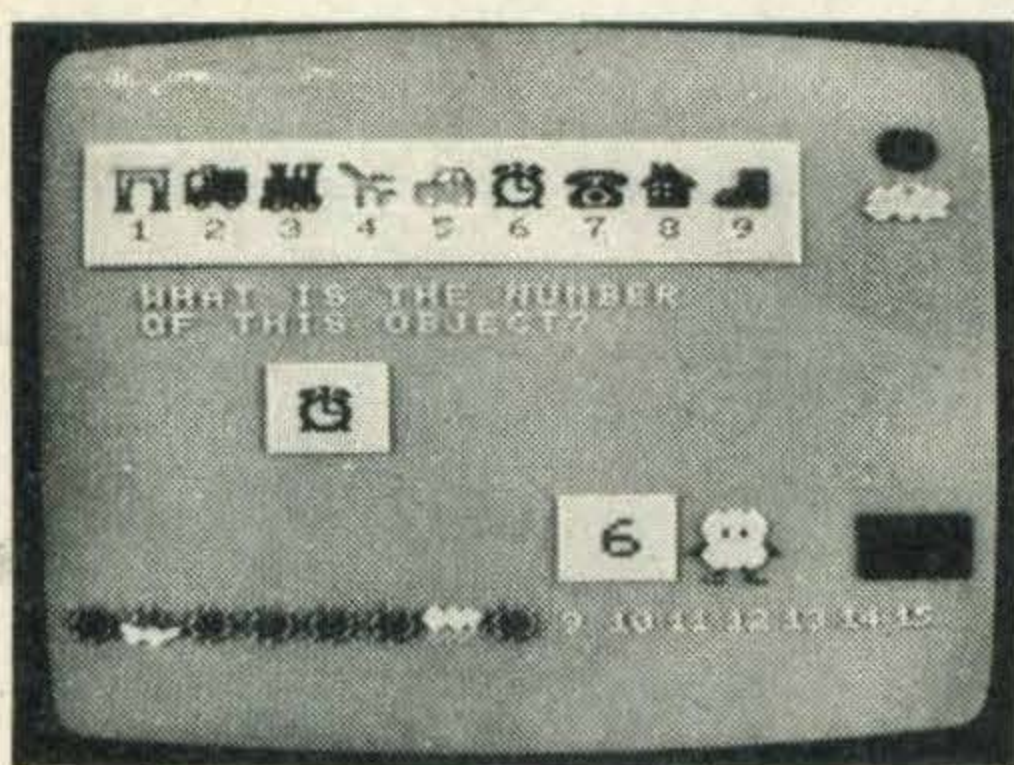
REFLEXES

**Supplier: Morwood
Products (04243) 5840
Type: Educational
Format: Cassette
Price: £9.95**

Children need to develop a number of mental abilities while growing up and *Reflexes*, an educational program from Morwood's *Puddles* series, tests and aims to improve two of these; perception and spatial ability (co-ordination of mental and physical ability).

Three cassettes, each containing a different type of problem, make up the package. *Reflexes* is aimed at the four to eight-year-old age group, but an even younger age group.

A problem involving numbers is the subject of the first tape. After choosing the number of exercises to be attempted, the level of difficulty required and the target number of points from a scale of one to 10, the lessons start.



A large yellow house complete with purple roof and three black windows dominates the first screen. Along the bottom lie the numbers one to 10 and these represent the number of questions to be answered in an exercise.

Numbers appear in the house windows and all the participating child has to do is type them on the screen in the same order as they appear in the windows — as quickly as possible.

The simple task of copying down numbers is supposed to increase manual dexterity, familiarity with the numeric keyboard and of course the speed of response.

Cartoons reinforce right or wrong answers. If all the numbers are copied down correctly, a cute penguin grins and flaps his wings up and

down. A balloon rises from the ground and a smiling sun covers the relevant number at the base of the screen.

Once all 10 questions have been completed, the lesson is over and another cartoon demonstrates how well the child has done. In this one a car drives along one of three roads.

At the end of each road is a sun, cloud covered sun and a rain cloud. The comments 'very good', 'good' and 'study more' tell the child how well they have done in the lesson.

After completing all the lessons a colour bar chart breaks down the final score into the number of points achieved and the number lost through time wasting and errors.

By constantly judging the child's performance with brightly coloured cartoons, the program tries to provoke a competitive spirit in the child and stimulate him or her to try harder next time.

If the lessons were too easy for the pupil, the bar chart gauges this and advises attempting another level.

Cassette number two uses similar principles, but encourages familiarity with the QWERTY keyboard. Letters instead of numbers appear in the house windows.

Numbers and letters are replaced with familiar shapes in the third cassette. Nine shapes such as ships, keys, telephones and clocks appear along the top of the screen. One of these shapes appears on the lower half of screen and by pressing its position number from the series above, the child should develop some sort of perception skills.

Sounds are fairly uninspiring in these programs, but the graphics are excellent; it is likely that children might just be interested long enough in the programs to actually learn something.

Graphics: Bright and colourful
Sound: Not terribly inspiring
User Appeal: Ideal for youngsters
Conclusion: Well designed

CHILLER

**Supplier: Mastertronic
01-402 3316
Type: Arcade
Format: Cassette
Price: £1.99**

Deep in some horrible haunted house lies an incarcerated girl. Her fearless boyfriend is on his way to rescue her, but encounters some difficulties on the way. *Chiller* chronicles these difficulties, but isn't one of Mastertronic's best MSX conversions.

The game starts in the forest where the boy's car has mysteriously run out of petrol. The trees are covered in side branches and five crosses are situated in various positions around the screen. While playing the game it is essential



to watch the energy quotient on the meter running along the top of the screen. Once it runs out the game is over.

Dotted around the screen are purple and blue mushrooms. Avoid the latter at all cost because they drain energy. The purple ones supplement the boy's energy supplies.

The boy, using a tarzan-like system of climbing branches and ropes, has to jump around the trees collecting all the crosses. Flimsy ropes and energy-sapping giant spiders make life difficult, as do the various ghouls and spirits haunting the woods.

It is important to remember that whatever energy you have left will be carried onto the next screen. In the haunted cinema, the screen after the forest, there is no way of replenishing it, so make sure there is enough to collect all the crosses. A wizened old woman wanders across the screen, but the real energy drainers are the snow flakes.

We found the most frustrating thing in the game to

be the speed with which the energy disappeared, especially once the boy had passed the cinema and is in the ghetto. Here the graphics become a bit messy making it difficult to spot the various ghouls, ghosts, bats and zombies.

Once past the ghetto, the boy wanders into a creepy graveyard, literally crawling with horrible objects. The purple mushrooms are still about, so it's possible to top up energy supplies.

A cross between the *Ghostbusters* theme and *Thriller*, Michael Jackson's smash hit, makes up *Chiller's* theme tune. But unfortunately Mastertronic could have done a better job of using MSX's sound facilities.

Once all the crosses have been collected from the final scene — the haunted house

— the girl appears at the door and happiness is nearly theirs. We say nearly because now they've both got to get back to the car the same way he came!

This time it's doubly difficult. The girl has to collect red crosses and the boy, blue crosses in each of the locations.

Chiller could be a good game, but not enough care has been taken to co-ordinate the boy's movements so that they correspond to what is on screen. In addition, the energy quotient depletes too rapidly. It's too easy to be killed, which probably means that many people will rapidly lose interest. Having said that, £1.99 is about the least you'll pay for professional software in the UK.

Graphics: Colourful, but occasionally cluttered
Sound: A bit of a failure as MSX game tunes go
User Appeal: Energy runs out too easily
Conclusion: This MSX conversion could be improved

CALCULATION I

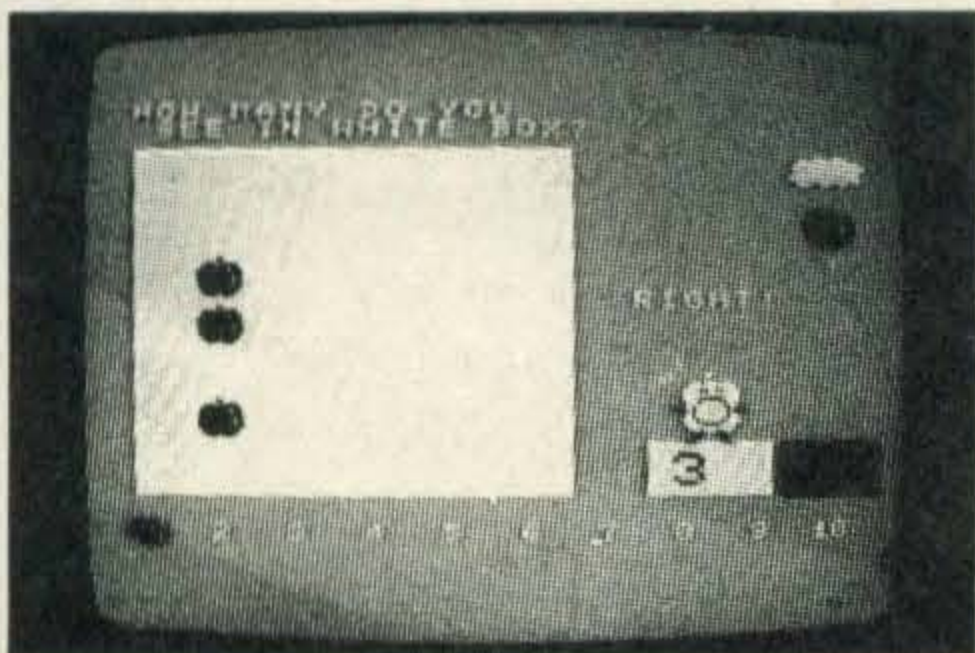
Supplier: Morwood Products (04243) 5840
Type: Educational
Format: Cassette
Price: £9.95

By installing a light-hearted but competitive streak into its *Puddles* range of educational software, Morwood aims to help children learn the basic concepts of calculation.

Before starting on the calculations, a number of options have to be selected first; the number of exercises you'd like to attempt, the level of difficulty required and the number of points you think you'll achieve. A number between one and 10 has to be picked for these options, one being the lowest level.

Because there are so many difficulty levels, the program will suit a fairly broad age range.

Three cassettes are included in the *Calculation I* package and each one presents a different set of mathematical problems, although they are all based on addition or subtraction.



The first cassette, entitled 'Calculate the Missing Number', uses both skills. On screen, three boxes appear. The two upper ones contain numbers which when added up make the third number. For each exercise one of these numbers is missing and must be inserted so that so by adding or subtracting the numbers, the two upper boxes add up to the number in the lower box.

The child has three opportunities to get the right answer. If the answer is correctly calculated first time a cute cartoon penguin jumps up and down flapping his little wings and smiling.

If the answer is wrong the penguin's face puckers up! If the answer is correct on the second try, the sun symbol appears, but is partly covered by cloud. The sun is replaced

by a rain cloud if three wrong answers are given in a row.

By using strong graphics, bright vivid colours and catchy tunes, Morwood is increasing the chances that a child's interest will be held long enough for him or her to complete the program.

Once the 10 questions in the exercises have been completed, another cartoon grades the performance so far. In this, a car drives towards one of three destinations; a sun, sun and cloud or a rain cloud, and the comments — very good, good and study more — are awarded respectively.

A colour bar chart illustrates the results once the lesson has been completed. Each colour has a meaning and by studying the colour key and the chart, the number of points achieved compared to estimated achievement, the number of points lost through time wasted and through mistakes are shown. A level of difficulty and target points are suggested for the next exercise.

By constantly grading the child's progress, he will be spurred to do better next time.

The other two tapes use exactly the same format but use different calculations. In the second tape, a formal sum using either subtraction or addition is presented and the answer has to be inserted. The third tape develops subtraction skills.

Operating the programs is a joy. All the child has to do is use the numeric keys and press the Return key or space bar occasionally, leaving the child to concentrate on getting the answers right.

Despite the rather uninspiring title, *Calculation I* is fun, colourful and will encourage even the most obstinate child to keep doing the sums until they get a happy penguin every time.

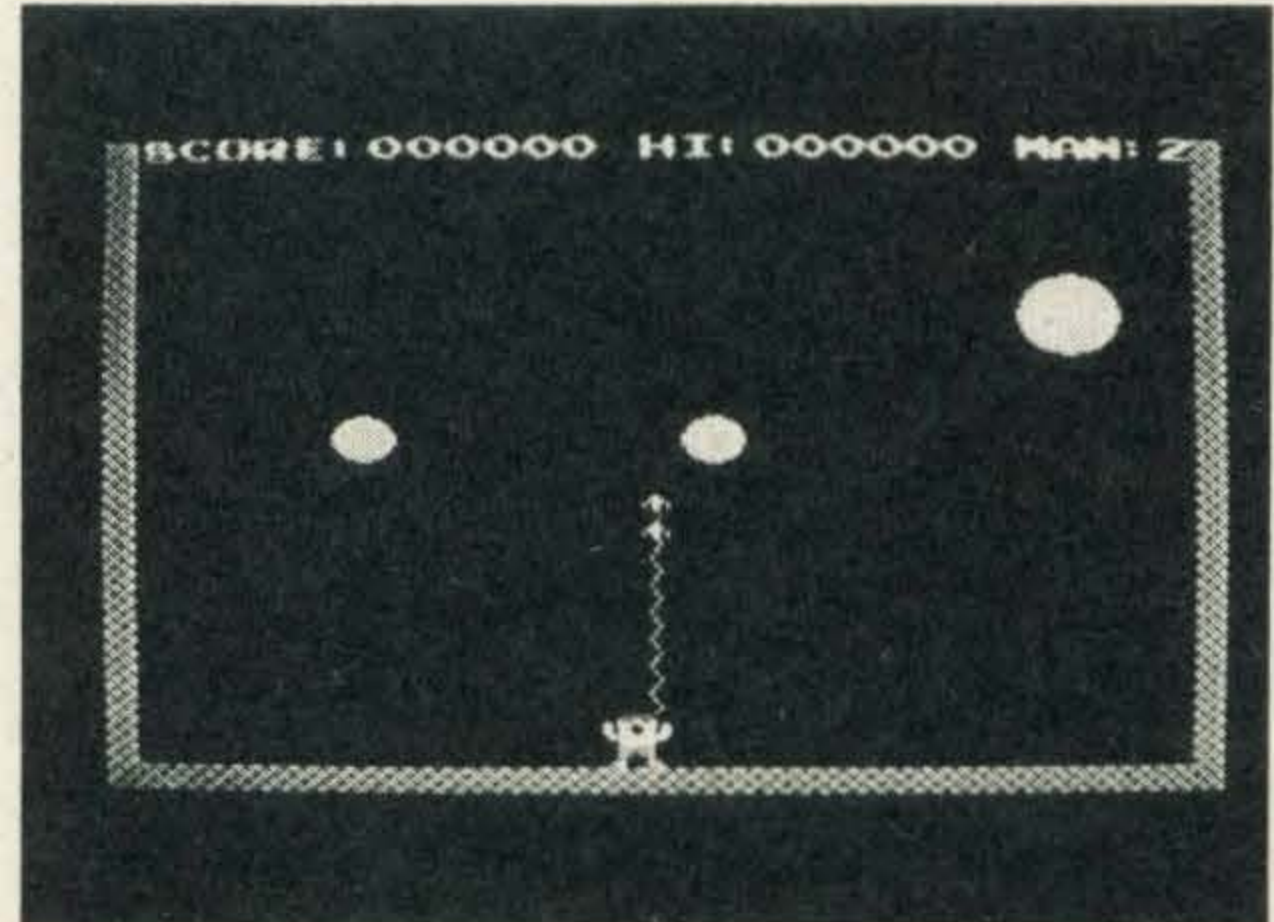
Graphics: Memorable and vivid
Sound: Adequate
User Appeal: Great fun
Conclusion: If this doesn't encourage kids to add up, nothing will!

