A Haymarket publication

February 1985 85p

MSX COMPUTING

LIGHT PENS
THE STATE OF THE ART

Machine code for beginners

Sounding out MSX BASIC

PLUS Over 20 pages of reviews & listings

COMPETITION
Toshiba HX10 plus games pack to be won

You'd expect one of the best-selling home computers in Japan to have a specification list as big as its memory.

But the Toshiba HX10 doesn't just limit itself to that.

It was developed along with other Japanese home computers to operate on one language: MSX. You can swap programs, games, cassettes, even peripherals like disk drives, printers, and joysticks: they're all compatible with every other MSX computer.

All of which makes MSX the system of the future.

So if you want a computer that won't be obsolete in a few years, buy an MSX. If you want one of the best-selling MSX computers in Japan, buy a Toshiba HX10.

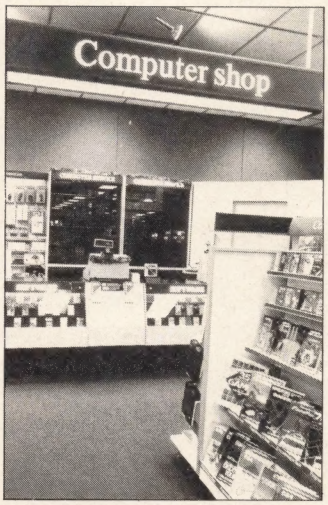
TOSHIBA MSX

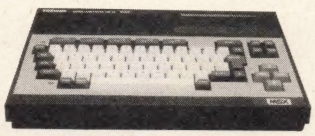
FOR MORE INFORMATION ON THE TOSHIBA HX10 CONTACT TOSHIBA (UK) LTD., TOSHIBA HOUSE, FRIMLEY ROAD, FRIMLEY, SURREY GU16 5JJ. TEL: (0276) 681691.

MSX COMPUTING

REGULARS

FEATURES





DEPARTMENTS

TESTING

SOFTWARE

LISTINGS

EDITORIAL:
Editor: Hazel James
Deputy Editor: Steve Mansfield
Assistant Editor: Julia Alexander
Art Editor: Richard Grill
Secretary: Nikkie Smith
Design: Fred Foot/Footprint

Photography: Dave King, Stan Papior
Group Editor: Gareth Renowden
Publisher: Paul Camp
ADVERTISING:
Advertisement Manager: Damian Ross

Assistant Advertisement Manager: Neil Aldritt
Sales Executive: Caroline Marshall, Patricia Willmott, Alistair Collingwood
Advertising Production: Julia Cox

Photosetting and litho origination by Meadway Graphics, Carlisle House, 198 Victoria Road, Romford, Essex RL1 2NX

Printed by Chase Web Offset, St Austell, Cornwall

MSX Computing is published and distributed by Haymarket Publishing Ltd, 38-42 Hampton Road, Teddington, Middlesex TW11 0JE (01-977 8787). Subscriptions: UK £16 per annum inc postage (overseas details on request). Back numbers from Book Sales, 12-14 Ansdell Street, London W8 5TR (01-937 7288). Every care is taken in compiling the contents of this magazine to ensure that they are correct and accurate, but the publisher can assume no responsibility for any effects from errors or omissions. Manuscripts, copy and taped listings are submitted entirely at the owner's risk. Prices and data are accepted by us in good faith as being correct at the time of going to press. Prices quoted in the editorial are supplied by manufacturers and may differ from shop prices.

Level 9 converts adventures

Master of the adventure game genre, Level 9 Computing has converted all of its titles to run on MSX computers. That makes another seven complex adventures for fans to master.

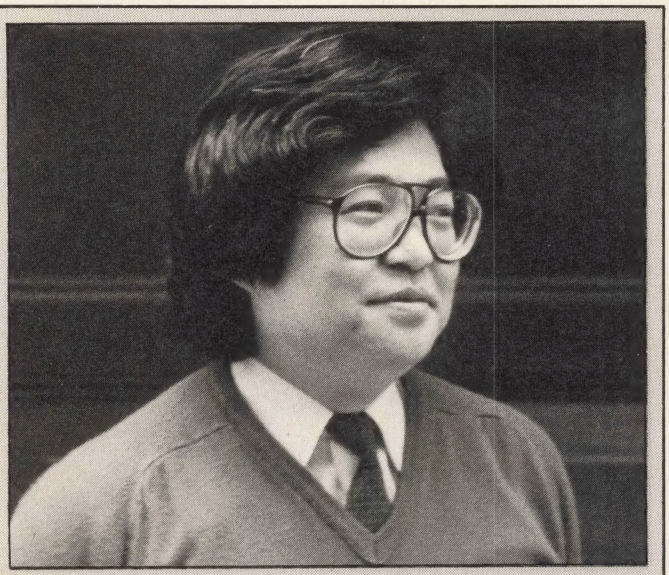
Each adventure has a mass of locations. Presumably, the usual combination of imagination, intelligence and patience will be needed to fulfil the set tasks.

For traditional adventure buffs, there is a trilogy of sword and sorcery type games — *Colossal Adventure, Adventure Quest* and *Dungeon Adventure*. Science fiction fans are catered for by *Snowball* (with 7000 locations) and *Return To Eden*. *Lords of Time* spans centuries of history.

All games are on cassette and priced at £9.95. Look out for a new, budget release too — *Emerald Isle* for an attractive £6.95.

Steebek auto-dial option

Owners of Steebek modems now have an auto-dial option available. The SB-AD Auto Dial Option will automatically dial and log on to databases with just two key presses. It also has a last number redial. Steebek Systems can be found on Newbury 33009.



Flying visit to the UK by the top man in MSX

'As far as MSX goes I have no competitor,' said an exuberant Kuzuhiko 'Kaye' Nishi, father of MSX, on a flying visit to London in December.

Nishi's enthusiasm for MSX is unmistakable and he took time to show us a photograph of the latest VLSI, a new superchip about the size of a small fingernail. This minute gadget incorporates the functions of all the MSX chips, obviating the need for separate sound and graphics chips as at present.

The VLSI was developed at Microsoft's MSX development centre in Sierra Nevada, USA and Nishi expects that MSX computers using these chips would 'probably be available in the UK this summer'. Hopefully that means lower prices are on the way.

The UK will definitely be seeing 16-bit machines sooner or later, using either the Intel 8086 or the Motorola 68000 chip as well as the second generation machines, but Nishi couldn't give any details.

'I haven't decided yet when they will be coming,' he said. 'I'll have to make some decisions soon. We'll just have to see what happens at Christmas.' But he added, 'Whatever happens, the bottom line will be compatibility'.

So far MSX machines have been marketed at fairly high prices, but Nishi confidently predicts that 'by next year the price will go down — in Japan the Casio MSX is selling for about £80 now.'

Furthermore, the UK should be seeing a lot more of the peripherals and interface devices needed to complete an MSX system. At present Japanese manufacturers have to improve their product safety standards to meet the British Electrical Safety Standards. Also the British companies have to be trained in the use of Japanese products like laser discs and organ interfaces.

Nishi was on a flying visit, with only minutes to catch a flight to the Middle East for the launch of an MSX Arabic extension. Now MSX micros can be used in Hindi, Chinese, Korean, Japanese — and English.

New RS232 adapters coming for MSX

One of the most difficult things about logging on to MSX-NET (see story on page 61) is getting hold of an RS232 adapter. Fortunately we've just heard of two new models which may make the situation easier.

MSX-NET is marketing its own unit, the design of which is just being finalised. It should be available in small quantities at the end of January 1985.

The unit will be fairly inexpensive — the final selling price is expected to be under £50. The reason for this is that it's not a full implementation of the standard. The cartridge-based adapter needs to be software configured for each type of application, including printer output, robotics and communications.

Logically, MSX-NET is including cassette-based software with the cartridge to configure it for use with a modem and Telecom Gold. Software updates, to use it with other peripherals, will be made available for downloading via MSX-NET.

As with other RS232 adapters (from JVC and Kuma), this new one will include free membership of MSX-NET for one year (worth £10). A more sophisticated version, which includes a built-in modem, should appear early Autumn. Again, this will be minimum specification to keep prices low.

Toshiba is also bringing in an RS232 cartridge, although in this case it's a full specification model with built-in ROM software (like the JVC).

Initially, only 100 samples are being brought in for evaluation. Chris Greet, product manager at Toshiba, is: 'Waiting to see what happ[illegible]ese. We've got to se[illegible]ell it goes.'

When Toshiba do finally launch the cartridge on to the market, you can expect it to cost around £100.

Brother—printer now, micro later

Brother Office Equipment, the Japanese maker of printers, portable typewriters and so on, has been telling of its plans for MSX.

In Japan it has an MSX compatible version of the new M-1009 dot matrix printer, and there is a prototype Brother MSX computer in existence.

John Carter, Brother's sales manager, said that there were no plans to market an MSX computer in the UK at this stage, though the MSX printer will be available in the near future.

'We could bring in a computer, but we would want it to be the right model, and with the market as it is at the moment, we don't think the time is right.'

The prototype couldn't be sold for less than £500, he claimed, but when the market has settled down, Brother should be in there with a product.

The M-1009 printer is a £189, 80 column dot matrix printer. It prints at up to 50 cps, bi-directionally, and can handle graphics.

Toshiba drops prices and adds software package

Toshiba is cutting the price of its HX-10 MSX micro by £40, to £239.99. That will make it the least expensive Japanese MSX machine on the market. The company is also giving away three popular programs with each machine, and three year guarantees will be available on all computers sold until the end of March.

Couple that with vigorous attempts to explain the virtues of MSX to dealers and you can see that Toshiba is keen to press home the advantage of being the first company to get MSX computers to the UK.

The HX-10 is a full specification, 64K MSX micro, with a wide range of Toshiba accessories to support it. It was also the first MSX micro available in the UK.

The three software titles are: *Manic Miner*, a best selling game from Software Projects; *Hunchback*, another best seller from Ocean; and the educational *French Is Fun*, from CDS. Toshiba did approach Activision for supplies of the *Ghosbusters* game, but these plans didn't come off. These three titles cost over £20 in the shop, and are available while stocks last.

Romik to launch MSX titles

In spite of pessimism from some people in the computer trade, others seem to be pleasantly surprised by the speed at which it's taking off.

A good example of this is Romik, a company well known for its games software. Next April Romik is due to launch what it is calling its 'Fourth Generation' software.

Originally these programs were only going to be produced for the established home micro systems. But now it looks as though MSX will be included at the time of launch.

Romik is claiming the Fourth Generation to be: 'The last word in conventional arcade games'. These are not 'mega-games' a term which the company feels has fallen into disrepute, but very sophisticated games following an established format.

Romik's Mike Andres affirmed that the new games will be in the arcade action line. "We won't be trying to break the mould; we'll be giving kids what they want, with the emphasis on good packaging."

Keep it locked—you know it makes sense, don't you?

Computers are a popular target for thieves, as they can easily be snatched from a desk. Versapak, a Kent based company, has come up with a computer workstation designed to defeat the lightfingered.

Made of stout 14-gauge steel, the *Compusafe* is available in a range of colours. The housing is bolted to the desk and contains two sliding shelves.

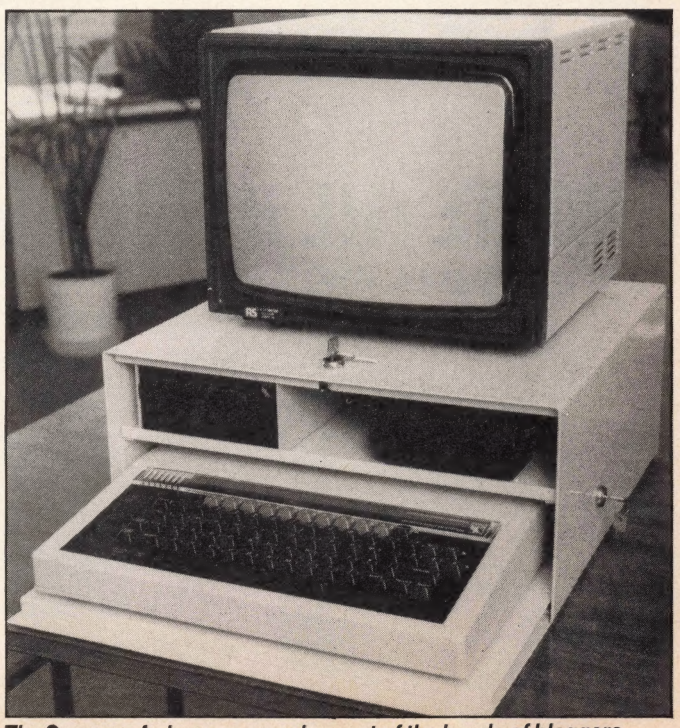
A computer, data recorder, disc drive and so forth can be put on these shelves. A monitor can be bolted to the top of the housing. The front of the *Compusafe* hinges up and can be locked shut when the computer is not in use.

Two keys are needed to remove the computer. The first unlocks the front flap for normal use. The second allows for shelves to be withdrawn.

Special security measures ensure that copies of the master key can only be obtained from Versapak. The unit has other security measures too.

Faced with the enormous increase in computer theft and the cost of computer insurance, any measures to deter thieves are important.

Priced at around £80, including delivery, the *Compusafe* is available from Versapak International Ltd, 17 Upland Rd, Bexleyheath DA7 4PL. You can call them on 01-301 2111.



The* Compusafe *keeps your micro out of the hands of blaggers

REWRITE THE HIGH SCORE TABLES

So, you've got a MSX. You've also got enemies. With the Gunshot, you'll have all the opposition cowering in corners. 8-directional action and an all-in-one moulded stem allows accurate annihilation and strength to survive those all-night sessions. Dual fire buttons for fading fingers (and a rapid fire version when they're really coming thick and fast). And, if you break it (and we know you'll try) our 12-month guarantee will prove invaluable. Only £8.95.

The Gunshot plugs directly into any MSX home computer.

See the range of Vulcan joysticks and interfaces at your local stockist ... we'll see you on the high score tables.

VULCAN ELECTRONICS LTD

Joystick Genius

200 BRENT STREET HENDON NW4 1BH TEL: 01-203 6366

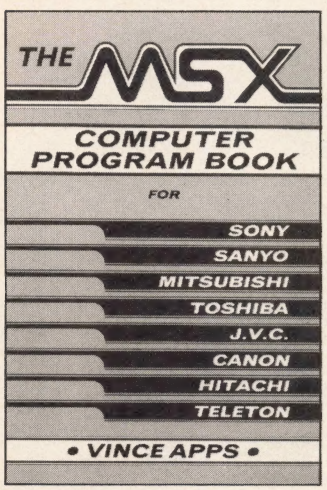
The latest in print

MSX related books are being announced in ever increasing numbers. Phoenix Publishing, Kuma and Sunshine are the latest companies to get in on the act.

Vince Apps is the author of Phoenix Publishing Associates' *The MSX Program Book*. Selling for £5.95, this is a book of type-in programs. It includes arcade games, adventures, puzzles and general utilities.

Sunshine has scheduled *The Working MSX* by David Lawrence and Mark England for release in March. Costing £5.95, it is packed with useful utility and applications programs for you to enter. The aim is to put your MSX to practical use in the home or office.

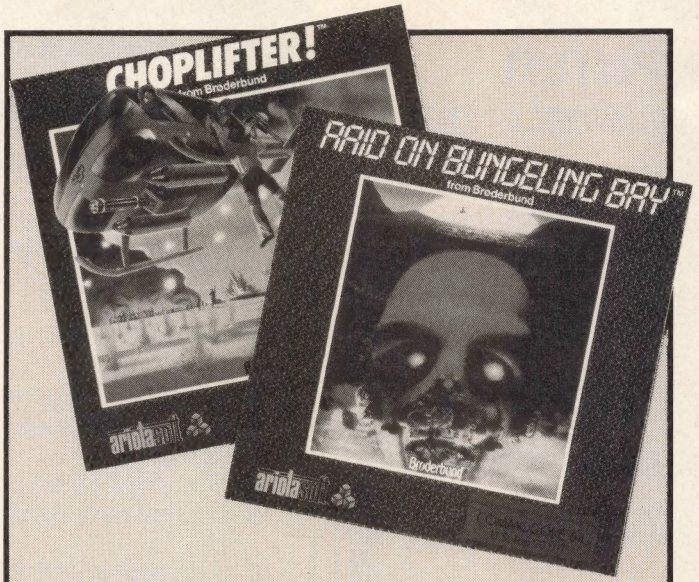
Kuma's latest MSX book is *Behind The Screens Of The MSX Microcomputer*. Mike Shaw is the author. It deals with MSX graphics in considerable depth.



On record

Micro Dealer UK has a new data recorder in stock, and it comes with a free azimuth alignment tape. The recorder is the £24.95 Omega Data Recorder.

This features a tape counter and remote control facility, plus a condensor microphone. The azimuth alignment tape, worth £5.95, helps you set the recorder for best program loading.



New companies set to launch software for '85

Companies, new or established, continue to announce plans for MSX software.

Following its impressive launch at London's *Hippodrome*, Ariolasoft is initially importing best selling American titles for Commodore computers, but has plans for MSX conversions very shortly.

Ariolasoft is a subsidiary of the company that controls Arista and Ariola records.

Mirage is a new Liverpool-based software house with plans for MSX titles. Orpheus is another new company and they have released their first MSX title — *MSX Darts*. Watch this space for more details.

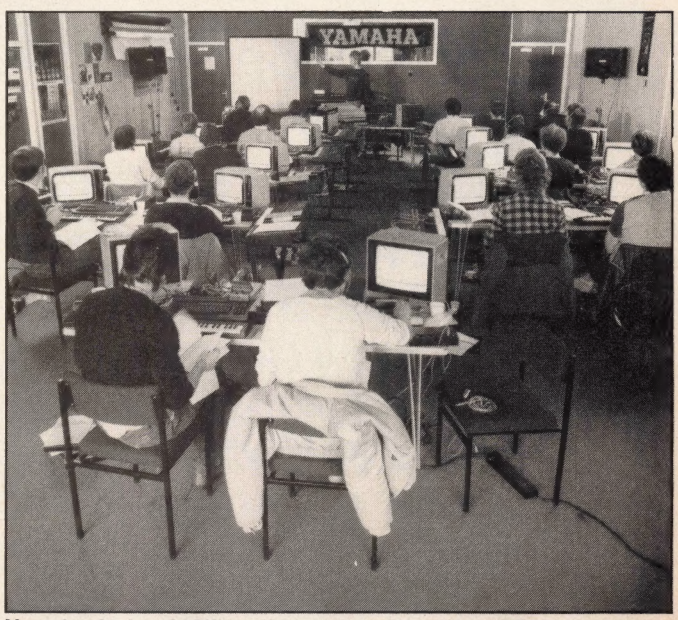
Yamaha teaches dealers to play

Yamaha is making sure that its MSX dealers are able to offer the best service around. That's why the Yamaha CX-5M music computer is only available through 50 selected outlets.

These Hi-Tech stockists each have a sound room in which the CX-5M can be demonstrated, together with other associated products. Each shop will also have a member of staff who has attended a two-day seminar on the musical capabilities of the CX-5M.

The aim is to explain how the computer operates before the customer buys it. Bruce Everiss, formerly of the Imagine software house, is a consultant on these courses.

The name of your nearest Hi-Tech Music Dealer can be obtained from Yamaha-Kemble Music (UK) Ltd, Mount Avenue, Bletchley, Milton Keynes, MK1 1JE.



Yamaha dealers in Milton Keynes learning about MSX

Phone home, British Telecom

To find out the latest news in the computer world, call Bradford 722622. That's the number of the Home Computer Line, a new service set up by British Telecom, Bradford.

Callers will hear a recording of news about latest products and events. The news is updated twice weekly and is aimed at owners of home computers. For further details the organizing company, Information Unlimited, can be contacted on (0422) 842525.

Cut price micro

Microdealer has reduced the price of its Goldstar MSX micro. It's the second MSX manufacturer to knock down the original price. The Goldstar can now be bought for £199. And it is currently the lowest priced MSX micro on the market.

YAMAHA

CX5 COMPUTER

The first truly musical micro

AVAILABLE NOW FROM

Chappell of Bond Street

50 New Bond Street, London W.1. Tel: 01-491 2777

ATTENTION MSX OWNERS!!

MIDLAND COMPUTER LIBRARY

1 All the latest titles on cassette, disk and cartridge
2 Your first tape hired free
3 Life membership £6
4 Hire charge only £1.50 inc p&p for full 7 days
5 No limits to the amount of games you can hire
6 All games originals with full documentation
7 Games, Business and Educational software
8 Return of post service
9 Lowest new hard and software prices in the UK
10 Join now on 14 day money-back guarantee

Send cheque or postal order for £6 with your selections or large SAE for further details to:

MIDLAND COMPUTER LIBRARY

The first MSX library in the country

172 Studdley Road, Greenlands, Redditch, Worcs.

Tel: 0527 23584

MSX COMPUTING

woolfmans

MSX THE ONLY COMPLETELY COMPATIBLE COMPUTING SYSTEM!

STOCKS NOW ARRIVING!