CANNON BALLS

Supplier: Hudson Soft
01-458 3310
Type: Arcade
Format: Cassette
Price: £7.95

Harpooning bright yellow balls is not everyone's idea of having a good time, but in *Cannon Balls* this very pastime is the main aim of the game.

We were a little surprised by this program because for a £7.95 price tag we expected at least a professional-looking game. However, when we first started playing the game, it resembled one of the programs sent to us by a



competent amateur for our listings section.

A little man sporting blue shorts, a yellow shirt and a green cap is the harpoonist and is under the player's control. Either a joystick or the keyboard can be used, but the keyboard is best as it controls the man more sensitively and accurately.

A green border surrounds the screen and stage one kicks off with the man standing on the bottom. Along the top of the screen, information such as the score, high score and the number of men left is displayed.

A single big yellow ball bounces onto screen and the idea is to hit this ball with a harpoon.

By hitting the space bar or fire button, the man shoots the spear together with an attached rope upwards. It's your task to make sure some part of this contraption hits the ball. As the ball is moving fairly rapidly, its position will have to be anticipated.

Once hit, the ball splits into two smaller balls. The aim is to hit both halves and then to hit the resultant four even smaller

balls. The final result is eight tiny balls and bursting these wins you 10 generous points per ball.

Sounds fairly easy and simple, but it's not. The balls all bounce on the ground close together yet at random, and if the man is hit he is squashed flat — not a pretty sight! To reach level two, all the small balls have to be speared.

Luckily the supply of three lives is replenished on the second stage because this time you have twice as much work to do — two huge balls appear. Every time a life is lost, the player has to wait ages for the next life to appear — very frustrating. On the third level, three balls bounce onto the screen.

Sounds accompanying the

game are basic — a series of metallic pings and beeps interrupted by fairly realistic noises of balls being burst and the man being squashed.

Cannon Balls' graphics are not particularly inspiring either. The balls are not quite round and while passing each other seem to disintegrate. All the man seems to do is wave his arms up and down.

Despite its shortcomings, this game does have a certain addictive, hypnotic effect. However, this effect is short lived because every time you lose the game — even if you've managed to get to the third stage — the game just begins right back at the beginning again.

This, combined with the lack of variety in the game and graphics, means the product has very little to hold the player's attention or enthusiasm.

Graphics: Rather crude
Sound: Metallic bleeps and pings
User Appeal: Presents some sort of challenge
Conclusion: Doesn't offer enough for £7.95.

MEMORY

Supplier: Morwood (04243) 5840

Type: Educational

Format: Cassette

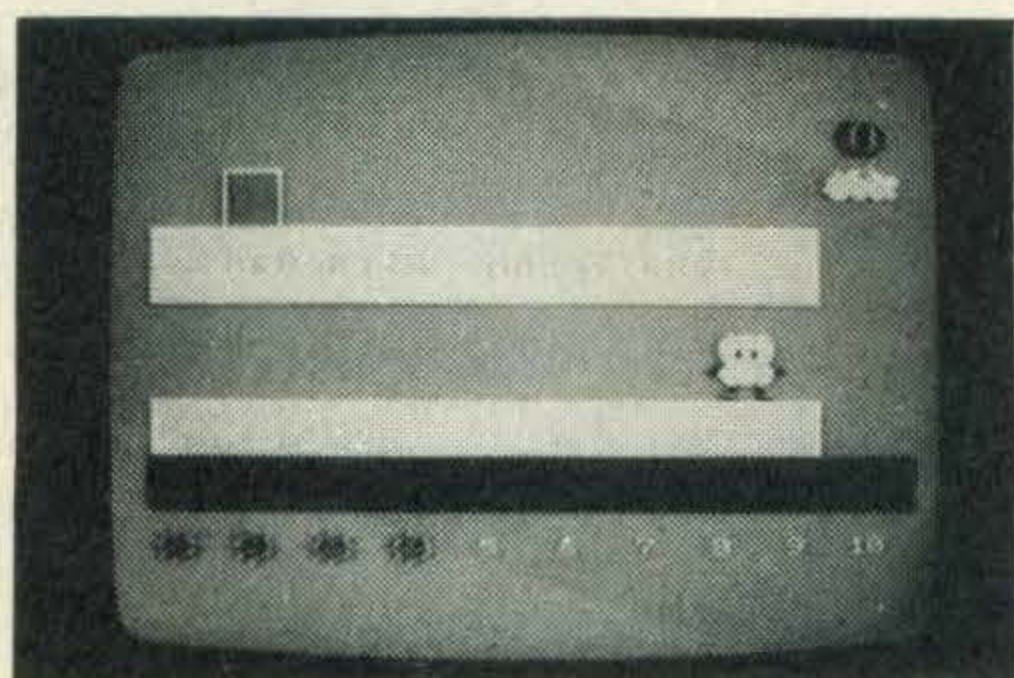
Price: £9.95

Recalling factual detail is a skill that most of us find fairly difficult. Yet developing a quick and accurate memory is essential to children if they are going to do well in the educational process — if only to pass exams.

Memory, one of a range of educational programs from Morwood, is designed to test and help children improve their memory capacity.

Three cassettes, each containing a different type of memory problem, are packed into a natty plastic casing. The cover is adorned with a grinning yellow splodge sporting mortar board, teaching gown and roller skates. He is obviously 'The Happy Learner' mentioned in the blurb. Morwood believes in making the learning process as much fun and as painless as possible and its programs often reflect this philosophy.

Entitled *Memory Game*, the first cassette really does test the old grey matter. The



programs were designed for four to eight year olds, but even we found them testing.

After choosing the number of exercises (there are 10 questions in each exercise), the level of difficulty and the target points (choose a number from one to 10 for all these options), a grid of 24 numbers is displayed on screen.

If a low difficulty level was selected the numbers will be in single figures. If not, the figures will be much higher.

After memorising the cards, they are covered up and numbered from one to 24. Four boxes and a penguin appear on one side of the screen. On lower levels, you

are asked to pair the numbers off by recalling what is underneath the covered cards and filling the boxes with the two numbers representing two matching numbers.

On higher levels, three or four matching sets have to be found. If you get it wrong, the cards are uncovered for a short period — this period decreases every time your answer is wrong.

Each exercise is awarded more than one try; the lower levels allow 12 tries whereas in tougher levels the player is only given six. Believe us, you'll need all the goes you can get because memorising all the locations isn't easy.

Numbers and Alphabet is the second cassette and this, Morwood informs us in the leaflet, is intended to develop 'associative memory'.

A small section of the alphabet is displayed in boxes along the top of the screen. Underneath these a few letters are displayed in numbered positions. As soon as some of the alphabet letters have disappeared, the letters have to be inserted in exactly the same order. The ubiquitous penguin informs you of success or failure with a happy smile or a frown.

The final cassette deals with shapes and numbers. It follows a similar format to *Number and Alphabet*, except that it involves shapes and is intended to develop 'perceptual speed'. Five numbered shapes are displayed for five seconds and then disappear. One of the shapes reappears and the idea is to pick out its original position using the number.

Both graphic and sound effects are mediocre and could be brightened up. The program's ending is very crude; OK appears and the only way to start the program again is to type in RUN then wait for the title sequences to finish.

Graphics: Mediocre
Sound: Sporadic and dull

User Appeal: Some of the exercises are difficult

Conclusion: The user certainly requires a good memory to succeed

FINDERS KEEPERS

Supplier: Mastertronic 01-402 3316

Type: Arcade

Format: Cassette

Price: £1.99

Princess Germintrude's birthday is coming up and her father, the king of Isbisima is frantically trying to find a suitable present. Unfortunately he has no idea what to give her.

Just when he's starting to get really desperate, the magic knight arrives on the scene and demands to join the famous polygon table. The king seizes his chance and



informs the knight that the only way he will be granted that honour is if he finds the princess a special present.

The knight agrees to the quest and is transported to the dreaded castle of Spriteland.

Although Mastertronic is selling the game at the comparatively low price of £1.99, don't be fooled into thinking it won't be any good. This game has all the ingredients of a really exciting, addictive game and is exceptionally good value for money.

It is your job to control the knight — as you may have already guessed. The game starts in the king's chamber and as the knight steps back onto the teleport pad, he finds himself transported to the castle teleport room.

Once in the castle, the magic knight is faced with two choices. He can collect as many treasures as possible and escape from the castle a rich man. Or he can find a wonderful gift for the princess, please the king and gain immediate acceptance to the polygon table. The choice is up to you.

Finders Keepers is a multi-screen platform game and as you run around the platforms

jumping up and over the obstacles, you find treasures and ordinary household objects everywhere. But it's not called the dreaded castle for nothing — in every location the knight encounters foul ghouls and energy-sapping creatures.

These nasty strength-reducing creatures — jellyfish, pneumatic drills, fanged clams and monster hippos to name a few — will drain the energy from the magic knight every time he comes into contact with them. It's absolutely vital that the knight avoids them.

On one side of the screen a table tells you the number of rooms the magic knight has visited, the number of lives left, the value of the objects he's picked up and the amount of cash he's managed to amass. Keep an eye on the strengthometer as it shows you how much energy the knight is losing.

While wandering through rooms such as the ice cream factory and Dr Wombat's bedroom, objects such as hairy dogs, clowns' noses and bars of gold crop up.

By taking them to one of the castle traders stationed at various castle levels, it is possible to trade them in for money.

The game's graphics are excellent and some of the monsters are wearing extremely wicked expressions.

Two mazes yield a wealth of both valuable and worthless objects. Moving through the maze adjoining the room with a view is an unusual experience as it seems to ripple — almost as if the knight was moving underwater.

Finders Keepers is well worth £1.99; it takes a while to get the hang of the game, but once you've got used to the controls and the techniques necessary to get the magic knight through some of the screens, it becomes great fun.

Graphics: Some mean-looking monsters
Sound: Pleasant catchy tune

User appeal: Takes a while to get used to the controls

Conclusion: Excellent value for money

MAYHEM

Supplier: Mr Micro 061-728 2282

Type: Arcade

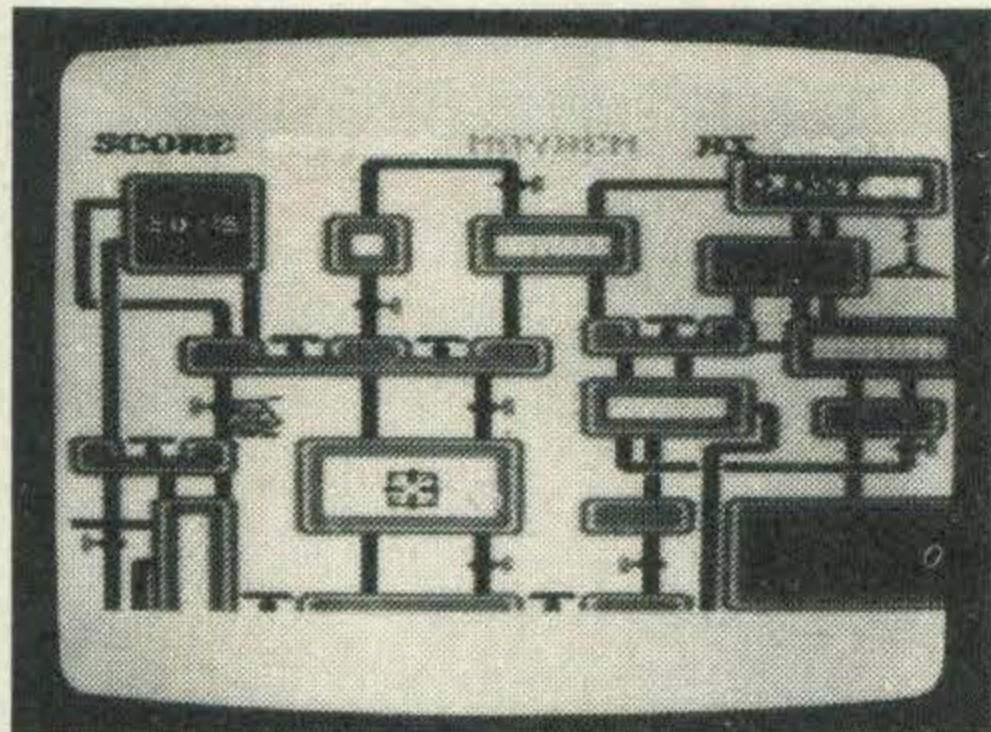
Format: Cassette

Price: £7.95

An alien planet is dying and the little Tribbles are the only creatures still living — but only just. They too will die out if they aren't rescued from the planet.

Luckily for the Tribbles, help is at hand in the form of you and your nifty spaceship. Somehow all the tiny creatures must be lifted off the planet, carried safely on board and dropped off on another planet. Only then will the species survive.

Mr Micro has divided the game into three parts. In the first section, the sad scene of a dying planet is vividly displayed: a lurid red planet with shrivelled yellow trees. Your ship hovers about in the sky while the Tribbles dash frantically about on the ground. By dropping a plastic transport capsule onto a creature, it is enclosed and carried up to the ship.



As the Tribbles are being rescued, a time limit is set by the movement of a sun. As soon as it is finally eclipsed, the second part of the game takes place.

Once in the ship the Tribbles, which resemble blobs of blancmange with twitching feelers and tiny feet, become uncontrollable and create mayhem. Hence the game's title.

The inside of the ship looks like a rather complicated plumbing system with pipes, pistons and switches, except that there is a garbage incinerator in one corner. Rather like lemmings, the Tribbles are attracted to this and if they manage to reach it, their death is nasty but instantaneous.