FROM GOLDSTAR
JVC SANYO
SONY TOSHIBA

FROM ONLY £229.95

LATE NIGHT FRIDAY TILL 8.00

LOWEST PRICES GUARANTEED
IF AT ANY TIME OF PURCHASE YOU CAN FIND ANY OF OUR PRODUCTS IN STOCK CHEAPER ELSEWHERE WE WILL BEAT THE PRICE ON THE SPOT (subject to verification)

ALL STOCK SUBJECT TO AVAILABILITY. PRICES CORRECT AT TIME OF GOING TO PRESS.

Instant Credit up to £1,000 Apr. 34.2%
76 ILFORD LANE, ILFORD, ESSEX
Open 9-6 Mon to Sat 9-8 Friday

Tel: 01 478 1307

VISA Access

We're very sorry but . . .

In the rush to bring you the latest news and information, we made a couple of slips in last month's issue. Put it down to operator error or overloaded chips, somehow they got through.

The Sony disk drive does not have MSX-DOS in the interface cable. This comes on a separate system disk, as you'll realise if you read our review starting on page 26.

We also credited the Yamaha CX5M with a little more muscle than it actually has. The machine is a 32K micro, not 64K as we reported. The amount of RAM available to BASIC is exactly the same.

The extra memory on the larger machines is for machine code routines.

We're sorry about these aberrations. But you'll be pleased to know that the people responsible have been forced to leave the country, as punishment!

At long last, Panasonic takes the plunge

Panasonic (UK) Ltd is the latest company to enter the MSX marketplace, with a 64K computer in the shops now. Called the Panasonic CF 2700, it is selling at around £280.

The CF 2700 is a standard 64K MSX computer. It has two expansion ports, two joystick ports, a Centronics printer interface and a diamond-shaped cursor keypad. Finished in black and grey, it has a recommended price of £311.50.

Panasonic is only bringing in small quantities of the CF 2700, and has no plans to introduce supporting peripherals at the moment.

Activision snaps up Ghostbusters

MSX owners can look forward to two new programs from Activision. The first is an MSX version of the chart-topping *Ghostbusters*.

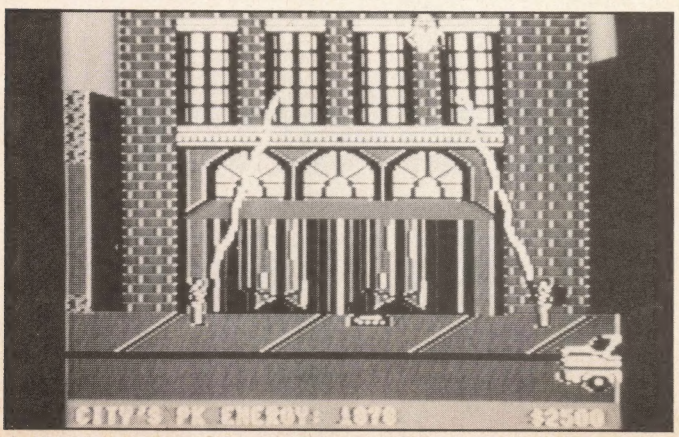
In this arcade game you have to save New York from an invasion of ghosts. You open a *Ghostbusters* franchise, equip your vehicle and cruise the streets, trapping ghosts. The game is accompanied by an extremely catchy rendition of the *Ghostbusters* hit single.

The program has initially been launched for the Commodore, with the Spectrum version hot on its tail. But by the time you read this, the MSX version should have made an appearance.

The launch is something of a feather in the cap for Activision. The movie, and its associated spin-offs, have proved to be extremely popular, and so involves a lot of prestige, not to mention the inevitable piles of money.

The Designer's Pencil is another program scheduled for release. It will let the user design games, with sound and graphics.

Both of these programs will be available on cassettes and will be priced at around £11.99.



Activision has the software scoop of the year. The company bought the rights to the box office success, Ghostbusters

Mr Micro's graphics adventure

Software house Mr Micro has seen fit to bring in John Ridgeway a cartoonist of Marvel and Dr Who fame, to design its first MSX graphics adventure game, *Zakil Wood*.

Released this month, *Zakil Wood* will form the first part of a trilogy, the two remaining — and as yet unnamed — games appearing over the next couple of months.

Zakil Wood is set in the stone age when a group of space travellers land on a planet and decide to call it Zakil. They leave behind the hero to find the missing ruby and face battles with monsters such as Pyral the two headed beast.

In the second part of the trilogy the hero finds himself in a modern city where he has various urban experiences and at the last minute somehow activates a monument which transforms into a rocket.

The last game sees the hero in the future on planet Zakil having space orientated adventures.

All the games combine text with graphics displays and commands can be given in sentence form, for instance 'cross river and go into cottage'.

Each cassette costs £7.95 — for more information ring Mr Micro on 061-728 2282.

Plug in to safety first

Small power surges are bad news for computers. They may corrupt data, erase programs and generally prove annoying. To safeguard against this, try *The Plug*, a Power International product.

Priced at £17.75. The Plug counteracts power surges and other corruptions in the mains supply. It can be obtained from Power International Ltd, 2a Isambard Brunel Road, Portsmouth, Hants PO1 2DU.

LETTERS

Not quite MSX . . .

I was very interested in your first issue, but unfortunately not in quite the way I had hoped, as I now find myself as part of the sizeable user-base which has an outdated (and presumably replaced) Spectravideo SV328 computer.

Although I began to suspect that it wasn't an MSX micro, it still came as a bit of a shock to see it in black and white. However, I was wondering whether you could give me some idea of the deviations of my MSX-all-but computer, and particularly whether I shall be able to load and run any commercial software.

The BASICs seem to be close enough such that conversion would be easy but what about machine code programs, baudrates for cassette-based programs, memory maps etc? Quite obviously, it would be very beneficial if I could use (even some) MSX programs, and so any help you could give me in this direction would be most gratefully received.

David Foster
Cambridge

. . . but nearly

Last Christmas I bought a Spectravideo 328 computer.

I only bought this computer after reading many reviews in computer magazines and from Spectravideo's own literature.

All the reviews said that it was the first of the MSX computers and it would be compatible to all other MSX computers. Some months afterwards I discovered this wasn't so.

After buying your first issue I discovered how restrictive this machine is compared with a truly MSX machine. In the future there is going to be a very wide choice of software. I felt very disappointed when I could not run the listings in your magazine as I was looking forward to having a computer with its own publication, with listings that could run on the machine.

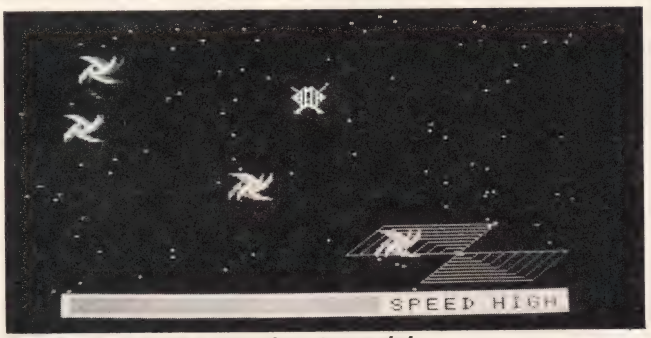
Could you please give me advice on what my options are. Thanking you for any advice that you give me.

Name withheld
by request

The Spectravideo 328 provided the basis from which the MSX designers worked. But they made several alterations and improvements which have resulted in the two systems being compatible.

The cartridge slot is a different size, the cassette interface and keyboard arrangement are different, and the machines are controlled in different ways.

The BASICs are very close, so converting magazine listings shouldn't be too difficult, as long as they don't make use of PEEKs and POKEs. But commercial MSX software will not run on the older Spectravideo machine. If you want MSX compatibility, you have to buy an MSX machine.



If at first you don't succeed try, try again!

Comma crisis

I refer to your *MSX Computing* magazine, Bumper first edition December 1984.

Shortly after purchasing a Sony MSX computer as advertised in your magazine, I decided to try out one or two or the programs listed in the magazine.

During typing in the programs I found a few mistakes as listed below. Space Hazard by Tom Sato page 92 1410 COLOR 1 Should be 1410 COLOR,1 Breakout by Tom Sato page 93 720 COLOR 1 should be 720 COLOR,1 900 COLOR 1 should be 900 COLOR,1

I am sure that you will appreciate that it is necessary that these programs are printed with the utmost accuracy — as indeed is required when giving the data to the machine. Someone of less experience could find this problem most frustrating!

M E Davies
Port Talbot

Having checked through Space Hazard and Breakout ourselves, we've not found any errors.

However to make doubly sure we also talked to the author, Tom Sato.

Tom was very surprised to hear that you have discovered some errors in his programs.

And according to Tom who also tried and tested the programs, there is definitely not supposed to be a comma in line 1410 of Space Hazard or in lines 720 and 900 of Breakout.

Tom ran both programs on his Toshiba HX-10 with the commas included. He found that line 1410 becomes redundant, and that both games didn't perform nearly as well.

We recommend that you try typing in the program more carefully as it's quite possible that you've typed incorrect lines and not spotted the errors. It's laborious but that's the only way to get it right.

Off centre

I have just purchased a Sony MSX HB75B Computer, also a Fidelity CTM 1400 colour TV receiver and monitor. I wish to know where I can purchase an RGB lead with a 21 pin connector for the computer and TV.

I have one complaint. The picture on the monitor is slightly offset to the left. In one aspect I read it did mention about this, can this be adjusted on the computer or monitor?

Mrs E Hitchcock
Kent

RGB leads with a 21 pin connector for computers and televisions can be purchased from any dealer who sell accessories for televisions.

However, if you are having problems getting one we suggest that you go back to the dealer who sold you your Hit-Bit and he should be able to order one for you.

Having a slightly offset picture to the left of the screen is a common problem. If you are losing characters then we recommend that you try going back to BASIC and typing in WIDTH 37, this should solve all your problems.

However, if this fails to work try typing in the same command but with 39, most television sets and monitors work on 39.

If this also fails to work then your monitor is in need of re-adjustment.

Sharp thinking

I would be obliged if you could help me with some answers to queries with MSX. We have a Sharp MZ700. Software is very limited for this machine, particularly games.

Is there any way that we can adapt our MZ700 to MSX by machine code tape, EPROM or ROM chip? If anything is available could you inform me of manufacturers, suppliers, prices etc?

S P Marks
Redruth

Although the Sharp machine uses the same main processor as the MSX micros — the Z80 — it is completely different in all other respects. There is no way of converting it to MSX compatibility short of re-building it!

RECORDS & TAPES VIDEO FILMS
HOME COMPUTER SOFTWARE
LASERVISION DISCS COMP
TELEPHONES MUSIC VIDE
ACCESSORIES BOOK
COMPACT DISCS HOM
COMPUTER HARDWARE

Lightning

COMPACT DISCS COMPUTER BOOKS
CESSORIES COMPUTER HARDWARE
RECORDS & TAPES VIDEO FILMS
HOME COMPUTER SOFTWARE
LASERVISION DISCS
S RECORDS & TAPES
WARE MUSIC VIDEOS

ALL OF THESE DEALERS
NOW STOCK *Lightning*
MSX SOFTWARE

SOFTWARE HOUSE
12 Ettrick Square,
Town Centre,
Cumbernauld,
Tel: 02367 38398

Patersons
10 Hamilton Place, Edinburgh
Tel: 031-225 1771
200 Bruntsfield Place, Edinburgh
Tel: 031-228 3288
386 Morningside Road, Edinburgh
Tel: 031-447 9609
Waverley Market, Princes Street, Edinburgh
Tel: 031-557 2917

SHIELDS VIDEO CENTRE
23 Nice Street,
North Shields,
Tyne & Wear
Tel: 0632 571304

GREENSIDE ELECTRICAL CO. LTD.
83-85 Queen Street,
Morley,
Leeds
Tel: 0532 533925

TOMORROW'S TECHNOLOGY TODAY LTD
(ASHBY COMPUTER CENTRES)
247 Ashby High Street
and 3a Robert Street
Scunthorpe
Tel: 0724 871756/854369

ROBINSONS
89 High Street,
Huntingdon,
Cambs.
Tel: 0480 56311

FAXMINSTER LTD
Market Place,
Hemel Hempstead,
Herts.
Tel: 0442 55044

ALPHASCAN LTD
Chester House
Windsor End,
Beaconsfield,
Bucks.
Tel: 04946 71259

VIDEO PALACE
100 Oxford Street,
London, W1
Tel: 01-637 0366

WEST END VIDEO
6 Marble Arch,
London, W1
Tel: 01-402 8661

Your MSX centre in S. Bucks is
KINGSLEY COMPUTERS
132 Desborough Road
High Wycombe
Bucks
Tel: 0494 449749

COLCHESTER & EAST ESSEX CO-OP
(CAMERA & COMPUTER CENTRE)
27 Long Wyre Street,
Colchester,
Essex
Tel: 0206 577751

HIWAY HI-FI LTD.
313/315 Edgware Road,
London, W2
Tel: 01-723 5251
01-262 9267

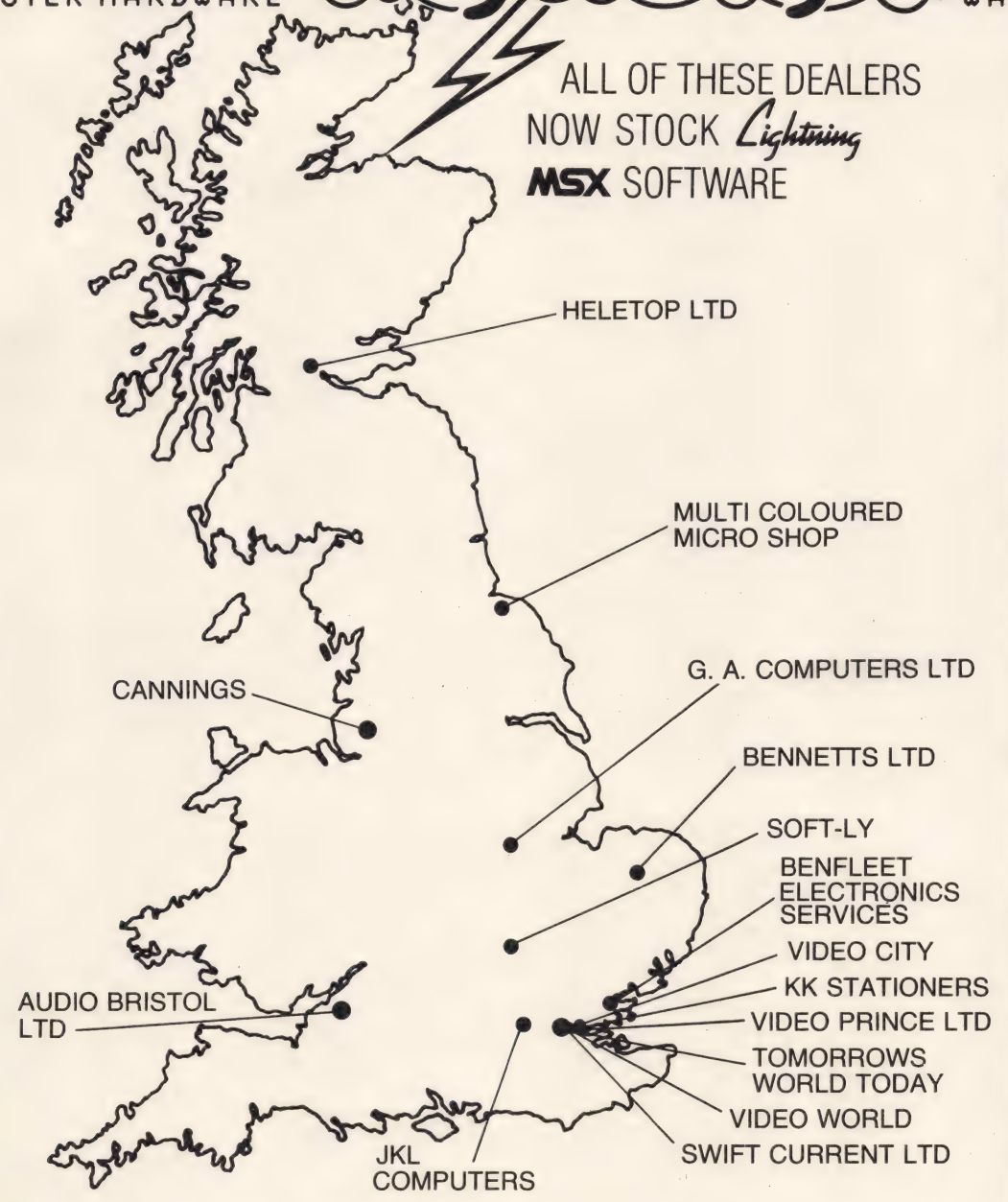
CHANTRY TV
4 High Street,
Westbury,
Bucks.
Tel: 0373 822709

841 HARROW ROAD, HARLESDEN, LONDON NW10 5NH

RECORDS & TAPES VIDEO FILMS COMPACT DISCS COMPUTER BOOKS
HOME COMPUTER SOFTWARE CESSORIES COMPUTER HARDWARE
LASERVISION DISCS COMP RECORDS & TAPES VIDEO FILMS
TELEPHONES MUSIC VIDE HOME COMPUTER SOFTWARE
ACCESSORIES BOOK LASERVISION DISCS
COMPACT DISCS HOM S RECORDS & TAPES
COMPUTER HARDWARE WARE MUSIC VIDEOS

Lightning

ALL OF THESE DEALERS
NOW STOCK *Lightning*
MSX SOFTWARE



HELETOP LTD
75 King Street,
Stirling,
Scotland
Tel: 0786 73004

CANNINGS
24 Union Street,
Leigh,
Lancs.
Tel: 0942 602468

MULTI COLOURED MICRO SHOP
8 Dundas Street,
Redcar,
Cleveland
Tel: 0642 486643

G. A. COMPUTERS LTD.
20-22 High Street,
Ruddington,
Notts. NG11 6ES
Tel: 0602 211225

SOFT-LY
5-7 Deer Walk,
Milton Keynes,
Bucks.
Tel: 0908 670620

JKL COMPUTERS
7 Windsor Street,
Uxbridge,
Middx. UB8 1AB
Tel: 0895 51815

VIDEO WORLD
260 Tottenham Court Road,
London, W1
Tel: 01-631 3573

SWIFT CURRENT LTD
10 Tottenham Court Road,
London, W1
Tel: 01-631 1069

VIDEO PRINCE LTD
328 Edgware Road,
London, W2
Tel: 01-724 3800

BENNETTS LTD
24 Norwich Street,
Dereham,
Norfolk
Tel: 0362 2488

VIDEO CITY
445-447 Beacontree Avenue,
Dagenham,
Essex
Tel: 01-597 2505

AUDIO BRISTOL LTD
8 Park Row,
Bristol 1
Tel: 0272 291931

TOMORROWS WORLD TODAY
27 Oxford Street,
London, W1
Tel: 01-439 7799

K. K. STATIONERS
187 Edgware Road,
London, W2
Tel: 01-723 1436

BENFLEET ELECTRONICS SERVICES
223 High Road,
Benfleet,
Essex
Tel: 03745 57860

TEL: 01-969 5255 (CUSTOMER LIAISON MANAGER) TELEX: 927813 LARREC

THE UNIQUE MSX SYSTEM Complete

In the confused world of computer technology the unique MSX System has been adopted as a common standard for computer production by at least 16 of the biggest and best names in home electronics. This major breakthrough in the development of

The Sensational SONY HIT BIT

A 64K MSX Computer with an exclusive, built-in Personal Data Bank (firmware). This handy facility enables you to enter, store, recall and up-date all kinds of personal information such as appointments, addresses, telephone numbers, etc. Operation is simple, with instructions appearing on the screen every step of the process.

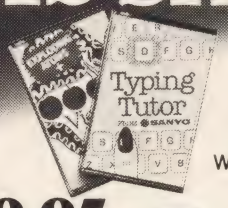
£299.95

Data from the Personal Data Bank can be saved on any data storage facility or on the **UNIQUE HBI 55 RAM CARTRIDGE,** available for **£39.95**

KV1430 14" MONITOR STYLE, PUSH BUTTON CONTROL TRINITRON COLOUR TELEVISION
with front mounted RF terminal. **£239.95**

HBD50 MICRO FLOPPY-DISK UNIT stores up to 360K bytes of information on a 3½" disk. Easily connected to the Hit Bit by using one of the expansion slots. **£349.95**

The Superb SANYO MPC 100



This sophisticated piece of equipment offers all the advantages of 64K MSX computing. *(complete with 4 programme starter pack)* **£299.95**

Plus a unique optional feature – **MLT001 LIGHT PEN.** This provides you with unlimited flair and flexibility in colour graphics design. This feature comes complete with a software package containing some intriguing graphic facilities.

CBP 3000 14" MONITOR STYLE COLOUR TELEVISION with removable smoked glass screen for higher definition. **£199.95**

MLT001 LIGHT PEN **£89.95**

PRICES SHOWN INCLUDE VAT AND ARE CORRECT AT TIME OF GOING TO PRESS. E. & O.E.