Blocking off entry to the

garbage disposal unit is the only way to prevent the stupid animals from rushing headlong into it. A 'Coerco' grille is provided for this very purpose. Placing the grille in front of a Tribble stops it in mid track. It then disappears and another one appears. Every time a Tribble is saved, points are won.

Altogether you are given 10 Tribbles and this stage only ends once they've all been incinerated. After a while, the mere act of placing a grille in front of the Tribbles becomes dull, but excitement is slightly improved with the appearance of a wild wafer.

This resembles a spinning purple waffle and bounces round the screen knocking your grid off its perch whenever they happen to touch. A new grid has to be picked up and replaced, without the wafer even touching it.

Once that part is mastered, a blue 'service droid' hits the scene. This creature moves along the pipes like the Tribbles, but as with the wafer, the grille is knocked away if the two come into contact.

Once 10 creatures have been killed, the final game stage occurs. This time your space ship is hovering over a new planet which is brimming with health, vitality and verdant undergrowth. Dropping the encapsuled wafers onto the planet frees them for their new life. But take care to avoid the planet's bouncing wild wafer. A sun and moon once more set a time limit.

Mayhem's graphics are excellent — cute and colourful — and the game reacts responsively to both keyboard and joystick controls. Sound effects are fairly good — the effect of chaos and mayhem in the spaceship is admirably created with a jumbled set of high pitched bleeps.

Graphics: Fairly amusing

Sound: Chaotic series of bleeps

User Appeal: The game can be mastered very quickly

Conclusion: *Mayhem's* appeal dulls after a little while

COLOR BALL

Supplier: Hudson Soft 01-458 3310

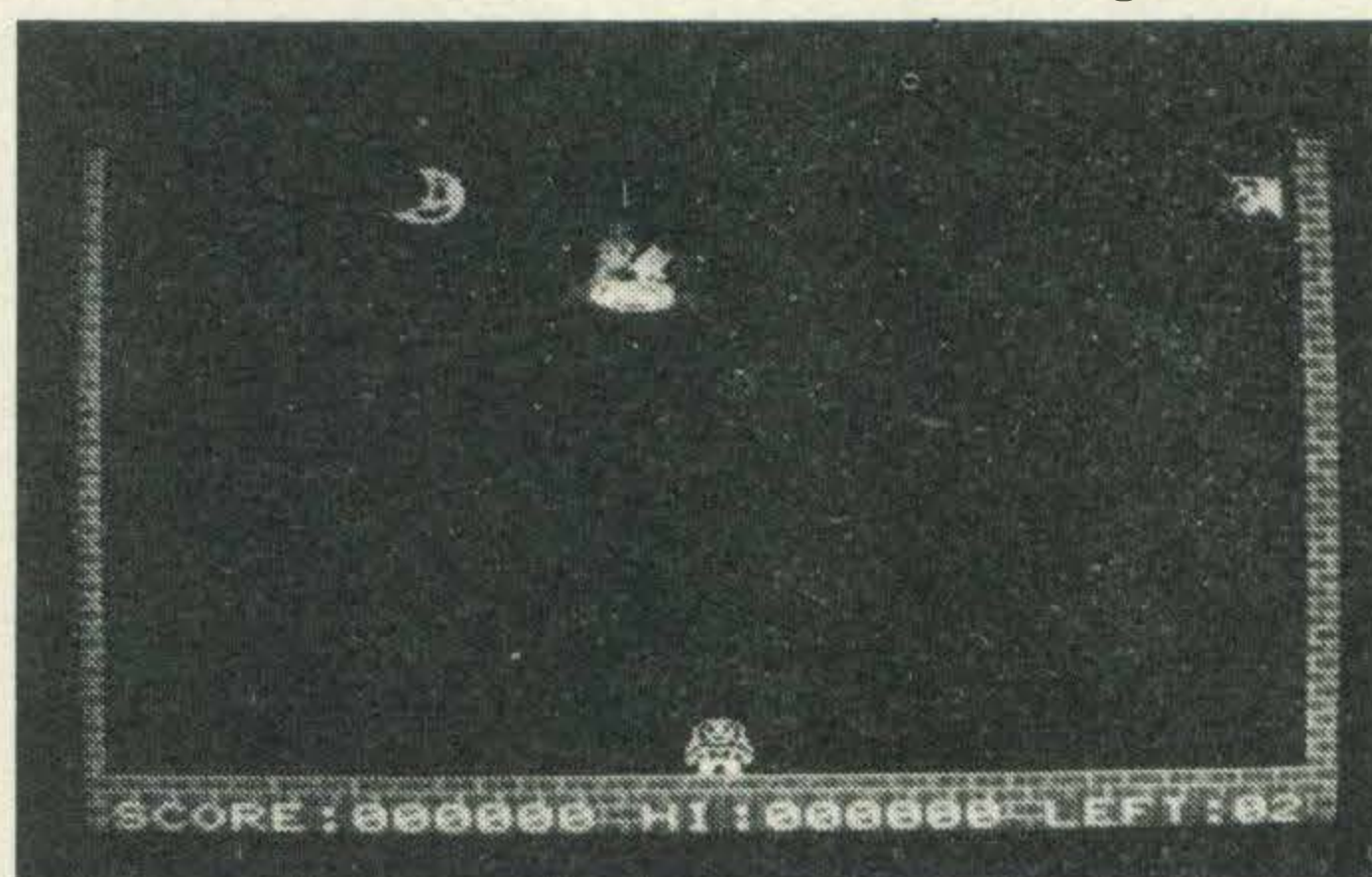
Type: Arcade

Format: Cassette

Price: £7.95

Celebrating Shrove Tuesday by tossing pancakes into the air, is, as you will know if you've ever tried it, a very hit and miss affair. *Color Ball* contains many qualities similar to pancake tossing and although it looks simple to play is actually quite difficult.

For some reason best known to the game's authors, all the action takes place at night. To create this effect,



brilliant stars and a friendly moon adorn the sky. On the right hand side of the screen lamp light brightens up the night.

An angel bearing a cloud darts across the screen announcing the first stage. A few seconds later the same halo bearing angel returns to the screen to drop a single green ball on to a red haired girl below.

She is blessed with a very athletic step and will leap great distances if necessary. Her main task is to brandish a blue saucepan just in time to catch the falling balls.

On the first level, a single green ball drops down and changes colour to light blue if she manages to catch it in the pan. The ball bounces back up and the next time she catches it, the ball turns yellow. After that she only has to scoop it up two more times before it turns white and a smile appears on the ball's face. It then disappears — the smile is a sign that the second level is imminent.

The more times the ball is caught, the bouncier it gets and judging where it will fall becomes quite an art.

If she misjudges the ball's

falling position and is hit on the head, the girl starts to shake uncontrollably for a few seconds. The ball turns red, then dark blue and starts to roll towards her. If it bowls her over, she turns bright red and dies. But the situation can be saved if she scoops up the dark blue ball as it turns red and starts to bounce again.

On the second level, two balls are dropped by the angel. This time you have to change the colours of both balls by catching them. The third level sees you catching three balls.

You are given three lives

per level, so even if you lose all three struggling to get to the next difficulty stage, you are still granted three more lives.

Color Ball's sound is quite good, a rendition of Beethoven's fifth symphony and one of Handel's harpsichord concertos assails the player as he or she rushes around catching balls.

It took a while to get the hang of the controls and it took us ages to realise that you could only use the saucepan if you were standing still. It is also difficult to gain points — you can rush around catching balls until you're blue in the face and still only win a meagre 50 points.

Color Ball is not a snappy title, but it does inspire or frustrate players to keep on trying until they've got the game under control. It is overpriced at £7.95; there are better games for the same price on the market.

Graphics: Appealing

Sound: Computerised classical tunes

User Appeal: Not as easy to play as it looks

Conclusion: Over-priced

SUPER SNAKE

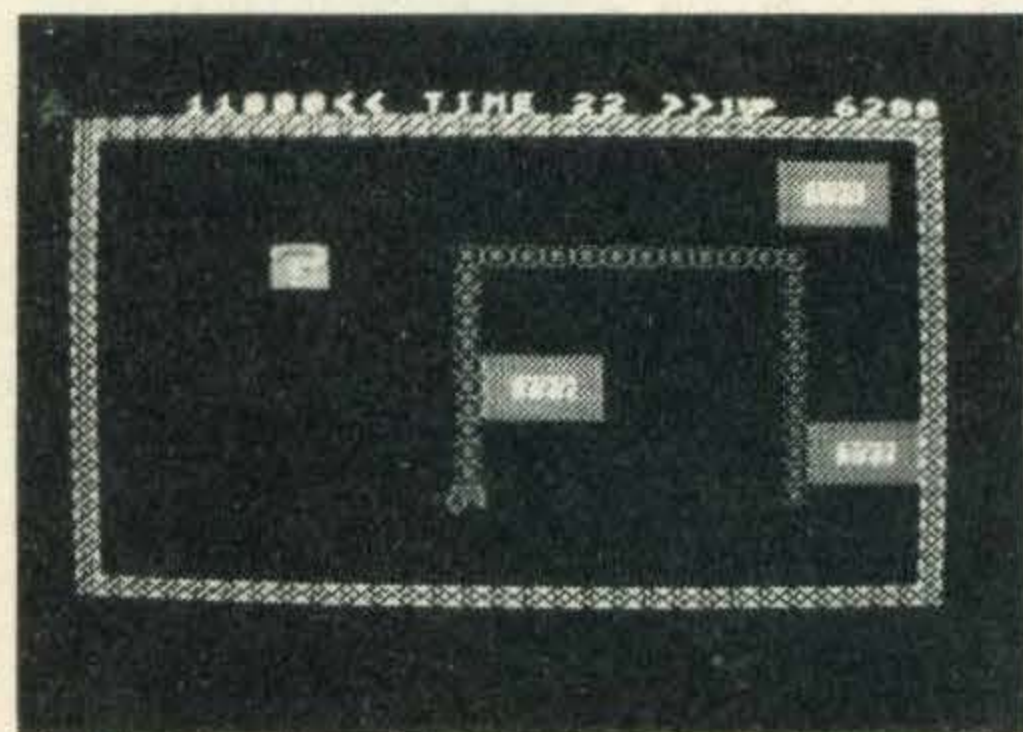
Supplier: Morwood
Products (04243) 5840
Type: Arcade
Format: Cartridge
Price: £14.95

Gobbling numbered boxes is not everyone's idea of having a good time, but in *Super Snake* this very occupation makes up the majority of the game. Believe it or not, it's fun!

A simple blue border surrounding a bare arena is displayed on screen and all action takes place within this rectangle. One or two people can play with the fast or slow speeds provided.

Playing *Super Snake* on the lower speed is advisable if you're a beginner, but as the slow speed is very slow, move on to the fast level as soon as possible.

Super Snake is a green snake which starts off very short but grows quickly once the game gets underway. It is perpetually on the move, but grows and shrinks at will. The idea is to guide the snake using the cursor keys or a joystick around the arena, making sure it doesn't cross itself or hurtle into the surrounding walls.



If it does, its life is lost and 500 points are totted up onto the penalty score. As with the majority of arcade games, the idea is to win lots of points. In this program, a penalty score board is added to the usual high score board.

Of course, there is more to *Super Snake* than just guiding the snake aimlessly round the screen. Targets, mystery boxes and rice cakes all add to the fun.

Target boxes are numbered with scores such as 600 or 900 and crossing these has the effect of throwing the number straight onto the plus score. Some of the target boxes are labelled with question marks instead of

numbers and it's impossible to tell whether they are plus or minus numbers until you've passed over them.

Targets are little blue boxes with bright red question marks. Most boxes contain yummy fruits such as strawberries, pineapples and cherries which add substantial amounts to the score. If by chance a skull is uncovered, the snake shudders horribly and your score is halved — a harsh punishment if you've slaved away to amass a huge score.

Rice cakes, it must be said, look absolutely nothing like rice cakes. Instead they look like evil little critters with fangs, wavy feelers and lots of little legs.

Yellow rice cakes extend the game for ten seconds, green cakes grab 2000 points from the opponent and red cakes cause the snake to shrink back to its original size.

Every so often, a warp tunnel opens up on the side of the frame for five seconds, enabling the snake to exit, win more points and to reappear at the other side.

A 60 second time limit governs the game and every time the snake is killed, the clock stops ticking until the next one is ready. Dying too often loses points because all the target scores left on the screen are totalled up and shoved straight onto the penalty score.

Super Snake's sound effects are loud and brash. The graphics are lively and the snake responds sensitively to the controls.

At £14.95, it is not a cheap game, but the convenience of a cartridge's quick loading and the fact that it is very addictive outweighs the extra expense.

Graphics: Snake responds sensitively to controls

Sound: Similar to a pinball machine

User Appeal: The first-time player will start getting high scores very quickly

Conclusion: A great version of an old favourite

STEP-UP

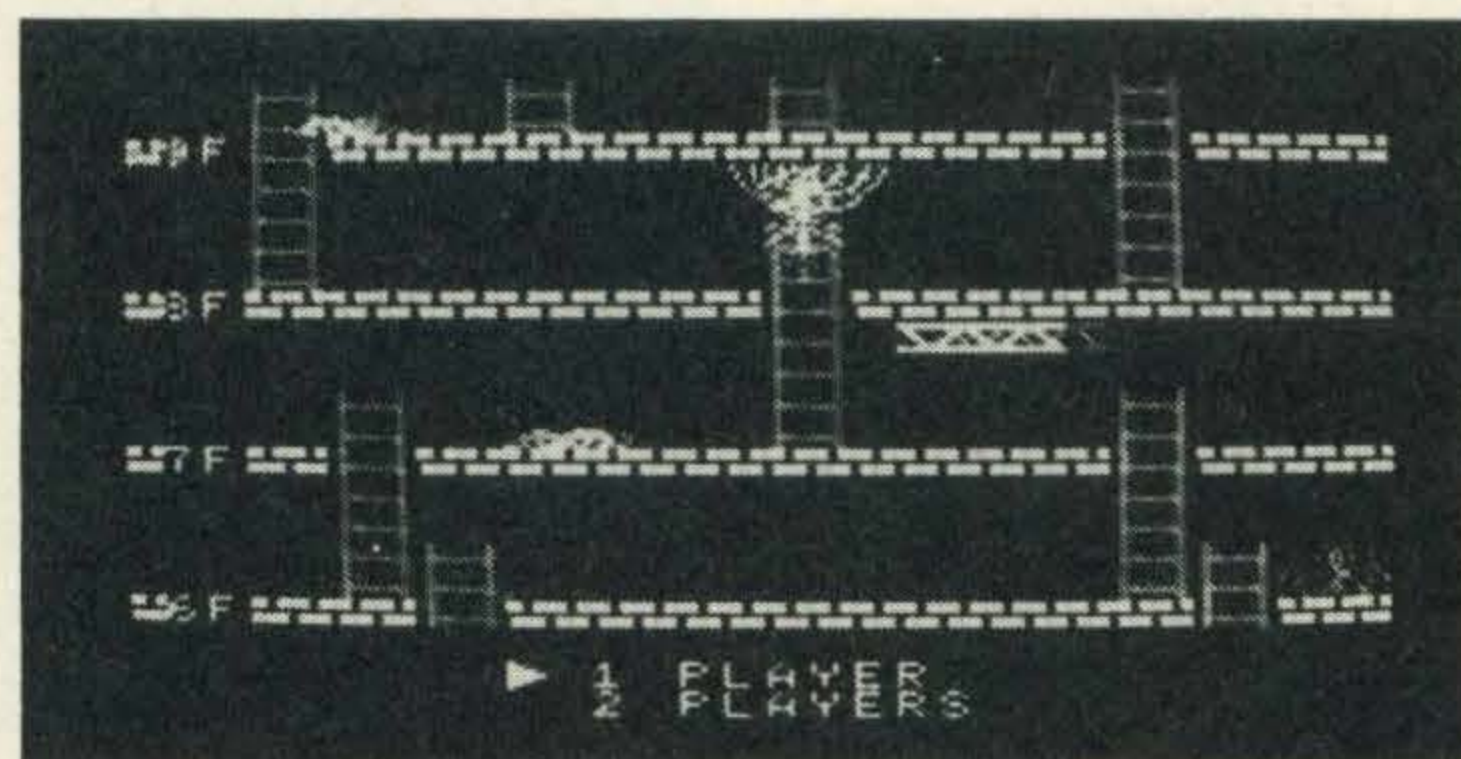
Supplier: Morwood
Products (04243) 5840
Type: Arcade
Format: Cassette
Price: £14.95

To be or not to be, that is the question you will be answering in *Step-Up*, yet another computerised platform game.

Great things are promised in the accompanying leaflet for the game; never-ending thrills, suspense and excitement that will surely hold your attention to the game.

But unfortunately these claims don't quite come true.

You play the part of a lonely spaceman marooned on a planet inhabited by a varied assortment of nasty creatures.



The planet is represented on screen as a series of 10 platforms (F1 to F10) connected by blue ladders. Dressed in a white spacesuit complete with space helmet, you are expected to climb to the top platform, also known as the rooftop, and catch the next passing UFO.

Of course, the platforms are swarming with alien beings; purple bats, cobwebs complete with giant spiders, yellow curly-tailed rats, green horned monsters and a live red girder. All of these things knock the spaceman off his platform, causing him to land head first onto a rock hard floor — not a pretty sight!

Each creature attacks in a different way; the rat scurries along the ground, the bat flies up and down, the green monster runs up and down ladders, the red girder moves along underneath the platform and the spiders pop out of their webs every so often, surprising any spaceman that happens to be underneath.

Luckily, our hero has two ways of staying alive; jumping up to avoid obstacles or using his energy supply to render

himself immune. The energy supply is indicated along the bottom of the screen, and each time our hero turns red — a sign that the barrier is activated — a little energy is lost. He dies as soon as it runs out. Fortunately the supply is renewed every new life and level.

Once the roof has been reached, a little spaceship flies up and the only way to escape is to leap in. If he is too slow, the spaceship starts to move away, leaving him at the bat's mercy.

Every time the spaceman is killed, he has to start back at the bottom again, but if he manages to jump into the UFO he is transported on to the next level. Everything on the second level is very similar to the first, except that the supply

of cobwebs increases.

A new life is granted every 10,000 points, but usually the game ends after three lives are lost.

Sound effects in *Step-Up* are not spectacular, just a series of various computerised bleeps. The graphics are more entertaining — the purple bats and cobwebs are very convincing.

There are so many platform games around, all with the same theme of jumping over creatures on platforms, that a new one would have to have something special to warrant recommendation.

Unfortunately, it is hard to recommend this one — there just isn't anything particularly special or different about it.

Graphics: Chunky and colourful

Sound: Bleeps in varying tones

User Appeal: If you can play other platform games, you can play this

Conclusion: Contains nothing to set it apart from other platform games

ODYSSEY K

Supplier: Rittor Music
01-208 0588
Type: Music Composer
Format: Cassette
Price: £11.95

There aren't many music programs available for MSX as yet, but the situation is gradually changing and the latest addition to the repertoire is Rittor Music's *Odyssey K*.

It is aimed at computer users who have some previous knowledge of music and are interested in playing their own simple tunes without the investment of a musical keyboard. So if you are tone deaf and can't play a note this program isn't going to be of much use or interest.

The screen displays a keyboard with 32 white keys and 20 black keys. However, four of the white keys are dummies as is one of the black keys — they are there purely for cosmetic purposes. The manual that goes with the program contains a full layout of the keyboard and all this is explained.

To whet the appetite the program starts off with a version of Scott Joplin's *The Entertainer* and if that doesn't



ring any bells you probably know it better as the theme tune to *The Sting*.

Having listened to it a couple of times I then decided to tinker with the keys myself and see what I could produce.

My musical talents stretch no further than a few elementary lessons on the recorder at school, but after a few minutes I managed to tap out the National Anthem and Humpty Dumpty. Once I really got going I was able to make use of the three recording channels and built up a reasonable sounding tune.

There is a menu offering 12 different functions so once you've created your musical

masterpiece it's possible to alter the tempo, overdub any of the three recording channels if you're not happy with the sounds and alter the metronome, which marks the time.

After recording each channel you can play them back separately — useful if you're creating a melody and need to re-check parts of it. Selecting the Bias mode allows you to change the pitch of all your recorded data and some pretty amazing sound effects can be created.

Once the composing is finished, key in PLY and sit back and listen to your efforts. If it still doesn't sound quite right, *Odyssey K* allows you to alter sections or erase the whole lot so that you can start from scratch.

The main disadvantage with *Odyssey K* is that it doesn't allow you to play two or more notes simultaneously. Also, it can only play in 'real' time so you have to make sure that what you're inputting is accurate.

For instance, if you're playing a tune and stop midway — say, because you have forgotten the next note — when you come to play it back there will be a long pause where you stopped. The notes are recorded exactly as you play them. If you're a lousy musician it will reflect your mistakes, whereas a synthesizer would quite easily disguise bad timing.

It also takes some time to get used to playing the notes on a QWERTY keyboard as opposed to a musical keyboard, but for £11.95 you can hardly expect more.

Although compared to a modern synthesiser it's very limited, it's a good place to start if you're seriously interested in composing but can't afford the real thing.

User appeal: For the musically inclined.

Sound: Just what you'd expect from a micro

Graphics: One keyboard looks much the same as any other

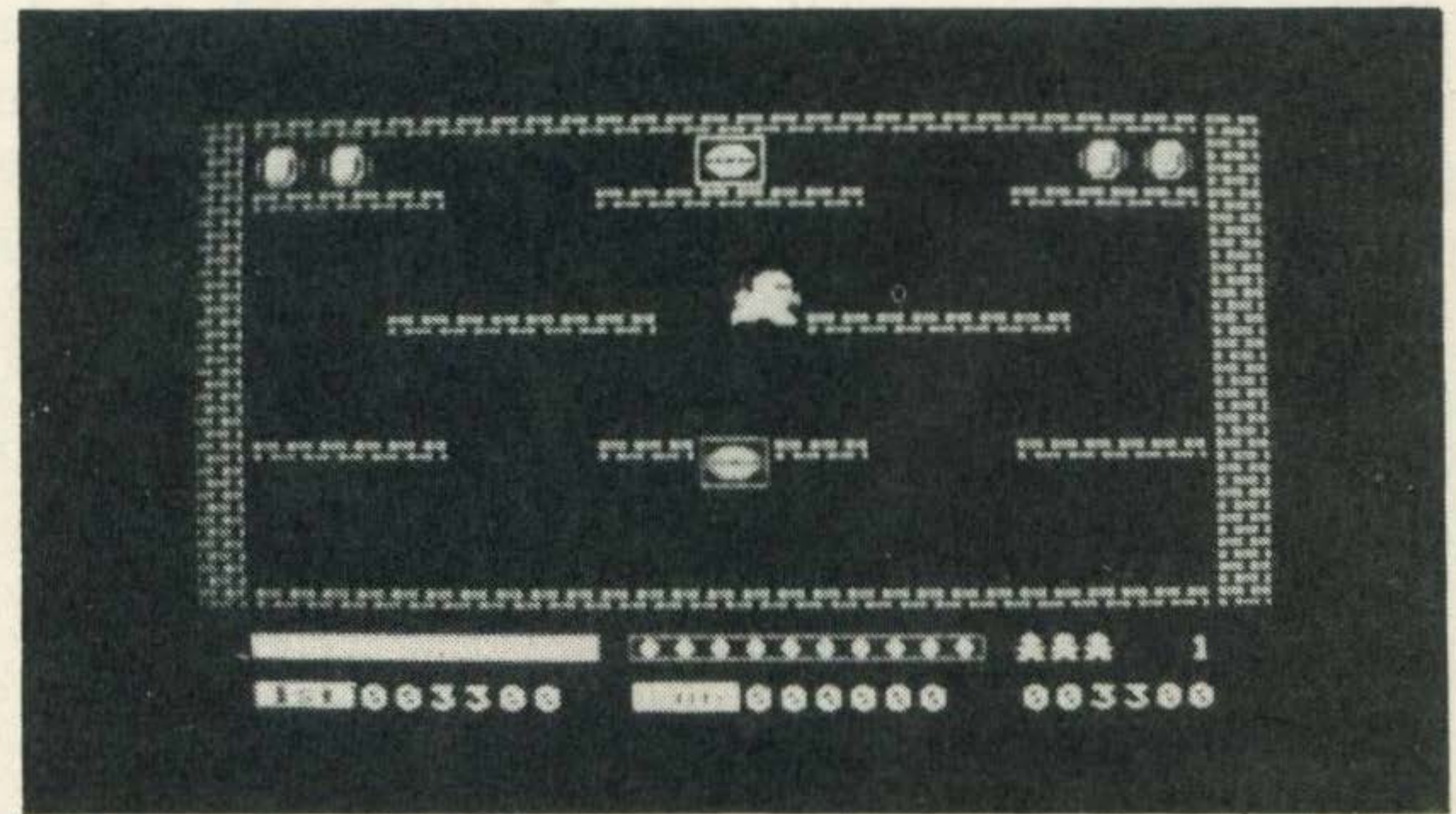
Conclusion: Not bad for £12

SASA

Supplier: Panasonic
01-735 4522
Type: Arcade
Format: Cartridge
Price: £18.80

'Sasa, the warrior robot,' says the blurb on the cartridge cover, 'flies by using a portable phaser gun'. A more apt description would have compared his likeness to that of an astronaut carrying a knapsack.

Your mission is to penetrate the arsenal, destroy a power generator, collect some power packs beneath the sea and



knock a few aliens out at the same time.

Sasa's phaser gun can only fire 50 rounds with one energy supply so you have to remember to look at the monitor which displays the phaser's energy level and top it up when it's too low. You also need to keep an eye on the monitor which shows your remaining ammunition — and keep a lookout for the enemy.

There are only four levels to the game but just to make it more interesting there are three levels of difficulty. If you're a downright coward, PRACTICE is the playing mode to go for. Feeling adventurous I opted for NORMAL mode. Playing at ARCADE level was too risky!

To get through level one Sasa has to penetrate a gate that blocks the way to the arsenal. But, not only is the gate in an awkward position but it's also regularly patrolled by helicopters and the occasional guided missile. On top of that, the ceiling is protected by an electrical barrier — get too close and you'll fry.

This certainly isn't an easy game to master and requires intense concentration. Until

you've got the hang of moving around backwards few points will be scored.

But, as you start off with five lives, extra lives are awarded every time you manage to get to level 4. So you stand a reasonable chance of success.

Once the arsenal in level two has been penetrated there are four power generators to demolish.

Level 3 takes place on the seabed where the task is to collect five energy packs. But there's a snag; the octopii have swallowed them and have to be zapped before you can retrieve the packs.

When the robot reaches

level 4 the action is fast and furious and he is attacked by aliens and spaceships. Fortunately the phaser has a limited supply of energy — otherwise finding time to recharge it could be a major problem.

The game can be played with a joystick but manoeuvring Sasa isn't as smooth as with the keyboard. Zapping the aliens, however, is a lot easier with a joystick.

One thing you can usually count on with a ROM cartridge is its high quality graphics. Panasonic's *Sasa* contains graphics which are both colourful and imaginative.

Despite the fact that this reviewer is no kill-an-alien games fanatic, *Sasa* had me hooked. Figuring out how to get past the enemy and onto the next level adds a touch of adventure — I couldn't be sure what was going to happen next.