RING TELEDATA 01-200 0200 FOR DETAILS OF YOUR NEAREST STOCKIST.
ANYTIME DAY OR NIGHT

compatibility...

Home Computing brings you complete compatibility in hardware and software. To cater for all home computing needs, Axis have selected in these pages an unbeatable, top value-for-money range of MSX computers, colour monitors, peripherals and software for you to choose from. "We believe that when you discover the benefits of MSX computing no other system will do".

TOSHIBA

The Star Value TOSHIBA HX10

The first MSX computer to be introduced into the U.K.

SAVE £40
PLUS **3 YEAR GUARANTEE**
PLUS **3 FREE SOFTWARE TITLES**

IN THE SHOPS NOW!

SANYO

DR202 DATA RECORDER
Top of the range machine offering a host of high technology features. **£44.95**

Offering superb facilities and outstanding value for the first time user or enthusiast. 64K Ram, 16 colour graphics, RF, video and audio connectors, plus ports for printer, disk drive and data recorder. *(Including starter pack software).* **£279.95**

140E MONITOR STYLE COLOUR TELEVISION
The perfect partner for the HX10, providing excellent picture and sound quality. **£189.95**

HX-P570 PLOTTER PRINTER
Easily connected to the HX10 through the printer interface. This printer features image and character plotting in 4 colours – red, green, blue and black – making it ideal for colourful graphs, pie and bar charts. Plotting speed is 285 steps per second.
£249.00

DON'T FORGET TO ASK YOUR DEALER FOR DETAILS OF CREDIT FACILITIES, EXTENDED GUARANTEES, ETC. AVAILABLE ON CERTAIN ITEMS.

AXIS
AT HOME WITH TECHNOLOGY

THE UNIQUE MSX SYSTEM ..amazing

When you buy your MSX computer, you enter a new dimension of Home Computing with software options on disk, ROM cartridge or cassette tape.
Peripheral options cover colour monitors, printers, disk

The Spectacular JVC HC-7GB

IN THE SHOPS NOW!

The HC-7GB personal computer from JVC is a new MSX machine designed for total compatability between other MSX machines and all MSX softwear. A highly advanced 64 K machine, the HC-7GB has three display modes offering RF, composite video and RGB outputs. The HC-7GB MSX personal computer from JVC is the final word in home entertainment.

£279.00

THE JVC 7255 GB 14" COLOUR TELEVISION COMPUTER MONITOR

With full remote control

£269.95

SANYO CTP3132 14" PUSH BUTTON COLOUR TELEVISION

The ideal budget price television for your home computer unit. Great value for money at SANYO

£179.95

JOYSTICKS

For extra versatility and sensitivity in control there is a range of high quality joysticks available from these famous manufacturers offering such features as double trigger and suction stability pads.

TOSHIBA HX-J400 £12.95

SANYO MJY 002 £12.95

JVC HCJ615 £12.95

SONY JS 55 £19.95

SONY PRN-C41 PLOTTER/PRINTER

This Plotter/Printer produces red, green, blue and black images and characters. Pen replacement is easy and it takes a wide choice of paper sizes including FREE 'greetings pack' software.

SONY **£249.95**

PRICES SHOWN INCLUDE VAT AND ARE CORRECT AT TIME OF GOING TO PRESS. E. & O.E.

RING TELEDATA 01-200 0200 FOR DETAILS OF YOUR NEAREST STOCKIST.
ANYTIME DAY OR NIGHT

versatility

drives, light pens, plotters, joysticks, data recorders and RAM cartridges from many top name manufacturers in the home electronics field.

Their performance offers you unrivalled graphic and sound quality together with outstanding simplicity of use.

THE INCREDIBLE FISHER CFB1410 P MONITOR STYLE COLOUR TELEVISION

This superb, high technology 14" monitor style television has earned a high quality reputation as a reference in the field of home computer monitoring. It features a full 17 function infra red remote control housed in the front of the set. Other sophisticated facilities include direct audio/visual terminals in/out and smoked glass filter for perfect picture definition.

FISHER £269.95

SOFTWARE

A wide variety of games, also software for business, education and specialist applications are now available.

Pick up a software brochure from your Axis recommended dealer for full information.

SONY ROM CARTRIDGE SOFTWARE A range of sophisticated Sony Rom Cartridge Software is available at prices from **£17.95**

SANYO DR201 DATA RECORDER

An AC only recorder styled for computer use with all controls conveniently placed on top of the machine for ease of use. **£34.95**

SANYO DR101 RECORDER

Specifically designed for use with personal computers, with phase shift switch, speaker monitor and AC/DC operation. **£34.95**

SONY TCM737 DATA RECORDER

A mains or battery operated recorder ideal for use with your home computer. **£39.95**

JVC HC-R105 DATA RECORDER

The stylishly designed HC-R105 data recorder is an example of a machine produced to offer superb user convenience, exceptional performance parameters and reliable data transfer. The HC-R105 is a high speed machine giving very short access times to data. **£89.00**

RING TELEDATA 01-200 0200

For your local stockist or visit your nearest Axis recommended Dealer listed below

AVON

BRISTOL C.J. FREEMAN & CO. LTD. 47, High St., Portishead Tel: 0272 848180

BEDFORDSHIRE

BEDFORD TAVISTOCK HI-FI LTD. 21, The Broadway Tel: 0234 56323

BERKSHIRE

SLOUGH C.F. LAKE LTD. 37, Stoke Road Tel: 0753 38287

READING SEWARDS 130-131, Friar Street Tel: 0734 599527

BRACKNELL SEWARDS 54, The Broadway Tel: 0344 52255

BUCKINGHAMSHIRE

CHESHAM D.L. CHITTENDEN LTD. 59-61, The Broadway Tel: 0494 784441

CHESHIRE

NORTHWICH NORDIS LTD. 39, Chester Way Tel: 0606 3691

CREWE ROY TOWNSEND SOUND & VIDEO 2-4 Victoria Street Tel: 0270 213276

CLEVELAND

STOCKTON ON TEES MCKENNA & BROWN LTD. 81, High Street Tel: 0642 679995

DERBYSHIRE

DERBY STUART WESTMORELAND 67, St. Peter's Street Tel: 0332 367546

DURHAM

DARLINGTON MCKENNA & BROWN LTD. 102, Bondgate Tel: 0325 59744

EAST SUSSEX

EASTBOURNE CLEARVIEW RENTAL 215, Seaside Tel: 0323 21646

SEAFORD CLEARVIEW RENTAL 34-40, High Street Tel: 0323 898989

ESSEX

GRAYS A.C.L. RADIO SERVICES LTD. 1, Northmall Tel: 0375 4666

ILFORD D. WOOLFMAN LTD. 76, Ilford Lane Tel: 01-478 1307

SOUTH BENFLEET HODGES & JOHNSON LTD. 285, High Road Tel: 037 45 58725

WESTCLIFF HODGES & JOHNSON LTD. 96-98, Hamlet Court Road Tel: 0702 334488

CHELMSFORD RUSH HI FI 5-6, Cornhill Tel: 0245 57593

GRAMPIAN REGION

ABERDEEN A & G KNIGHT 108, Rosemount Place Tel: 0224 630526

GREATER LONDON

CROYDON J & T ROBINSON LTD. 20, Norfolk House, George Street Tel: 01-681 2800

SUTTON LANDAU RADIO LTD. 195-197, High Street Tel: 01-643 0027

HAMPSHIRE

BASINGSTOKE SEWARDS 18, Paddington House, Bedford Walk Tel: 0256 65665

KENT

GRAVESEND BENNETT & BROWN 181-183, Windmill Street Tel: 0474 52919

SHEERNESS BRITTAIN & HOBBS. LTD. 22-24, High Street Tel: 0795 665551

LANCASHIRE

PRESTON GOODRIGHTS LTD. 1, Friargate Tel: 0772 57528

BARNOLDSWICK HARRY GARLICK (TV CENTRE) 1, Church Street Tel: 0282 813309

BURNLEY HARRY GARLICK (TV CENTRE) 10, Howe Walk Tel: 0282 37118

LEICESTERSHIRE

WIGSTON A.G. KEMBLE LTD. 63, Leicester Road Tel: 0533 881557

LOUGHBOROUGH STUART WESTMORELAND 33, Cattlemarket Tel: 0509 230465

LINCOLNSHIRE

GRANTHAM STUART WESTMORELAND 49, High Street Tel: 0476 78108

LONDON

HOLBORN BERRYS RADIO 37-39, High Holborn Tel: 01-405 6231

EALING SQUIRES OF EALING 28-30, New Broadway Tel: 01-567 1881

MERSEYSIDE

LIVERPOOL BEAVER RADIO 20-22, Whitechapel Tel: 051 709 9898

NORFOLK

NORWICH HUGHES TV & AUDIO 17-21, White Lion Street Tel: 0603 60935

NORTH YORKSHIRE

YORK CUSSINS & LIGHT LTD. Kings Square Tel: 0904 55666

NOTTINGHAMSHIRE

NOTTINGHAM E.N.L. AUDIO VISUAL 116-118, Alfreton Road Tel: 0602 784015

SOUTH YORKSHIRE

ROTHERHAM BRITTAIN BROS LTD. Doncaster Gate Tel: 0709 65393

STAFFORDSHIRE

STOKE-ON-TRENT ROY TOWNSEND SOUND & VIDEO 10, Trinity Street, Hanley Tel: 0782 289114

STRATHCLYDE REGION

SALTCOATS HARRIS OF SALTCOATS 104-106, Dockhead Street Tel: 0294 64330

SUFFOLK

IPSWICH HUGHES TV & AUDIO 42, Buttermarket Tel: 0473 215093

LOWESTOFT HUGHES TV & AUDIO 62, London Road North Tel: 0502 85611

SURREY

DORKING DORKING AUDIO SYSTEMS 23, South Street Tel: 0306 882897

WEST YORKSHIRE

HOLMFIRTH FRANK PLATT ELECTRICAL Victoria House, 24, Victoria Street Tel: 0484 682036

HALIFAX FRED MOORE LTD. 15-17, Southgate Tel: 0422 67763

BINGLEY SPENCER & HILL LTD. 133, Main Street Tel: 0274 565161

PLEASE NOTE "MSX" PRODUCTS ARE IN SHORT SUPPLY. PLEASE PHONE YOUR DEALER TO CHECK HE HAS STOCK AVAILABLE.

DON'T FORGET TO ASK YOUR DEALER FOR DETAILS OF CREDIT FACILITIES, EXTENDED GUARANTEES, ETC. AVAILABLE ON CERTAIN ITEMS.