Graphics: Excellent

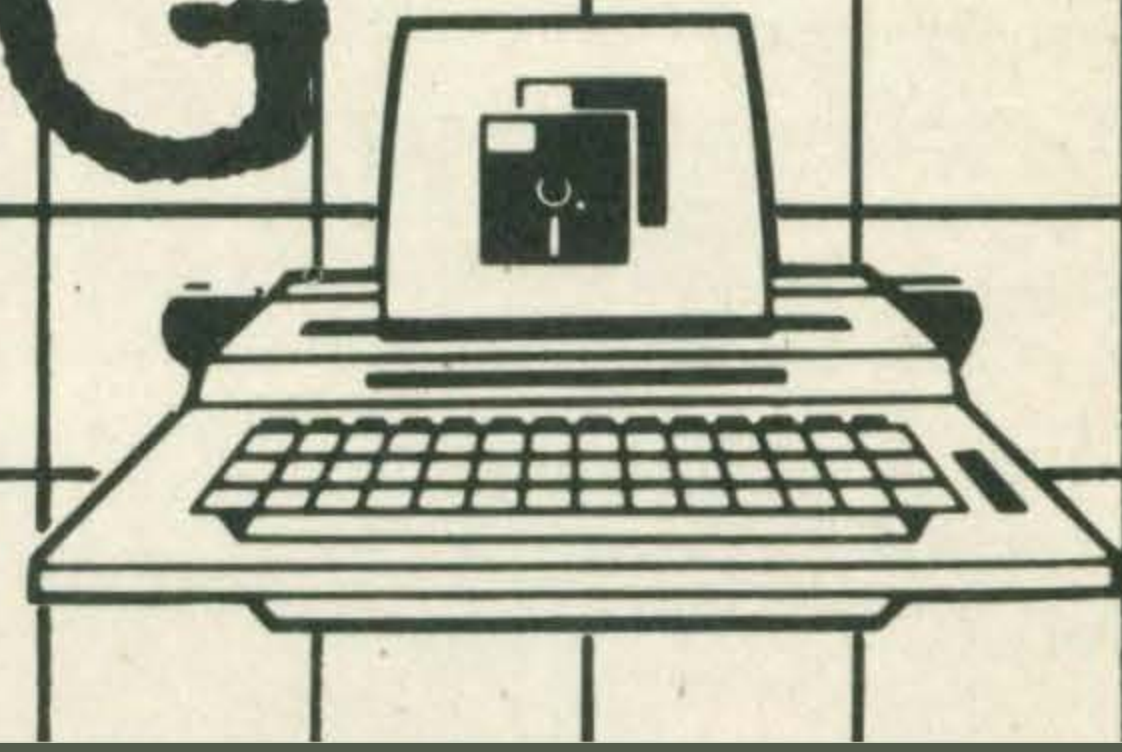
Sound: Adequate run-of-the-mill electronic noises

User appeal: Brings out the competitive streak

Conclusion: Add it to your collection

GET TYPING

Feel like doing it yourself? Get your teeth into our readers' programs



SINK THE SHIP

by M D Shaw

This is a colourful version of the old children's number guessing game. It involves simple logic, with the player having to guess a number which the computer has generated. At the same time the computer is trying to guess a number of yours. You are in control of a fort and the computer is shown as a ship. The idea is blow each other up with some quaintly low-tech cannons, by guessing the right number. Your shooting indicates in which way your guess is wrong. For example, if your guess is too small, your shot falls short. Full instructions are given on the screen, along with some imaginative graphics.

Program structure

10-80	Set up routines
90-200	Input on high res screen
210-260	Check user's guess
270-360	Explosion on ship
370-510	Logic for computer's guess
520-600	Print computer's guess
610-670	Fort explosion
680-780	Shell from fort to ship

790-900	Shell from ship to fort
910-1020	Explosion sound
1030-1160	End routine/offer new game
1180-1440	Initial input routines
1450-2060	Set up graphics and sprites
2070	Initialise variables
2100	Tune
2110-2360	Instruction routines
2370-2460	Spacebar routines
2470-2520	Data for sprites

Main program variables

A\$-E\$	Temporary variables used in input routines and sprite set-up
NA\$	Holds user's name
G%	Plane movement
R%,S\$	Bird's movement
T%	Tune
X% Y% Z%	System flags
TRY%	Number of user's guess
GU%	User's guess
UN%	User's number
CG%	Computer's guess
NBR	Computer's random number
H, L, M, N, O, P, V	— variables used for shell's flight and computer's logic.

```

10 'SINK THE SHIP by M.D. SHAW.
20 'PRODUCED MARCH 1985.
30 'AN EDUCATIONAL LOGIC GAME
40 CLEAR500
50 GOSUB 2070:REM SET UP ROUTINE
60 GOSUB 1200:REM INPUT LEVEL
70 GOSUB 1470:REM GRAPHICS
80 GOSUB2420
90 PSET(0,160):COLOR8:PRINT#1,"WHAT I
S YOUR GUESS"
100 IF INKEY$<>""THEN 100
110 T=150:S=160
120 FOR F=0 TO 3
130 A$(F)=INPUT$(1)
140 IFA$(F)=CHR$(13) THEN F=3
150 IFA$(F)=CHR$(8) THEN A$(F)="" :LIN
E(0,160)-(255,168),7,BF:F=3:GOTO90
160 DRAW"BM"+STR$(T)+", "+STR$(S)
170 PRINT#1,A$(F)
180 T=T+8:NEXT
190 X$=A$(0)+A$(1)+A$(2)+A$(3)
200 GU%=VAL(X$)
210 IF GU%<NBR THEN H=128:V=117:L=-10
:M=0:N=55:P=5:GOSUB790
220 IF GU%<NBR THEN PSET(0,160):PRINT

```

```

#1," SORRY THAT WAS TOO LOW!!!":GOTO
390
230 IF GU%>NBR THEN H=137:V=205:L=-14
:M=-2:N=50:P=4:GOSUB790
240 IF GU%>NBR THEN PSET(0,160):PRINT
#1," SORRY THAT WAS TOO HIGH!!!":GOT
O 390
250 IF GU%=NBR THEN H=137:V=200:L=-12
:M=-5:N=5:P=5:GOSUB790
260 GOSUB930
270 FOR F=1 TO25
280 X=INT(RND(1)*250):IFX<150 GOTO 28
0
290 Y=INT(RND(1)*120):IF Y<100 GOTO 2
90
300 COL=INT(RND(1)*11):IF COL<4 OR CO
L>11 THEN GOTO 300
310 LINE(200,130)-(X,Y),COL:NEXT
320 FORF=116 TO 132
330 IF F=125 THEN LINE(150,100)-(250,
131),7,BF
340 PUT SPRITE3,(185,F),1,3
350 PUT SPRITE4,(201,F),1,4
360 FOR X=1TO50:NEXTX:NEXT F
370 GOSUB 2420

```



```

380 GOTO 1030
390 GOSUB 2420
400 IF Z%=1 THEN GOTO 500
410 IF X%=0 THEN GOTO 460
420 H%=L%:L%=L%/2
430 IF L%=UN% THEN CG%=L%:GOTO 510
440 IF L%>UN% THEN CG%=L%:X%=1:GOTO 510
450 IF L%<UN% THEN CG%=L%:X%=0:GOTO 510
460 N%=(H%-L%)/2:N%=N%+L%
470 IF N%>UN% THEN H%=N%:GOTO 490
480 L%=N%
490 CG%=N%
500 Z%=0
510 LINE(0,160)-(255,168),7,BF
520 PSET(15,15):PRINT#1," MY GUESS IS "CG%
530 IF CG%<UN% THEN H=125:V=-80:L=9:M=-8:N=8.5:P=110:GOSUB690
540 IF CG%<UN% THEN PSET(25,25):PRINT#1,"OH DEAR TOO LOW!!!":GOSUB 2420
550 IF CG%<UN% THEN GOTO 90
560 IF CG%>UN% THEN H=86:V=-80:L=9.5:M=-8.25:N=10:P=110:GOSUB690
570 IF CG%>UN% THEN PSET(25,25):PRINT#1,"OH DEAR TOO HIGH!!!":GOSUB 2420
580 IF CG%>UN% THEN GOTO 90
590 IF CG%=UN% THEN H=101:V=-69:L=9.5:M=-8.25:N=10:P=110:GOSUB690
600 GOSUB930
610 FOR F=1 TO25
620 X=INT(RND(1)*100)
630 Y=INT(RND(1)*100):IF Y<30ORY>80 GOTO 630
640 COL=INT(RND(1)*11):IF COL<4 OR COL>11 THEN GOTO 640
650 LINE(40,85)-(X,Y),COL:NEXT
660 PSET(25,25):PRINT#1,"YOUR NUMBER WAS "CG%:GOSUB 2420
670 FLAG=1:GOTO1030
680 '
690 ' SHIP TO FORT
700 '
710 SOUND6,31:SOUND8,16:SOUND11,103
720 SOUND12,30:SOUND13,8:SOUND7,55
730 FOR F=1 TO400:NEXT F:SOUND8,0
740 FOR X=LTOMSTEP-1:PSET((H+(X*N)),(V+(P+(X*X)))):FORF=1TO100:NEXT:NEXT
750 FOR F=1TO100:NEXT
760 FOR X=LTOMSTEP-1:PRESET((H+(X*N)),(V+(P+(X*X)))):NEXT
770 RETURN
780 '
790 ' FORT TO SHIP
800 '
810 SOUND6,31:SOUND8,16:SOUND11,103
820 SOUND12,30:SOUND13,8:SOUND7,55
830 FOR F=1 TO400:NEXT F:SOUND8,0
840 FOR X=LTOM:PSET(V+(N-(X*X)),(H+(X*P))):FOR F=1TO100:NEXT:NEXT
850 FORF=1TO100:NEXT
860 FOR X=LTOM:PRESET(V+(N-(X*X)),(H+(X*P))):NEXT
870 LINE(0,155)-(255,178),7,BF
880 TRY%=TRY%+1:PSET(15,170):PRINT#1,"TRY S = "TRY%
890 RETURN

```

```

900 '
910 'EXPLOSION
920 '
930 SOUND0,0:SOUND1,5
940 SOUND2,0:SOUND3,13
950 SOUND4,255:SOUND5,15
960 SOUND6,30:SOUND7,0
970 SOUND8,16:SOUND9,16
980 SOUND10,16:SOUND11,0
990 SOUND12,5:SOUND13,0
1000 FORX=0TO30:NEXTX
1010 SOUND12,56:SOUND13,0
1020 RETURN
1030 SCREEN1,0,0
1040 SOUND8,0:SOUND9,0:SOUND10,0
1050 IF FLAG=1 GOTO 1080
1060 PRINTTAB(1);"WELL DONE ";NA$
1070 LOCATE0,5:PRINT"You guessed my number in...."TRY%;"goes":GOTO 1100
1080 FLAG=0:LOCATE0,5:PRINT"HOORAY, I WON. YOUR NUMBER WAS "
1090 LOCATE12,8:PRINTUN%
1100 LOCATE0,10:PRINT"Would you like another game ?"
1110 CLOSE#1
1120 LOCATE 8,22:PRINT"(Press Y or N)"
1130 IF INKEY$<>" "THEN 1130
1140 K$=INKEY$:IF K$="Y"OR K$="y"THEN GOTO 50 ELSE IF K$=""THEN1140
1150 CLS:LOCATE2,10:PRINT"THANKS FOR THE GAME....."
1160 LOCATE8,15:PRINT"BYE..BYE":END
1170 '
1180 REM:INPUT LEVEL
1190 '
1200 IF INKEY$<>" "THEN 1200
1210 CLS:LOCATE 0,6:PRINT"PLEASE TYPE IN YOUR NAME...."
1220 LOCATE 0,8:INPUT NA$
1230 LOCATE 0,10:PRINT"WHICH LEVEL DO YOU REQUIRE"
1240 LOCATE 0,12:INPUT L:IF L<1OR L>4 THEN CLS:GOTO 1230
1250 '
1260 REM GET RANDOM NUMBER
1270 '
1280 ON L GOSUB 1350,1370,1390,1410
1290 '
1300 LOCATE0,14:PRINT"what number between 1 & 1000 do you want the computer to try and guess?"
1310 LOCATE0,18:INPUTUN%:IF UN%<1 OR UN%>1000 THEN CLS:GOTO 1300
1320 LOCATE 0,20:PRINT"THANK YOU "NA$
1330 GOSUB 2370
1340 RETURN
1350 NBR=INT(10*RND(1)+1)
1360 RETURN
1370 NBR=INT(100*RND(1)+1)
1380 RETURN
1390 NBR=INT(500*RND(1)+1)
1400 RETURN
1410 NBR=INT(1000*RND(1)+1)
1420 RETURN
1430 '
1440 '
1450 REM:GRAPHICS

```

LISTINGS

```
1460 '
1470 SCREEN2,2,0:COLOR12,7,7:CLS
1480 FOR F=0TO255 STEP 8
1490 LINE(F+4,132)-(F+6,132),4
1500 PSET(F+5,131),4
1510 NEXT F
1520 LINE(0,133)-(255,149),4,BF
1530 LINE(0,95)-(63,95),12
1540 LINE(63,95)-(87,149),12
1550 LINE(87,149)-(0,149),12
1560 PAINT(0,148),12
1570 LINE(23,71)-(55,95),13,BF
1580 FOR F=29 TO 45 STEP 8
1590 LINE(F,71)-(F+4,75),0,BF
1600 NEXT
1610 LINE(56,77)-(61,80),1,BF
1620 CIRCLE(223,20),8,10
1630 PAINT(223,20),10
1640 CIRCLE(208,35),8,15,...5
1650 CIRCLE(223,36),15,15,...5
1660 CIRCLE(235,38),11,15,...4:LINE(2
08,35)-(235,41),7:PAINT(208,35),15,15
1670 CIRCLE(50,7),7,15,...5:CIRCLE(59
,9),5,15,...5:LINE(50,7)-(59,7),7:PAI
NT(50,7),15,15
1680 RESTORE:B$="":C$="":D$="":E$="":
F$=""
1690 FOR F=1 TO 32:READ A:B$=B$+CHR$(
A):NEXT
1700 FOR F=1 TO 32:READ A:C$=C$+CHR$(
A):NEXT
1710 FOR F=1 TO 32:READ A:D$=D$+CHR$(
A):NEXT
1720 FOR F=1 TO 32:READ A:E$=E$+CHR$(A):N
EXT
1730 SPRITE$(3)=B$
1740 SPRITE$(4)=C$
1750 SPRITE$(1)=D$
1760 SPRITE$(2)=E$
1770 PUT SPRITE1,(185,132),4,1
1780 PUT SPRITE2,(201,132),4,2
1790 SOUND7,56
1800 PLAY"xt$;","xt$;","xt$;"
1810 FOR F=230 TO 185 STEP-1
1820 PUT SPRITE3,(F,116),1,3
1830 PUT SPRITE4,(F+16,116),1,4
1840 LINE(15,170)-(255,178),7,BF
1850 NEXT F
1860 RESTORE 2510
1870 FOR Y%=0 TO 5:A$="":FOR X%=0TO7
1880 READA%A$=A$+CHR$(A%):NEXT X%
1890 SPRITE$(Y%+25)=A$:NEXTY%
1900 RETURN
1910 REM PLANE / BIRD MOVEMENT
1920 PUT SPRITE9,(R%,60),1,29
1930 PUT SPRITE10,(S%,50),1,30
1940 PUT SPRITE27,(G%,4),1,25
1950 PUT SPRITE28,(G%-16,4),1,28
1960 PUT SPRITE29,(G%-32,4),13,27
1970 PUT SPRITE30,(G%-48,4),9,26
1980 G%=G%+3
1990 R%=R%+1:S%=S%-1
2000 FOR F=1 TO 30:NEXT F
2010 PUT SPRITE9,(R%,60),1,30
2020 PUT SPRITE10,(S%,50),1,29
2030 FOR F=1 TO 30:NEXT F
2040 R%=R%+1:S%=S%-1
2050 RETURN
2060 '

```

```
2070 REM SET UP ROUTINE
2080 '
2090 KEY OFF:SCREEN 1,0,0:COLOR1,2,2:
CLS:STOP OFF:CG%=1000:L%=1000:Z%=1:X%
=1:TRY%=0:G%=50:R%=255:S%=255
2100 T$="t255cr64cegr64g2o5gr64g2er64
e2o4cr64cegr64g2o5gr64g2fr64f2o4dr64d
far64a2o5ar64a2fr64f2o4dr64dfar64a2o5
ar64a2er64eo4cr64cego5c2o6cr64c2o5gr6
4g2o4cr64cego5c2o6cr64c2ar64a2o4ddf
ar64a.r64af#go5e.r64eco4er64e..r64ea2gc
.c."
2110 OPEN"GRP:" FOR OUTPUT AS #1
2120 KEY OFF:LOCATE 8,10,0:PRINT"SINK
THE SHIP"
2130 LOCATE 0,20,0:PRINT"Do you requi
re instructions?"
2140 LOCATE 8,22:PRINT"(Press Y or N)
"
2150 IF INKEY$<>""THEN 2150
2160 K$=INKEY$:IF K$="Y"OR K$="y"THEN
GOSUB 2190 ELSE IF K$=""THEN2160 ELS
E CLS:RETURN
2170 RETURN
2180 '
2190 REM INSTRUCTION ROUTINE
2200 '
2210 CLS:PRINTTAB(9);"INSTRUCTIONS"
2220 PRINTTAB(30);"To sink the ship y
ou must guess the number that the
computer thinks of before it guesse
s yours."
2230 PRINTTAB(29);"Just to help you t
he computerwill give you clues to he
lp you guess."
2240 PRINTTAB(29);"Press RETURN after
each input"
2250 PRINT"You have 4 levels availabl
e:-"
2260 PRINTTAB(1);"1 A number between
1 & 10 "
2270 PRINTTAB(1);"2 A number between
1 & 100 "
2280 PRINTTAB(1);"3 A number between
1 & 500 "
2290 PRINTTAB(1);"4 A number between
1 & 1000 "
2300 GOSUB 2370
2310 CLS:LOCATE0,6:PRINT"The best sco
re is achieved by sinking the ship
in the lowest number of shots or
before your fort is blown up!"
2320 PRINTTAB(29);"You will be able t
o make the computer guess your intege
r number which can be between 1 & 1
000 ";
2330 PRINT"and it will use logic
to workout what the number is..."
2340 GOSUB 2370
2350 RETURN
2360 '
2370 REM SPACEBAR ROUTINES
2380 '
2390 LOCATE 1,23:PRINT"Press spacebar
to continue"
2400 A=STRIG(0):IF A=0THEN 2400

```


LISTINGS

```

R X=1 TO 1500:NEXT X:GOTO 150
330 C=C-M(D)
340 K(Z)=M(D):U(D)=1:C$(Z)=N$(D):G(Z)
=B(D):H(Z)=F(D):PI(Z)=D
341 FOR X=1 TO 1000:NEXT X
360 NEXT Z
370 PRINTT$:" TEAM IS CHOSEN.."
380 FOR Z=1 TO 2000:NEXT Z
390 CLS
400 LOCATE1,1
410 PRINT T$:" TEAM FILE"
415 FOR Z=1 TO 2000:NEXT Z
420 FOR Z=1 TO 5
430 PRINT:PRINT C$(Z)
440 PRINT"BATTING SKILL ";G(Z)
450 PRINT"FIELDING SKILL ";H(Z)
470 NEXT Z
480 TB=(G(1)+G(2)+G(3)+G(4)+G(5))*10
490 TF=(H(1)+H(2)+H(3)+H(4)+H(5))*10
495 FOR Z=1 TO 5000:NEXT Z
499 CLS
500 PRINT:PRINT"TEAM BATTING SKILL OU
T OF 500:";TB
501 PRINT"TEAM FIELDING SKILL OUT OF
500:";TF
510 PRINT:PRINT:PRINT"PRESS ANY KEY T
O PLAY"
520 A$=INKEY$
530 IF A$="" THEN 520
540 CLS:W=0:V=0:L=0
550 FOR Z=1 TO 10
560 I=INT(500*RND(1)+1)
570 J=INT(500*RND(1)+1)
580 PRINT"YOU PLAY THE ";O$(Z)
590 PRINT"THEIR BATTING SKILL IS ";I
600 PRINT"THEIR FIELDING SKILL IS ";J
610 PRINT:PRINT"YOUR BATTING SKILL IS
";TB
620 PRINT"YOUR FIELDING SKILL IS ";TF
630 FOR X=1 TO 1000:NEXT X
640 R=TB-J:S=I-TF
650 IF R<0 THEN R=0
660 IF S<0 THEN S=0
670 PRINT"*****
*****"
700 PRINT T$:" >";R:" HOME RUNS"
710 PRINT O$(Z);" >";S:" HOME RUNS"
720 IF R>S THEN C=C+(R*1000):PRINTT$:
"WON":PRINT:PRINT"MONEY RAISED FOR W
INNING:";(R*1000):W=W+1:TB=TB+INT(R/1
0):TF=TF+INT((200-S)/10)
730 IF R=S THEN V=V+1:PRINT"YOU DREW
WITH THE ";O$(Z):C=C+500000!
740 IF R<S THEN L=L+1:PRINT"THE ";O$(
Z);" WON":C=C-(S*1000):PRINT:PRINT"MO
NEY DEDUCTED FOR LOSING ";(S*1000)
750 PRINT:PRINT:PRINT"YOU HAVE GOT $"
:C:"IN THE BANK"
760 PRINT:PRINT:PRINT"PRESS ANY KEY T
O CONTINUE"
765 A$=""
770 A$=INKEY$:IF INKEY$="" THEN 770
800 CLS:NEXT Z
810 PRINT T$:" TABLE FOR SEASON ";P
820 PRINT"YOU WON ";W:"GAMES OUT OF
10"
830 PRINT"YOU DREW ";V:"GAMES OUT OF
10"

```

```

840 PRINT"YOU LOST ";L:"GAMES OUT OF
10"
850 PRINT:PRINT"MONEY RAISED $";C
851 IF C<0 THEN PRINT"SORRY YOU'RE BA
NKRUPT":PRINT"YOU HAVE TO START A NEW
3@AM NOW":FOR Z=1 TO 3000:NEXT Z:FOR
Z=1 TO 11:U(Z)=0:NEXT Z:GOTO 80
854 IF C>Q THEN Q=C:Q$=T$
855 PRINT"HIGHEST AMOUNT OF MONEY MAD
E"
856 PRINT"$";Q;" BY..":Q$:PRINT:PRINT
860 PRINT"PRESS<Y> TO PLAY NEXT SEASO
N"
870 PRINT"PRESS<N> TO START NEW GAME"
880 A$=INKEY$
890 IF A$="Y" OR A$="y" THEN 910
900 IF A$="N" OR A$="n" THEN 80
901 GOTO880
910 CLS:P=P+1
920 PRINT"PRESS<Y> TO BUY A NEW PLAYE
R"
930 PRINT"PRESS<N> TO KEEP THE SAME T
EAM"
935 A$=INKEY$
940 IF A$="Y" OR A$="y" THEN GOTO 961
950 IF A$="N" OR A$="n" THEN GOTO 390
960 GOTO 935
961 X=4
962 CLS
963 PRINT"PLAYERS IN ";T$:" TEAM"
964 PRINT".....NAME.....
PROFIT...."
970 FOR Z=1 TO 5
971 X=X+1
972 LOCATE 0,X
973 PRINT Z;".":C$(Z)
974 LOCATE 24,X
975 PRINT"$";K(Z)
990 NEXT Z
1050 PRINT"*****
*****"
1060 PRINT"ENTER NUMBER OF PLAYER TO
BE SOLD"
1070 INPUT D
1071 IF D>5 OR D<1 THEN GOTO 1070
1091 FOR Z=1 TO 1500:NEXT Z
1100 CLS:X=3
1101 PRINT"*PLAYERS THAT YOU CAN BUY*
"
1102 PRINT".....NAME.....
..PRICE...."
1110 FOR Z=1 TO 11
1120 IF U(Z)=0 THEN GOTO 1150
1130 NEXT Z
1140 GOTO 1210
1150 X=X+1
1160 LOCATE 0,X
1170 PRINT Z;".":N$(Z)
1180 LOCATE 25,X
1190 PRINT"$";M(Z)
1200 GOTO 1130
1210 PRINT"*****
*****"
1215 PRINT"MONEY IN BANK $";C
1220 PRINT"ENTER NUMBER OF PLAYER TO
BE BOUGHT"
1230 INPUT O

```

```

1234 IF O=0 THEN C=C-K(D):GOTO 920
1235 IF O>11 OR O<0 THEN GOTO 1230
1240 IF U(O)=1 THEN PRINTN$(O):" ISN'
T AVAILABLE.":FOR Z=1 TO 1500:NEXT Z:
GOTO 1100
1251 IF C-M(O)<0 THEN PRINT"YOU HAVEN
'T GOT ENOUGH MONEY TO BUY..":PRINTN$
(O):FOR Z=1 TO 1500:NEXT Z:GOTO 1100
1260 PRINT N$(O):PRINT"HAS NOW REPLAC
ED":PRINTC$(D)
1261 PL=PI(D)
1270 C$(D)=N$(O):G(D)=B(O):H(D)=F(O):
K(D)=M(O):U(PL)=0:U(O)=1:C=C-M(O).
1271 PI(D)=0
1280 FOR Z=1 TO 2000:NEXT Z
1290 GOTO 910
3000 CLS
3001 LOCATE 10,3
3010 PRINT"* BASEBALL COACH *"
3020 LOCATE 18,5
3030 PRINT"BY"
3035 LOCATE 14,6
3040 PRINT"GARY GREEN"
3050 LOCATE 8,23
3060 PRINT"GAZ software [23/5/85]"
3061 LOCATE 15,24:PRINT"VERSION 5"
3062 FOR A=1 TO 14
3065 COLOR A,15
3070 FOR X=1 TO 250:NEXT X
3071 NEXT A
3080 COLOR15,1
3090 CLS
4000 PRINT"DO YOU WANT INSTRUCTIONS(Y
/N)?"
4010 A$=INKEY$

```

```

4020 IF A$="Y" OR A$="y" THEN GOTO 40
50
4030 IF A$="N" OR A$="n" THEN RETURN
4040 GOTO 4010
4050 PRINT:PRINT"IN THIS SIMULATION Y
OU HAVE TO SELECTA BASEBALL TEAM.WHEN
YOUR TEAM HAS BEEN SELECTED YOUR T
EAM SKILL WILL BECALCULATED."
4060 PRINT"DURING THE SEASON YOU PLAY
10 TEAMS."
4070 PRINT"IF YOU WIN A GAME YOU WILL
EARN MONEYAND YOUR TEAM SKILL WILL I
NCREASE."
4080 PRINT"IF YOU LOSE YOU WILL LOSE
MONEY."
4090 PRINT"IF YOU DRAW YOU WILL EARN
$50000,BUT YOUR TEAM SKILL WILL NOT I
NCREASE."
4095 PRINT:PRINT"WHEN BUYING YOUR TEA
M AT THE START, YOU FIND YOU HAVEN'T
GOT ENOUGH MONEYTO BUY THE REST OF T
HE TEAM,ENTER`0' AS THE PLAYER YOU WI
SH TO BUY AND PRESS `RETURN'."
4100 PRINT:PRINT"IF, AFTER SELLING A P
LAYER (IN THE BUYA NEW PLAYER OPTION)
YOU DON'T WANT TO BUY A PLAYER AFTE
R ALL, ENTER`0' AND PRESS `RETURN'."
4110 LOCATE4,24
4120 PRINT"* PRESS ANY KEY TO CONTINU
E *"
4130 A$=INKEY$
4140 IF A$="" THEN GOTO 4130
4150 RETURN

```

KEYNOTES by A Gilbert

The versatility of MSX sound has prompted many people to send in sound and music programs. This one is a useful utility to help you write music to include in your own programs. At the first menu, three main options are present — Piano, MSX and Sound Shape. The last allows you to create a sound using the S and M commands and then play on the normal keyboard using this sound. The keyboard has three octaves, and notes are indicated as they are played by a moving

sprite. The octave can be changed while you're playing, and there are two sets of controls for this — for left- and right-handed players.

Main program variables

- NP, MN** Note indicator sprite position
- M\$** MSX keys for notes
- MU** Checks which key is pressed
- X\$** Holds one octave of notes
- K\$** Reads keyboard characters
- J** Current octave
- XM, XS** Value of S and M for sound shape

```

10 '*****
20 '*
30 '* MSX KEYNOTES *
40 '* A GILBERT *
50 '* (c) 1985 *
60 '*
70 '*****
80 '** GOSUB FOR INSTRUCTIONS **
90 GOTO390
100 '** KEYBOARD SPRITE POSITION **
110 X=88:Y=65:XX=156:J=4:M$="dfghjkl;
rtuio"
120 PUTSPRITE2,(NP,MN),10,2
130 PUTSPRITE0,(X,Y),6,0
140 PUTSPRITE1,(XX,Y),6,1

```

```

150 IFXS+XM=0THEN170
160 PLAY"s=xs;m=xm;"
170 PLAY"180=j;"
180 '** MAIN PLAY LOOP **
190 X$=INKEY$:IFX$=""THEN190
200 A=ASC(X$):IFA=27THENGOTO670
210 IFJ=5THEN260
220 IFASC(X$)=120ORASC(X$)=47THENJ=J+
1:X=X+77:XX=XX+77:IFJ>5THENJ=5
230 IFJ=3THEN280
240 K=ASC("k$"):PRINTK
250 A$=CHR$(K)
260 IFASC(X$)=122ORASC(X$)=46THENJ=J-
1:X=X-77:XX=XX-77:IFJ<3THENJ=3
270 '