AXIS

AT HOME WITH TECHNOLOGY

THE UNIQUE

YOUR No 1 MSX CENTRE

SYSTEM

AT THE FOREFRONT OF TECHNOLOGY

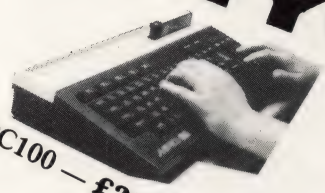
TOSHIBA

Model HX10 — **£279.95**

JVC

Model HC-7GB — **£275.00**

SANYO



MPC100 — **£299.95**

SONY HIT BIT

COMING SOON!

£299.95

MITSUBISHI SERIES ML

ML-F48 — **£245.00**
ML-F80 — **£299.00**

SOFTWARE PACKS

KNIGHTS:		HYPER VIPER	£7.95
KNIGHT-OTHELLO	£5.95	SPOOKS AND LADDERS	£6.95
VICIOUS VIPER	£5.95	COCO IN THE CASTLE	£6.95
EXPLODING ATOMS	£5.95	CRIBBAGE	£5.95
SMASH OUT	£5.95	HOLDFAST	£5.95
CAVE ADVENTURE	£5.95	HOME BUDGET	£14.95
MSX DEMONSTRATOR	£5.95	WDPRO:-Wordprocessor	£29.95
MSX GRAPHICS	£5.95	DATABASE	£19.95
TYPING TUTOR	£5.95	ZEN MACHINE CODE PROGRAMMING SYSTEM	£19.95
JUNIOR MATHS	£5.95		
MSX BASIC TUTORIAL PART 1	£5.95	KUMA FORTH	£39.95
MACHINE CODE LANGUAGE	£5.95	COMMUNICATIONS WITH VIEWDATA	£19.95
KNIGHTS MAIL LIST	£14.95	SPEECH SYNTHESIS	£69.50
BUDGET ACCOUNTS	£14.95		
KUMA:		**QUICKSILVA**	
DRILLER TANKS	£8.95	FRED	£7.95
BINARY LAND	£8.95	BOOGABOO (The Flea)	£7.95
FIRE RESCUE	£7.95	ANT ATTACK	£7.95
ERIC & THE FLOATERS	£5.95	THE SNOWMAN	£7.95
DOGFIGHTER	£6.95	GAMES DESIGNER	£9.95

Orders dealt with in strict rotation as supplies arrive

PRICE LIST

TOSHIBA	
HX10 COMPUTER	£279.95
HX-P750 PLOTTER PRINTER	£249.00
KPT22 CASSETTE RECORDER	£29.95
HXJ400 JOYSTICKS	£12.95
SOFTWARE STARTER PACK (5 GAMES) SPECIAL PRICE!	£30.00
SANYO	
MPC 100 COMPUTER	£299.95
MLT 001 LIGHT PEN	£89.95
DR202 DATA RECORDER	£44.95
MJY002 JOYSTICKS	£12.95
DR101 CASSETTE RECORDER	£34.95
JVC	
HC-7GB COMPUTER	£275.00
HC-R107 DATA RECORDER	£89.95
HC-J615 JOYSTICKS	£12.95
SONY	
HIT BIT COMPUTER	£299.95
HBD50 MICRO FLOPPY DISK UNIT	£349.95
JS 55 JOYSTICKS	£19.95
TCM737 DATA RECORDER	£39.95
PRN/C41 PLOTTER PRINTER	£249.95
MITSUBISHI	
ML-F48 COMPUTER	£245.00
ML-F80 COMPUTER	£299.00

ORDER

TOTAL £		

All prices include VAT and post and packing. All items include a full year guarantee. Products are stocked and usually despatched within 10 days. Overseas customers add £4 post and packing. Cheques/Postal Order, etc., payable to TAVISTOCK HI-FI LTD. Telephone orders (0234) 56323

Please debit my
Access/Barclaycard

Card Number _____

Signature _____

Name _____

Address _____

MSXC 2/85

BUY FROM THE EXPERTS — WITH CONFIDENCE

FOUNDER MEMBER OF AXIS AT HOME WITH TECHNOLOGY

'Selling with experience'

TAVISTOCK HI-FI LTD

21 THE BROADWAY, BEDFORD MK40 2TL

Tel: Bedford (0234) 56323

Mirage

SOFTWARE & DISTRIBUTION

9 Rossini Street
Seaforth
Liverpool
L21 4NS
Tel: 051-920 9713

PROGRAMMERS

WE ARE LOOKING FOR TOP QUALITY PROGRAMMES TO MARKET IN THE UK AND ABROAD. THE PROGRAMMES MUST BE OF TOP QUALITY AND IN MACHINE CODE WITH GOOD GRAPHICS AND SOUNDS AND ORIGINAL CONCEPT. WE ARE LOOKING FOR PROGRAMMERS TO CARRY OUT WORK ON NEW MACHINES SUCH AS THE C.B.M/16 AMSTRAD AND M.S.X. WE CAN SUPPLY THESE MACHINES TO CARRY OUT WORK FOR MIRAGE. WE ARE ALSO OFFERING £500 PRIZE FOR THE BEST PROGRAMME RECEIVED BY THE END OF FEBRUARY 1985 WHICH WE WILL DECIDE TO MARKET. WE OFFER AN OUT RIGHT PAYMENT OR 10% PLUS PAYMENT OR 20% ROYALTIES. FOR MORE INFORMATION CONTACT THE SOFTWARE MANAGER HE WILL BE GLAD TO LISTEN TO ANY QUESTIONS YOU MAY HAVE.

SOFTWARE HOUSES

WE ARE LOOKING FOR TOP SELLING PROGRAMMES TO DISTRIBUTE TO OUR WIDE RANGE OF OUTLETS THROUGHOUT THE UK AND GIVE YOU A VERY FAST SERVICE TO HELP WITH YOUR SALES AND TO MAKE THE MOST OF YOUR PRODUCTS. SEND A SAMPLE COPY OF YOUR PRODUCTS WITH RATES AND TERMS FOR A FAST ASSESMENT. FOR MORE INFORMATION CONTACT THE SALES MANAGER HE WILL BE GLAD TO HELP AND ASSIST YOU.

DEALERS AND DISTRIBUTERS

DEALERS WE HAVE THE BEST SELLERS FROM THE BEST PRODUCERS; WE ALSO OFFER VERY GOOD RATES AND TERMS TO HELP YOU AND US TO ACHIEVE THE BEST SALES AND SERVICE. FOR MORE INFORMATION CONTACT THE SALES MANAGER.

DISTRIBUTERS HAVE YOU GOT THE MIRAGE RANGE ON YOUR SHELVES, IF NOT THEN CONTACT THE SALES OFFICE FOR SAMPLES AND RATES.

SALES MANAGER
T.C. SAPHIER

SOFTWARE MANAGER
C.A. SAPHIER

DIY sprites

If you thought that producing moving aliens/spaceships/bugs on the screen was difficult, you'd be wrong. It's easy. With sprite graphics you'll soon be creating fairly complicated animation programs or arcade games.

Sprites are user defined shapes which can be placed on the screen without affecting the background. The backdrop remains the same while the characters move about the screen.

With MSX, you can use up to 32 sprites at any one time. The limitation is because there are only 32 sprite planes available. Each sprite plane can only hold one sprite with sprite plane 0 having the highest priority, so that any other sprite behind the main one in plane 0 will be automatically hidden.

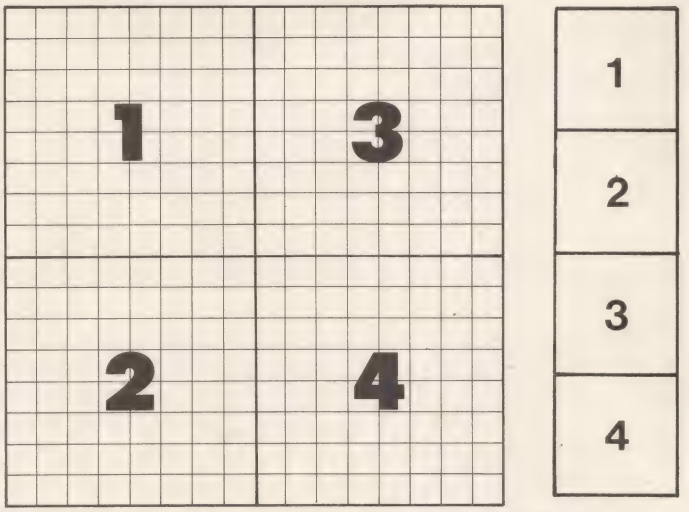
Because the sprites are in different display planes from each other and the graphics or text display, they have no effect on each other or on the background.

However, there are certain restrictions concerning when you can use sprites. Screen

SPRITE SIZE TABLE

Screen command	Pattern size	Pixel size	Actual screen size
Screen ,0	8×8	1×1	8×8
Screen ,1	8×8	2×2	16×16
Screen ,2	16×16	1×1	16×16
Screen ,3	16×16	2×2	32×32

HOW A SPRITE IS STORED



A 16×16 sprite, showing the order it's stored in SPRITE$()

mode 0 (the mode when the computer is turned on) cannot handle sprites. But text mode 1, multi-colour low resolution mode 3, and the high resolution mode 2 are OK. Text mode 1 is adequate and handy to use when you are defining your sprites, but when you come to programming an arcade game, you are much better off using the high resolution offered by graphics mode 2.

The simplest sprites have an 8×8 pixel size. Pixel, by the way, is the computing term for each 'dot' on the screen. You can define these sprites using a special string variable SPRITE$() and you can have up to 256 patterns starting from SPRITE$(0).

To place the sprite onto the screen you must use the PUT SPRITE command. PUT SPRITE is very useful because as well as placing your sprite on a new location, it will automatically erase that sprite at the previous location. In effect, this means that the sprite hardly flickers at all.

Program one (right) is a simple sprite defining program.

Line number 20, SCREEN 2,0 tells the computer to go into the high resolution graphics mode 2 and set the sprite size to 8×8 and normal magnification (we'll deal with magnification in detail later). Once the screen mode is set you can start defining your sprite pattern. A word of warning though; if you change the screen mode *after* you've defined the pattern, everything you've already drawn will be wiped off the screen.

If you are just beginning to explore MSX BASIC, the easiest way to define a sprite pattern is to put the sprite design in a series of DATA statements as binary numbers (as in line 100 onwards of program 1). The prefix &B indicates that the number is in binary.

At this point you may well be wondering exactly what a binary number is. Well, binary is a number system which consists of only 0 and 1. Therefore, it is very easy to see which bit in the sprite pattern is blank (i.e. 0) and which bit isn't (i.e. 1). You can clearly see from the program what the eventual sprite pattern is going to look like.