```

LISTINGS

```

280 V=J+1
290 MU=INSTR(M$,X$)
300 IFMU<=8THENMM=MU:MN=37:GOTO320
310 IFMU>8THENMM=MU-8:MN=17
320 NP=10*MM+X:IFMM=1THENNP=0
330 IFMU>=1THENNP=11*MM-10+X
340 IFMU>8ANDMM>1THENNP=12*MM+X
350 IFMU>8ANDMM=1THENNP=4*MM+X
360 IFMU>8ANDMM=2THENNP=8*MM+X
370 PLAYX$(MU):GOTO120
380 '** INSTRUCTIONS **
390 SCREEN1:KEYOFF:CLS:COLOR 1,5,5
400 '** MAKE LINE NUMBERS INVISIBLE I
N LISTING **
410 A%=BASE(6)
420 VPOKEA%+6,&H55:VPOKEA%+4,&H55:VPO
KEA%+5,&H15:VPOKEA%+7,&H55:VPOKEA%+25
,&H25
430 LOCATE5,2:PRINT"The instructions
for"
440 LOCATE0,4:PRINT"M.S.X. KEYNOTES s
croll in the"
450 LOCATE0,6:PRINT"same way as listi
ngs. Use the"
460 LOCATE2,8:PRINT"stop button to ho
ld and"
470 LOCATE0,10:PRINT"release scroll S
O BE READY!."
480 KEY1,"goto650"+CHR$(13)
490 LOCATE3,16:PRINT"PRESS SPACE BAR
TO START"
500 K$=INKEY$:IFK$=""THEN500
510 IFK$="" THENLIST520-640ELSEGOTO50
0
520 '
530 '
540 '
550 '
560 '
570 '
580 '
590 ' N*****
600 '
610 ' N***** M.S.X. K
EYNOTES is a keyboard program with th
ree sound options: PIANO, MSX SOUND o
r SOUND SHAPE. After sound choice a t
hree octave keyboard is displayed,alo
ng with the computer keys used to pla
y.(LOWER CASE ONLY).
620 'Ovtaves are changed by using the
zx or ./ keys for left or right hand
ed players, the current octave is sho
wn between two red pointers. A sprite
moves on the keyboard showing the no
tes being played.
630 ' N***** The s
ound options PIANO and MSX are self e
xplanatory. The SOUND SHAPE option al
lows the user to create a sound using
the S and M commands. When the desir
ed sound is created it may then be us
ed on the keyboard.
640 'NNPRESS F1 TO STARTNN
650 DEFINTA-Z:OPEN"grp:"AS#1
660 DIMX$(14)
670 SCREEN2,0:COLOR 1,13,15:CLS
680 FORN=1TO8

```

```

690 READSS:E(N)=SS:NEXTN
700 DATA0,4,8,10,11,12,13,14
710 LINE(25,0)-(225,30),15,BF
720 DRAW"bm50,1c10r25d2617u1617d1217u
1217d1617u26r9bm50,4":PAINT(50,4),10
730 DRAW"bm110,1c4r25d7118d4r18d15125
u5r18u4118u17bm112,6":PAINT(112,6),4
740 DRAW"bm173,1c2r10f12e12r9g15f1219
h8g8110e12h14bm175,3":PAINT(180,3),2
750 '** PRINT MENUE **
760 LINE(25,31)-(225,51),5,BF
770 DRAW"bm63,37":PRINT#1,"K E Y N O
T E S"
780 DRAW"bm60,85":PRINT#1,"(2) = PIAN
O"
790 DRAW"bm60,70":PRINT#1,"(1) = MSX
SOUND"
800 DRAW"bm60,100":PRINT#1,"(3) = SOU
ND SHAPE"
810 LINE(50,130)-(200,170),8,BF
820 DRAW"bm60,138":PRINT#1,"PRESS NUM
BER FOR":DRAW"bm75,153":PRINT#1,"SOUN
D CHOICE"
830 K$=INKEY$:IFK$=""THEN830
840 IFK$="1"THENXS=11:XM=100:GOTO1440
850 IFK$="2"THENXS=11:XM=5000:GOTO144
0
860 IFK$="3"THEN880ELSE830
870 '** SCREEN FOR SOUND SHAPE OPTION
**
880 COLOR 1,15,1:CLS
890 LINE(0,0)-(50,30),10,BF
900 LINE(205,0)-(255,30),10,BF
910 CIRCLE(67,15),10,4:PAINT(67,15),4
920 DRAW"bm65,18c15u7f3e3d7"
930 CIRCLE(95,15),10,2:PAINT(95,15),2
940 DRAW"BM92,19c15r5u415u4r5"
950 CIRCLE(123,15),10,9:PAINT(123,15)
,9
960 DRAW"bm120,19c15e8bm127,19h8"
970 DRAW"bm145,7":PRINT#1,"SOUND"
980 DRAW"BM145,17":PRINT#1,"SHAPE"
990 DRAW"bm20,45":PRINT#1,"PRESS NUMB
ER FOR ENVELOPE."
1000 DRAW"BM23,60":PRINT#1,"USE UP/DO
WN ARROW KEYS TO"
1010 DRAW"BM20,75":PRINT#1,"INCREASE/
DECREASE M VALUE"
1020 DRAW"BM20,90":PRINT#1,"*1. USE R
IGHT/LEFT KEYS TO"
1030 DRAW"BM25,105":PRINT#1,"INCREASE
/DECREASE M *50."
1040 DRAW"bm32,120":PRINT#1,"S VALUE
SHOWN IS MSX"
1050 DRAW"BM30,135":PRINT#1,"NOT AS S
CREEN DISPLAY."
1060 DRAW"BM30,180":PRINT#1,"PRESS SP
ACE BAR TO START"
1070 K$=INKEY$:IFK$<>" "THEN1070
1080 LINE(0,30)-(255,192),4,BF
1090 LINE(8,30)-(8,192)
1100 '** SCREEN FOR S AND M VALUE CHO
ICES **
1110 DRAW"BM10,40C1F10R40":PRINT#1,"
1":DRAW"BM10,80E10D10R40":PRINT#1," 2
"
1120 DRAW"BM10,120F10U10F10U10F10U10F

```

```

10U10F10":PRINT#1," 3":DRAW"bm10,160E
10F10E10F10e10":PRINT#1," 4"
1130 DRAW"BM90,40F10U10R40":PRINT#1,"
5":DRAW"BM90,80D10E10D10E10D10E10D10
E10":PRINT#1," 6"
1140 DRAW"BM90,120E10R40":PRINT#1," 7
":DRAW"BM90,160E10F10E10F10E10":PRINT
#1," 8"
1150 LINE(87,30)-(87,192)
1160 LINE(164,60)-(255,192),13,BF
1170 LINE(164,125)-(255,192),5,BF
1180 DRAW"bm195,140":PRINT#1,"PRESS"
1190 DRAW"BM175,160":PRINT#1,"RETURN
FOR"
1200 DRAW"BM185,180":PRINT#1,"KEYBOAR
D"
1210 DRAW"bm170,65":PRINT#1,"PRESS SP
ACE":DRAW"BM185,85":PRINT#1,"TO HEAR"
1220 DRAW"BM195,105":PRINT#1,"SOUND"
1230 LINE(164,30)-(255,60),5,BF
1240 IFXS+XM=0THENXS=11:XM=500
1250 GOTO1290
1260 K$=INKEY$:IFK$=""THEN1260
1270 IFK$=CHR$(13)THEN1440
1280 LINE(200,30)-(240,60),5,BF
1290 L=VAL(K$)
1300 K=ASC(K$)
1310 IFK>48ANDK<=57THENXS=E(L)
1320 '** CHANGE M VALUE **
1330 IFK=30THENXM=XM+1
1340 IFK=31THENXM=XM-1
1350 IFK=28THENXM=XM+50
1360 IFK=29THENXM=XM-50
1370 IFXM<1THENXM=1
1380 IFXM>65535!THENXM=65535!
1390 DRAW"bm180,40":PRINT#1,"M= ";XM
1400 DRAW"bm180,52":PRINT#1,"S= ";XS
1410 IFK=32THEN1420ELSE1260
1420 PLAY"14s=xs;m=xm;abc"
1430 GOTO1260
1440 SCREEN2,0,0:KEYOFF:COLOR 15,4,5:
CLS:A=0
1450 '** DRAW KEYBOARD **
1460 LINE(12,0)-(247,50),15,BF
1470 LINE(42,0)-(42,60),4
1480 LINE(86,0)-(86,60),4
1490 LINE(118,0)-(118,60),4
1500 LINE(163,0)-(163,60),4

```

```

1510 LINE(194,0)-(194,60),4
1520 LINE(238,0)-(238,60),4
1530 READI
1540 LINE(I,0)-STEP(5,28),1,BF
1550 LINE(I+3,30)-(I+3,51),4
1560 A=A+1
1570 IFA<15THEN1530
1580 DATA17,29,49,61,73,93,105,125,13
7,149,171,181,201,213,225
1590 FORM=1TO3
1600 FORN=1TO7
1610 DRAW"bm=a;,54"
1620 READD$
1630 PRINT#1,D$
1640 A=A+11
1650 NEXTN:IFM<3THENRESTORE1730:NEXTM
1660 DRAW"bm=a;,54":PRINT#1,"C"
1670 A$=""
1680 FORN=1TO8
1690 READB
1700 A$=A$+CHR$(B)
1710 NEXT:SPRITE$(0)=A$:SPRITE$(1)=A$
1720 SPRITE$(2)=STRING$(8,CHR$(24))
1730 DATAC,D,E,F,G,A,B
1740 DATA24,24,24,60,60,60,255,255
1750 DATA C,D,E,F,G,A,B,O=V;C,C+,D+,F
+,G+,A+o=j;
1760 DRAW"bm38,80":PRINT#1,"3";SPC(10
);"4";SPC(10);"5"
1770 DRAW"bm100,93":PRINT#1,"OCTAVES"
1780 LINE(85,120)-(165,160),13,BF
1790 DRAW"bm103,130":PRINT#1,"rt uio"
1800 DRAW"bm95,143":PRINT#1,"dfghjkl;
"
1810 DRAW"bm80,170":PRINT#1,"MSX KEYB
OARD"
1820 LINE(0,120)-(60,192),1,BF:DRAW"b
m6,140":PRINT#1,"ESC TO"
1830 DRAW"BM10,155":PRINT#1,"MENUE"
1840 LINE(190,120)-(255,192),1,BF:DRA
W"BM201,140":PRINT#1,"CHANGE":DRAW"BM
196,155":PRINT#1,"OCTAVES"
1850 DRAW"bm196,170":PRINT#1,"zxOR./"
1860 FORN=1TO13:READX$(N)
1870 NEXTN
1880 RESTORE:GOTO110

```

BOUNCER BERT by P R Griffiths

This is a reasonable version of the popular arcade game Q-BERT. You have to move around a 3-D pyramid, changing the colour of all the blocks. But watch out for the bouncing ball — it's lethal, costing you one of your three lives. Dropping off the pyramid will cost you all of them.

Main program variables

LL Lives
HS High score
S Score
A,B Co-ordinates of Bert
C,D Co-ordinates of ball

```

1 REM BOUNCER BERT
2 REM by P R Griffiths
5 ON STOP GOSUB 6000
6 STOP ON
10 CLS:KEY OFF:COLOR 10,1,1
20 PRINT:PRINT" BOUNCER BE
RT"
30 PRINT:PRINT:PRINT:PRINT"MOVE BERT
AROUND THE SCREEN USING JOYSTICK O
R CURSOR KEYS TO MAKE HIM JUMP FROM
BLOCK TO BLOCK"
40 PRINT:PRINT"BEWARE OF THE BOUNCING
BALL AND DO NOT JUMP OFF THE SIDE
OF THE PYRAMID OR YOU WILL LOSE ALL O
F YOUR LIVES"
50 PRINT:PRINT"YOU HAVE 3 LIVES TO ST
ART"
55 PRINT"IF TRAPPED TRY TO JUMP THE B
ALL"

```

LISTINGS

```
60 PRINT:PRINT"J FOR JOYSTICK.:C FOR
CURSOR KEYS"
70 AA$=INKEY$:IF AA$="J" OR AA$="j" T
HEN M=1:GOTO 80
75 IF AA$="C" OR AA$="c" THEN M=0:GOT
O 80
76 GOTO 70
80 SCREEN 2,2,0:HS=0
90 C$="H15E15F15G15D16H15U15D15F15E15
U15"
100 FOR X=1 TO 10:FOR N=255 TO 1 STEP
-19:SOUND 7,254:SOUND 8,15:SOUND 0,N
:SOUND 1,1:NEXT:NEXT:SOUND 8,0:SOUND
7,254
110 LL=3
120 S=0
130 GOSUB 1000
140 IF S<>100 AND S<>200 THEN CLS:COL
OR 10
150 IF S=100 THEN CLS:COLOR,4,4:CLS:C
OLOR,4
160 IF S=200 THEN CLS:COLOR,8,8:CLS:C
OLOR,8
161 IF S=400 THEN CLS:COLOR,3,3:CLS:C
OLOR,3
162 IF S=600 THEN C=1:CLS:COLOR1,15,1
5:CLS:COLOR,15
163 IF S=500 THEN CLS:COLOR,14,14:CLS
:COLOR,14
164 IF S=300 THEN CLS:COLOR ,13,13:CL
S:COLOR,13
170 B=55:A=128
180 C=128:D=115
190 V=5:W=5:X=5:Y=5:Z=5:VV=5:WW=5:XX=
5:YY=5:ZZ=5
200 GOTO 630
210 GOTO 450
220 DRAW"BM128,70;XC$;":DRAW"BM113,10
0;XC$;":DRAW"BM143,100;XC$;":DRAW"BM9
8,130;XC$;":DRAW"BM128,130;XC$;":DRAW
"BM158,130;XC$;":DRAW"BM173,160;XC$;":
DRAW"BM143,160;XC$;":DRAW"BM113,160;
XC$;":DRAW"BM83,160;XC$;":
230 IF S<>600 THEN PAINT(A-5,B+15),10
:PAINT(A+5,B+15),10 ELSE PAINT(A-5,B+
15),1:PAINT(A+5,B+15),1
240 IF V=10 AND W=10 AND X=10 AND Y=1
0 AND Z=10 AND VV=10 AND WW=10 AND XX
=10 AND YY=10 AND ZZ=10 THEN GOTO 600
250 IF A=C AND B=D THEN 670
260 PUT SPRITE 2,(C-8,D-8),10,2
270 H=RND(2)
280 IF H=1 THEN GOTO 380
290 CC=C:DD=D
300 IF B>D AND A>C THEN C=C+15:D=D+30
310 IF B<D AND A<C THEN C=C-15:D=D-30
320 IF B>D AND A<C THEN C=C-15:D=D+30
330 IF B<D AND A>C THEN C=C+15:D=D-30
340 IF CC=C AND DD=D AND A>C THEN D=D
-30:C=C+15
350 IF CC=C AND DD=D AND A<C THEN D=D
-30:C=C-15
360 IF CC=C AND DD=D AND B<D THEN D=D
-30:C=C-15
370 IF CC=C AND DD=D AND B>D THEN D=D
+30:C=C+15
380 PUT SPRITE 2,(C-8,D-8),10,2
390 J=STICK(M):IF J=2 OR J=4 OR J=6 O
R J=8 THEN 410 ELSE 220
410 IF J=2 THEN A=A+15:B=B-30
```

```
420 IF J=4 THEN A=A+15:B=B+30
430 IF J=6 THEN A=A-15:B=B+30
440 IF J=8 THEN A=A-15:B=B-30
450 PUT SPRITE 1,(A-8,B-8),2,1
460 IF A=143 AND B=25 OR A=158 AND B=
55 OR A=173 AND B=85 OR A=188 AND B=1
15 OR A=203 AND B=145 OR A=218 AND B=
175 OR A=188 AND B=175 OR A=158 AND B
=175 OR A=128 AND B=175 OR A=98 AND B
=175 OR A=68 AND B=175 OR A=53 AND B=
145 OR A=68 AND B=115 THEN 810
470 IF A=83 AND B=85 OR A=98 AND B=55
OR A=113 AND B=25 THEN 810
480 PLAY"T255V1505G"
490 IF A=128 AND B=55 THEN V=10
500 IF A=113 AND B=85 THEN W=10
510 IF A=143 AND B=85 THEN X=10
520 IF A=98 AND B=115 THEN Y=10
530 IF A=128 AND B=115 THEN Z=10
540 IF A=158 AND B=115 THEN VV=10
550 IF A=173 AND B=145 THEN WW=10
560 IF A=143 AND B=145 THEN XX=10
570 IF A=113 AND B=145 THEN YY=10
580 IF A=83 AND B=145 THEN ZZ=10
590 GOTO 220
600 SOUND 8,0:SOUND 7,255:FOR N=1 TO
255STEP 3:SOUND 7,254:SOUND 8,15:SOUN
D0,N:SOUND 1,0:NEXT:SOUND 8,0:SOUND 7
,254
610 S=S+100
620 GOTO 140
630 PUT SPRITE 6,(20,20),2,1
640 IF LL=2 OR LL=3 THEN PUT SPRITE 4
,(40,20),2,1 ELSE PUT SPRITE 4,(40,20
),1,1
650 IF LL=3 THEN PUT SPRITE 5,(60,20)
,2,1 ELSE PUT SPRITE 5,(60,20),1,1
660 GOTO 210
670 FOR N=255 TO 1 STEP -2:SOUND 8,15
:SOUND 7,254:SOUND 0,N:SOUND 1,0:NEXT
:SOUND 8,0:SOUND 7,254
680 LL=LL-1
690 IF LL=0 THEN 710
700 GOTO 140
710 CLS:SCREEN 0
720 PRINT:PRINT" YOU HAVE
BEEN KILLED"
730 PRINT:PRINT" BUT YOU SCORED
";S
740 IF S>HS THEN HS=S
750 PRINT:PRINT" THE HIGH SCORE
IS ";HS
760 PRINT:PRINT"PRESS CTRL-STOP AND T
HEN F5 TO PLAY"
770 GOTO 770
790 CLS
800 GOTO 720
810 REM
820 F=6:H=6
830 REM
840 F=F-.2
850 H=H-.2
860 IF A<128 THEN A=A-H:B=B+4
870 IF A>128 THEN A=A+F:B=B+4
880 IF A=128 THEN B=B+2
890 FOR B=255 TO 1 STEP -19:SOUND 8,1
5:SOUND 7,254:SOUND 0,B:NEXT:SOUND 8,
0:SOUND 7,254
900 PUT SPRITE 6,(B-8,A-8),2,1
```



```

910 IF A<10 OR A>218 OR B>185 THEN GO
TO 930
920 GOTO 830
930 REM
940 SCREEN 2,2,0:FOR J=1 TO 1000:NEXT
:GOTO 710
1000 FOR Y=1 TO 2:S$="":FOR X=1 TO 32
:READ D:S$=S$+CHR$(D):NEXT X:SPRITE$(
Y)=S$:NEXT Y
1010 DATA 3,7,15,25,57,127,127,119,59

```

```

,28,15,7,6,6,6,14,192,224,240,152,156
,254,254,238,220,28,240,224,96,96,96,
112
1020 DATA 3,15,31,63,63,127,127,127,1
27,63,63,31,15,3,0,0,192,240,184,188,
220,206,238,254,254,252,252,248,240,1
92,0,0
1030 RETURN
6000 CLS

```

KABOOM by David Styles

When you run this program you'll find a rather nasty piece of work at the top of your screen, dropping bombs your way. All you can do to save yourself is to catch the bombs in your basket, using the left and right cursor keys. But be warned — the action does hot up with time.

Main program variables

A	Speed of bucket
B	X axis of bucket
C	Stick value
S	Speed
M	X axis of man
SC%	Score
B1%	X axis of bomb 1
Y1%	Y axis of bomb 1
B2%	X axis of bomb 2
Y2%	Y axis of bomb 2
B3%	X axis of bomb 3
Y3%	Y axis of bomb 3

```

10 REM * KABOOM BY D.STYLES *
20 ON STOP GOSUB 620:STOP ON
30 GOSUB 460:ON SPRITE GOSUB 240
40 ON INTERVAL=500 GOSUB 300
50 SPRITE ON
60 IF FNN(25)=1 THEN SWAP L,R ELSE IF
M<20 OR M>207 THEN SWAP L,R
70 IF R=1 THEN M=M+S ELSE M=M-S
80 IF B1%>0 THEN Y1%=Y1%+S ELSE IF FN
N(10)=1 THEN B1%=M:Y1%=28
90 IF B2%>0 THEN Y2%=Y2%+S ELSE IF FN
N(15)=1 THEN B2%=M:Y2%=28
100 IF B3%>0 THEN Y3%=Y3%+S ELSE IF F
NN(20)=1 THEN B3%=M:Y3%=28
110 C=STICK(0):IF C=0 THEN A=0
120 IF C=7 THEN B=B-A
130 IF C=3 THEN B=B+A
140 IF A<18 THEN A=A+3
150 IF B<8 THEN B=8:A=0
160 IF B>223 THEN B=223:A=0
170 PUTSPRITE1,(M,24),11,1
180 PUTSPRITE2,(M,24),1,2
190 PUTSPRITE3,(B,156),6,3
200 IF B1%>0 THEN PUTSPRITE4,(B1%,Y1%
),1,4
210 IF B2%>0 THEN PUTSPRITE5,(B2%,Y2%
),1,4
220 IF B3%>0 THEN PUTSPRITE6,(B3%,Y3%
),1,4
230 IF Y1%>157 OR Y2%>157 OR Y3%>157
THEN 310 ELSE 50
240 SPRITE OFF
250 IF Y1%>126 AND B1%>B-8 AND B1%<B+
8 THEN PUTSPRITE4,(0,-30),0,4:B1%=0:G
OTO 290
260 IF Y2%>126 AND B2%>B-8 AND B2%<B+
8 THEN PUTSPRITE5,(0,-30),0,4:B2%=0:G
OTO 290
270 IF Y3%>126 AND B3%>B-8 AND B3%<B+
8 THEN PUTSPRITE6,(0,-30),0,4:B3%=0:G
OTO 290
280 RETURN
290 SC%=SC%+1:BEEP:RETURN

```

```

300 S=S+1:RETURN
310 SOUND 6,31:SOUND 7,1:SOUND 8,16
320 SOUND 12,100:SOUND 13,8
330 FOR C=15TO1 STEP-1:COLOR,,C
340 FOR D=1TO30:NEXT D:NEXT C
350 FOR C=1TO2300:NEXT C:SOUND 8,0
360 OPEN "GRP:"AS#1
370 PSET(88,80)
380 PRINT#1,"SCORE:";SC%
390 PSET(80,95)
400 PRINT#1,"PRESS SPACE"
410 FOR C=1 TO 15:COLOR C
420 PSET(98,65)
430 PRINT#1,"KABOOM"
440 IF STRIG(0) THEN RUN
450 NEXT C:GOTO 410
460 SCREEN 2,3,0:COLOR15,12,1:CLS
470 DEFINT A-Z
480 FOR A=1 TO 4: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 DATA 0,0,0,0,5,7,6,3,0,23,0,23,0,
16,0,8,0,0,0,0,64,192,192,128,0,208,0
,208,0,16,0,32
540 DATA 0,7,7,15,2,0,1,4,31,8,31,8,3
1,8,24,0,0,192,192,224,128,0,0,64,240
,32,240,32,240,32,48,0
550 DATA 31,21,31,0,0,31,21,31,0,0,31
,21,31,0,0,0,240,80,240,0,0,240,80,24
0,0,0,240,80,240,0,0,0
560 DATA 0,0,0,0,0,0,0,0,0,0,0,0,1,3,7,
7,3,0,0,0,0,0,0,0,0,0,0,128,0,128,192
,192,128
570 LINE(0,0)-(255,50),4,BF
580 RDRST=RND(-TIME)
590 B=110:L=0:M=100:R=1:S=4
600 DEFFN N(Z)=INT(RND(1)*Z)
610 INTERVAL ON:RETURN
620 COLOR 15,4,4:END

```

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. Otherwise you can pick your own graphics to suit your programming style.

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, which is almost certainly elsewhere in the program.

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 in a zero when it should be the letter O, or a small I when it should be the number one.

Lines which contain only 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.

It's often useful to place a ruler on top of the magazine page, underlining the line you're typing in. This stops you accidentally moving from one line to another — a common problem in graphics routines, for example, where one line looks very much like the others.

If you've double- and triple-checked a line or section, and it still looks right but doesn't work, try typing it in afresh. Sometimes it can be almost impossible to see your own mistakes.

If, in the end, you still can't get the program to work, then let us know. Mistakes do occasionally get through. But PLEASE WRITE, don't telephone. It's virtually impossible to de-bug a program over the phone, and we're usually too busy putting the next issue together. In any case, the intricacies of a program are usually known only to the original programmer, who is never around to answer your questions!

HIGH SCORES

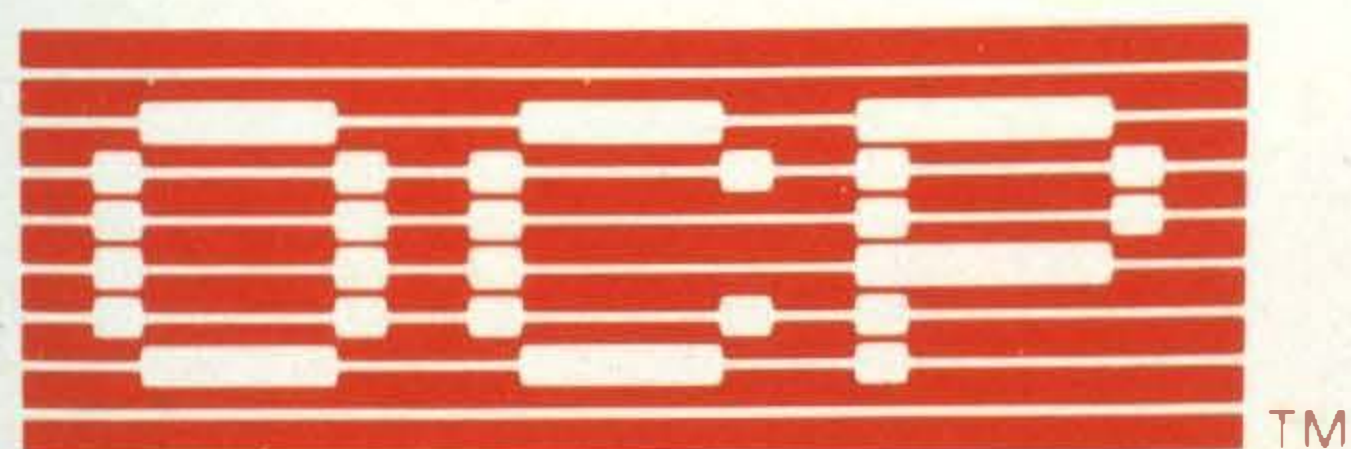
Don't worry, we know how it feels. You've stayed up all night, pounding away at the keyboard or joystick, building up a miraculous record score on your favourite game. And then . . . you've got no-one to tell!

Well, that's not quite true. Instead of bashing your head against the wall, throwing the computer out the window, or generally abusing your surroundings, you can always tell us, and we'll pass the information on to other avid games players.

So drop us a postcard or letter (please don't phone — we're busy trying to get our own high scores!) to: High Scores, MSX Computing, 38/42 Hampton Road, Teddington, Middlesex TW11 0JE.

HIGH SCORE TABLE

Game	Name	Score	Stage
Antarctic Adventure	Mr D J Styles (Erith)	209,310	31
Battleship Clapton III	William Chu (Colne)	43,550	—
Comic Bakery	Mr D J Styles (Erith)	119,860	13
Disk Warrior	Robert Glover (Leicester)	124,400	—
Hyper Olympic 1	Paul Boselli (Kenton)	3,595,580	70
Manic Miner	Jason Williams (Wolves)	—	6
Ninja	Mr D J Styles (Erith)	9,850	8
Yie Ar Kung Fu	Paul Boselli (Kenton)	2,131,000	219
Zaxxon	Phil Rotsky (New York)	250,150	—



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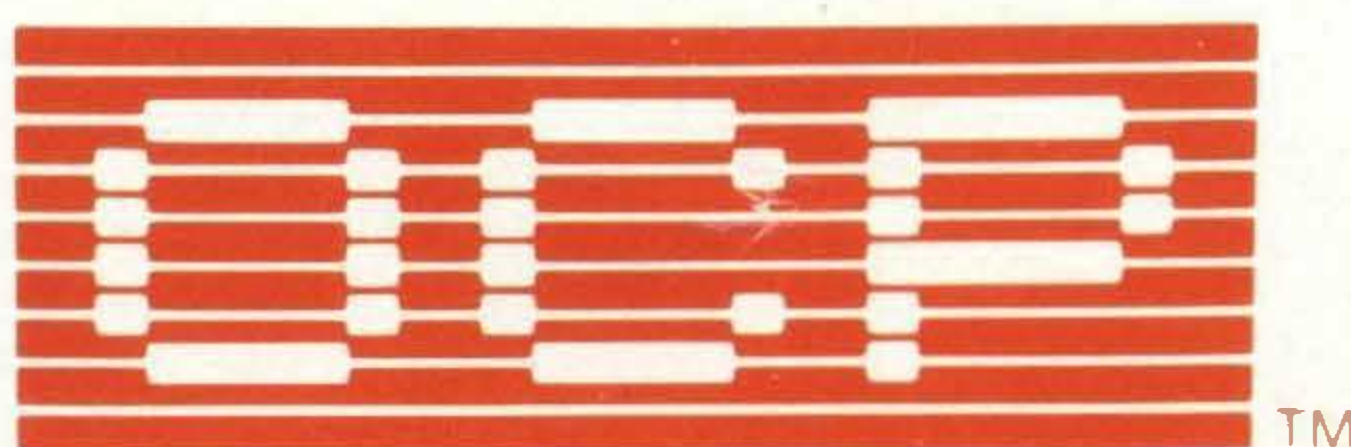
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