The FOR TO NEXT loop between line numbers 30 and 60 READs the DATA statements from line 100 and converts the numerical representation of the sprite pattern into a string. The computer then stores it in a string variable S$ using the CHR$() function. Each time it goes around the loop, the computer picks up the information for 8 horizontal dots so the FOR/TO/NEXT loop is set to '1 TO 8' to complete the 8×8 pixel pattern.

Once this task is completed and all the pattern information is stored in the temporary string variable S$, the pattern is transferred to a special sprite variable called SPRITE$(). The number inside the brackets indicates the sprite pattern number. Only positive integer numbers are allowed, and can be up to 255. As long as you do not redefine that sprite pattern or execute a SCREEN command that pattern will remain as it is.

To display the sprite on the screen, use the PUT SPRITE command. PUT SPRITE has the following syntax:

PUT SPRITE <sprite plane number>, (coordinates specifier),<colour>, <pattern number>

Therefore line 80 is:

80 PUT SPRITE 0, (100,100),15,0

This line means: put sprite on the sprite plane 0 at x co-ordinate 100, y co-ordinate 100, in white (colour code 15) with the pattern number 0.

The co-ordinates indicate the top left hand corner of the sprite. There is another way of

Program 1

```
10 REM sprite program 1
20 SCREEN 2,0
30 FOR I=1 TO 8
40 READ A
50 S$=S$+CHR$(A)
60 NEXT
70 SPRITE$(0)=S$
80 PUT SPRITE 0,
(100,100),15,0
90 GOTO 90
100 DATA &b00001100
110 DATA &b00001110
120 DATA &b00001111
130 DATA &b00001111
140 DATA &b11111111
150 DATA &b11111110
160 DATA &b01111100
170 DATA &b00111000
```

Program 2

```
10  REM sprite program 2
20  COLOR 15,15
30  SCREEN 2,0
40  FOR I=1 TO 8
50  READ A
60  S$=S$+CHR$ (A)
70  NEXT
80  SPRITES$ (0)=S$
90  FOR C=0 TO 15
100 Y=C*10
110 X=C*10+20
120 PUT SPRITE C, (X,Y), C, 0
130 NEXT
140 GOTO 140
150 DATA &b00111100
160 DATA &b01111110
170 DATA &b11111111
180 DATA &b11111111
190 DATA &b11111111
200 DATA &b11111110
200 DATA &b01111100
220 DATA &b00111000
```

Program 3

```
10 REM moving sprite
program 3
20 COLOR 15,15
30 SCREEN 2,0
40 FOR I=1 TO 8
50 READ A
60 S$=S$+CHR$(A)
70 NEXT
80 SPRITE$(0)=S$
85 FOR A=0 TO 500
90 FOR C=0 TO 15
100 X=A-A*(C-7)*2
110 Y=C*9+30
120 PUT SPRITE C, (X,Y),C,0
130 NEXT
135 NEXT
140 GOTO 140
150 DATA &b00111100
160 DATA &b01111110
170 DATA &b11111111
180 DATA &b11111111
190 DATA &b11111111
200 DATA &b11111110
210 DATA &b01111110
220 DATA &b00111100
```

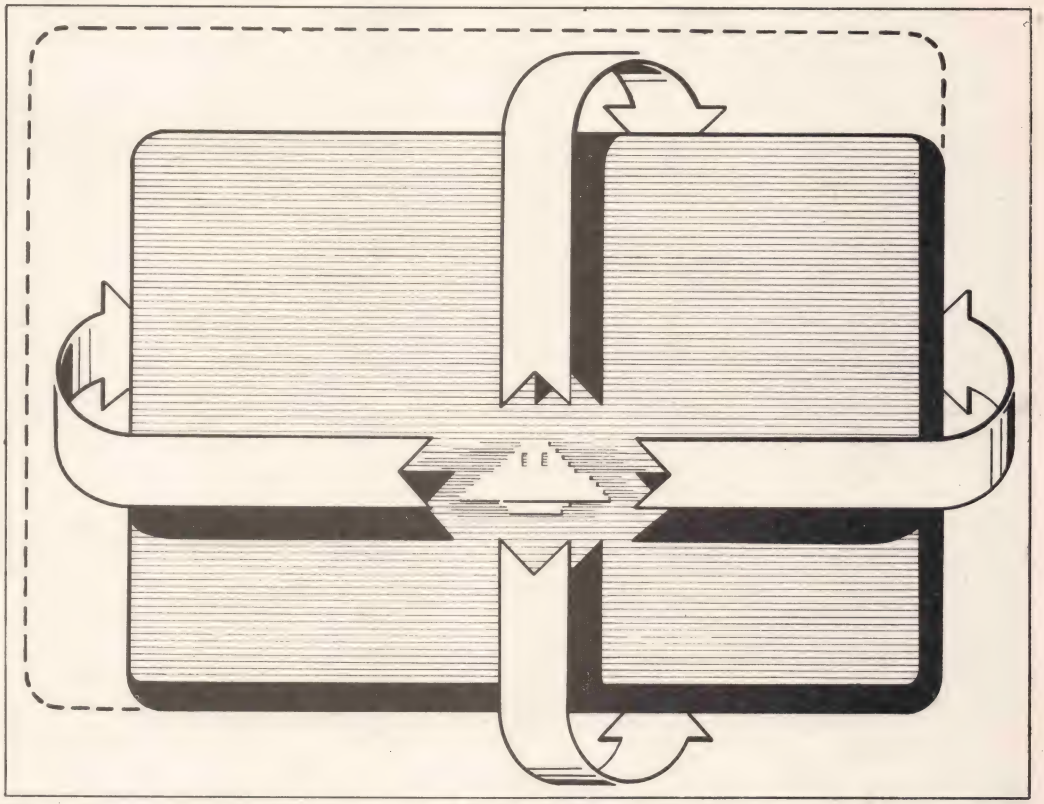
specifying the co-ordinates of a sprite, using the STEP command. For example if you replace (10,100) with STEP (<x-coord>,<y-coord>) format in line 80, the computer will place the sprite at the point relative to the last point referred to by the computer.

Line 90 is an infinite loop which stops the screen from going back to the text mode. To exit the program press <CTRL><STOP>.

The colour can be any of the 16 colours available on MSX micros but you can only designate one colour per sprite. In the next program we can see how to use colours and variables with sprites. Either type program 2 into your computer from scratch or edit the last program.

Lines 30 to 80 are exactly the same as program 1, but it's different from line 90 onwards. It is possible to use numerical variables in the PUT SPRITE command, so x and y co-ordinates are calculated from the FOR/TO/NEXT loop counter C.

In line 120 the colour and sprite planes are determined by the counter C. When you run this program you will see a diagonal line of circular sprites in various colours on a white background. You will only see 14 of them since a white sprite and transparent colour will not show up.



The sprite wraps round, so if it disappears off the top, bottom or sides it reappears on the opposite side

Now let's modify the above program so that we can have a simple animation. One of the things you must remember is that the co-ordinates can be anything between −32768 and 32767, even though the actual display co-ordinates are between 0 and 255 in x direction and 0 and 192 in y direction. This is because when the sprite co-ordinates go over the limit, the full screen wrap-around comes into effect. That means that if a sprite goes beyond one edge it will reappear at the other, just like the old arcade game, *Asteroids*. This effect is shown above.

By simply adding a few lines and varying the x and y co-ordinates you can make all the sprites move in an interesting formation. If you want to temporarily halt the movement, simply press the <STOP> key. If you press it again, the program will continue. To try it, type in program 3.

There are four sprite sizes you can use, but you can't mix two sprite sizes. You must choose the one you want when you execute the SCREEN command. Try and replace SCREEN 2,0 with SCREEN 2,1 and see what happens.

If you are thinking of writing an arcade game, then SCREEN ,2, the 16×16 unmagnified sprite will be most useful to you — 16×16 pixels will give you more scope for designing more detail into your sprite.

To define a 16×16 sprite you must use a more sophisticated programming technique than in programs 1, 2 or 3. To begin with, you have to store four times as much information as in an 8×8 sprite. Have a look at the diagram on the facing page to see what we mean.

As you can see from the diagram, the top left hand side is stored first, the bottom left hand side second, top right hand side third, and bottom right hand side fourth. Because there are more details to store per sprite, the number of sprite patterns you can have at any one time is restricted to 64. That still leaves a good choice — if you run out you can always redefine a pattern.

Program 4 defines a 16×16 sprite. It displays 32 of the same pattern as each sprite plane in different colours, and is programmed in a loop so that the effect appears like a snow storm.

As you can see, the screen is set to black (colour code 1). Because of the way the patterns are stored, the

Program 4

```
10 REM 16 by 16 sprite
20 REM snow demo
30 COLOR 15,1,1
40 SCREEN 2,2
50 FOR I=1 TO 16
60 READ C$
70 A$=A$+CHR$(VAL
   ("&B"+LEFT$(C$,8)))
80 B$=B$+CHR$(VAL
   ("&B"+RIGHT$(C$,8)))
90 NEXT I
100 SPRITE$(0)=A$+B$
110 FOR I=0 TO 31
120 Y=I*6
130 X=RND(1)*255
140 C=RND(1)*16
150 PUT SPRITE I, (X,Y),C,O
160 NEXT
170 GOTO110
190 DATA1110001111000
    111
200 DATA1100000110000
    011
210 DATA1010000110000
    101
220 DATA0001000110000
    1000
230 DATA0000100110010
    0000
240 DATA0000010110100
    0000
250 DATA1000001111000
    001
260 DATA1111111111111
    1111
270 DATA1111111111111
    1111
280 DATA1000001111000
    001
290 DATA0000010110100
    0000
300 DATA0000100110010
    0000
310 DATA0001000110000
    1000
320 DATA1010000110000
    0101
330 DATA1100000110000
    0011
340 DATA1110001111000
    0111
```

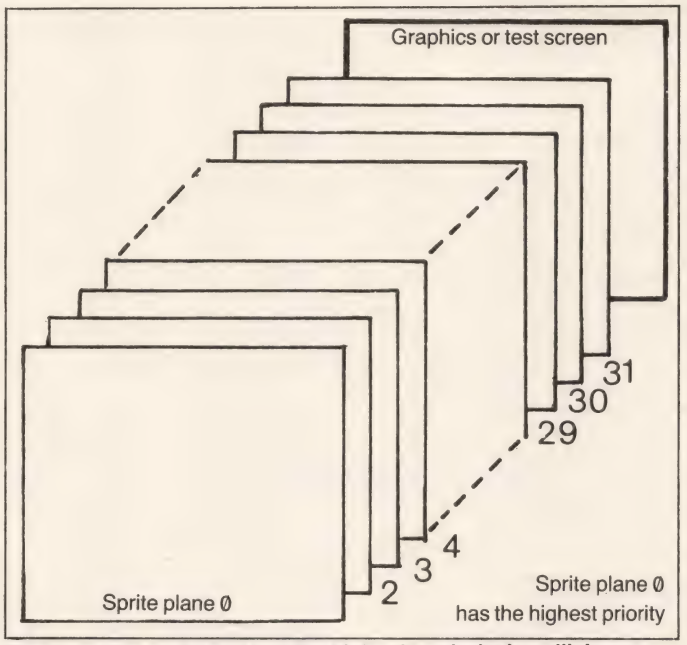
information is stored as strings in the DATA statements. The data may appear as binary but it is READ as a string C$ then processed as necessary in lines 70 and 80.

These string equations look complicated, but all they do is to split the left and right side into two separate halves, turn them into a number, then into an appropriate string character to be added to the temporary string variables, A$ and B$.

Once all the data is processed, the left and right sides are added to SPRITE$(0). Now that the pattern is ready to be used, the program can calculate the required random positions and colours. That's done in the FOR/NEXT loop between lines 110 and 160.

X=RND(1)*255 gives a random position in the X direction. Because RND(1) gives real numbers with decimal points, X will also be real. However, PUT SPRITE can cope with real numbers since all decimal points are immediately truncated. The same goes for the colour variable C.

Line 70 is added to keep the sprites moving by returning the program to the beginning of the FOR/NEXT loop. When you run this program you will see lots of multi coloured snowflakes constantly moving about.



The lower the sprite number, the higher its priority in collisions

When you are writing a program it is particularly important to conserve memory, whatever computer you use. You may have noticed that using binary numbers in DATA statements to store the sprite pattern is not very efficient in memory usage. A better way is to use the decimal system, but to squeeze in all that binary information you must know how to convert a binary number to decimal.

The easiest way to do this is, of course, to let the computer do it for you.

To convert the binary number 00001111 to decimal, type:

PRINT &B00001111

The result will be 15. If you calculate all the DATA statements and get rid of the loop in program 1, you will end up with the considerably shorter program 5.

Line 40 alone defines the sprite pattern 0 — a considerable improvement on the original version.

Simple sprite animation can be achieved with a minimum of fuss with MSX BASIC. All you have to do is swap two or more patterns rapidly so the characters appear to be changing. Program 6 shows how to put a smile on your sprite's face.

Line 30 defines the straight face, and line 40 the smiling face. There is a short delay between the two PUT SPRITE commands — otherwise the change would be too rapid, causing a fuzzy image. You can see from this demonstration that you can have more than one pattern per sprite — it is possible to have, say, four patterns to show a man walking.

There are various rules and restrictions in using sprites, one of the most important being 'the fifth sprite rule'.

A maximum of four sprites can be placed on one horizontal line. If you tried to place a fifth sprite you would find that the sprite with the latest sprite plane number would disappear.

This is not a bug. It's just that the video display processor cannot cope with more than four sprites on a horizontal line. Obviously, this does restrict the use of sprites a little. When you are writing your sprite program you would be well advised to keep this at the back of your mind.

If you assign the y co-ordinate of a sprite to 208, all the sprites with higher sprite plane numbers than that one will disappear from the screen. The co-ordinates will remain the same but you won't be able to see them. So, if you let the y co-ordinates of the sprite at sprite plane 0 be equal to 208, all the sprites will magically disappear at once.

If you want to detect a sprite collision, you can use the ON SPRITE GOSUB and SPRITE ON/OFF/STOP statements. These statements are mostly used in games programs.

ON SPRITE GOSUB defines the subroutine position when two sprites overlap or collide, and SPRITE ON/OFF/STOP acts as a switch to the sprite collision detector. The main disadvantage of this collision detector is that it does not tell you which two sprites collided or where they collided. Therefore you must write your own routine to find them out.

Now that you know much more about sprites, why not write a program? Whether it's a graphics demonstration program or an arcade game, send it in to *MSX Computing* and the best will be published in the months to come. We'll pay for all programs listed, so get cracking.

Remember to save all programs on cassette. If you want to exit the program, press <CTRL><STOP>. If you just want to halt the movement temporarily, press <STOP>. To restart press <STOP> again.

In some programs you will find the screen completely white after you break out of the program. This is because the colour of background and foreground has been set to white. To return to the original screen colour press <SHIFT><F1>.

Program 5

```
10 REM sprite program 5
20 SCREEN 2,0
40 SPRITE$(0)=CHR$(12)=CHR$(14)+CHR$
   (15)+CHR$(15)+CHR$
   (255)+CHR$(254)+CHR$(124)
50 PUT SPRITE 0, (100,100),15,0
60 GOTO 60
```

Program 6

```
10 REM animated sprite demo program 6
20 SCREEN 2,1
30 SPRITE$(0)=CHR$(60)+CHR$(66)+CHR$
   (165)+CHR$(129)+CHR$(129)+CHR$(189)
   +CHR$(66)+CHR$(60)
40 SPRITE$(1)=CHR$(60)+CHR$(66)+CHR$(
   165)+CHR$(129)+CHR$(165)+CHR$(153)+CH
   R$(66)+CHR$(60)
50 PUT SPRITE 0, (100,100),15,0
60 FOR i=1 TO 300:NEXT
70 PUT SPRITE 0, (100,100),15,1
80 FOR I=1 TO 300 NEXT
90 GOTO 50
```

TEST DRIVE

Want to take your programs for a spin? We look at Sony's brand new MSX disk drive system

You know the routine — slap the cassette into the data recorder, type in the relevant command, and then go and cook a five-course meal while you're waiting for it to load. Cartridges are faster, but they're read only, so you can't SAVE to them. Fortunately there's an answer to both problems — disks.

We've been taking a look at one of the first disk drive systems to become available for MSX. This is Sony's HBD-50, which is designed to be used with the Hit Bit, but will, of course, work with any MSX micro. We tried it on a number of machines, including the Toshiba and Goldstar, and found no problems at all.

Being Sony, it's naturally a very stylish piece of hardware. It looks good sitting alongside the Hit Bit. But few people are going to fork out around £350 for something which just looks pretty, so we'd better take a look at how well it works.

For a single sided 3½inch disk drive the unit is surprisingly large, being about the size you'd expect of a 5¼inch slimline drive. But that probably means that no compromises have been made in the design and manufacturing.

The drive incorporates its own power supply unit, with the large transformer visible through the top grating. This grating actually covers most of the top of the drive, which is just as well, as it does tend to get very hot — and so does the disk! A warning on the top plate tells you not to cover the grille, and you could just imagine the dire consequences of absent-mindedly leaving a manual or magazine on top — the disk could come out looking like a toasted sandwich.

Connecting up the drive is simplicity itself. Having plugged it into the mains, you connect it to the computer with a special cable. The micro end is in the form of an over-sized cartridge containing the controlling software in a 16K ROM.

The cable plugs into any cartridge port. We used the rear one on the Hit Bit, keeping the cable out of the way and the main port free for things like an RS232 card or games cartridge.

With the drive connected you automatically boot up into DISK BASIC when you first switch on. This isn't the much-vaunted MSX-DOS (which will be made available on disk) but Sony's own system. This adds several commands to the standard BASIC.

Strangely, with the Hit Bit you don't get the firmware menu. In fact, we found no way of accessing the machine's built-in software. Perhaps Sony thinks that with the rapid accessibility of disks at your disposal you don't need firmware.

Instead of the menu, you're asked to enter the date. Mind you, you don't really have to bother, as the manual says that the date information isn't used anywhere! For the sake of speed you might as well just type RETURN.

The only time you won't be faced with this date prompt is if you've saved a program under the name AUTOEXEC.BAS. The system always looks for a file of this name when it's first booted. If it finds one, the program is automatically loaded and run.

This is a handy feature. For example, we wrote a three line BASIC program which changed the screen colours to those we prefer, and prints out a list of the files on the disk, each time we power-up the system.

This list is available any time by typing FILES — a command similar to CAT and DIR on other systems. All file names are in upper case. If you type in lower case when either saving or loading, the system automatically converts.

Filenames can be up to eight letters long. In fact, you could effectively add another three letters to this, but it might cause confusion with another part of the name. If you want to identify what type of file it is — BASIC program, ASCII or DATA file — Sony recommends that you add a three letter identifier, preceded by a full stop.

To SAVE a BASIC program called LONO, then, you would use:

SAVE "LONO.BAS"

Other useful type names are .DAT and .ASC for DATA and ASCII files.

When you use FILES, the filenames appear in two columns, with the type names ranged to the right, so it's easy to read the files.

One thing to watch out for, though, is that you must include the type name when you try to LOAD or manipulate a file. In our example, typing LOAD "LONO" would result in

the error message 'File not found'. This doesn't apply, of course, if you haven't used a type name.

You can also add a *device name* to the file name when you LOAD or SAVE. This tells the computer where to look for the file. For example:

LOAD "A:LONO.BAS"

This instructs the computer to look for the file on drive A. Other valid device names are B:, C:, D: and CAS:. The last one is particularly useful as it still allows you to use the cassette system with the disk drive attached.

In the absence of a device name, the computer automatically accesses drive A when the commands LOAD, BLOAD, SAVE and BSAVE are used. CLOAD and CSAVE, however, still make use of the standard cassette filing system.

Changing the name of a saved file is pretty easy. Say you want to change LONO.BAS to HUNTER.BAS, the command is:

NAME "LONO.BAS" AS "HUNTER.BAS"

If the disk already contains a file with the new name (HUNTER.BAS in this case), the micro will refuse to do the renaming and sends you an error message.

Another useful command is COPY. It shouldn't be too hard to guess what this does. If you want to have a backup copy of your programs and other files, this is the command to use.

ANIROG

The Name For Quality And Innovation

Flight Path 737

ADVANCED PILOT TRAINER

NOW AVAILABLE For The MSX £6.95

TRADE ENQUIRIES: ANIROG SOFTWARE LTD. 29 WEST HILL DARTFORD KENT (0322) 92513/8
MAIL ORDER: 8 HIGH STREET HORLEY SURREY 24 HOUR CREDIT CARD SALES HORLEY (02934) 6083
PAYMENT BY CHEQUE P.O. ACCESS/VISA 50p POSTAGE & PACKAGING

You can use COPY in a number of ways. The basic format is:

COPY "A:LONO.BAS" TO "B:LONO.BAS"

This copies the file from drive A to drive B using the same filename. In fact, you could leave out the filename in the second part, and just enter "B:".

Wild cards can also be used — that's where one or more letters are replaced by special symbols. A question mark can be used to replace a single letter, and you can type an asterisk in place of any group.

You might, for instance, want to transfer all BASIC programs from disk A to disk B. The following command will do that:

COPY "A:*.BAS" TO "B:"

The BAS could also be replaced by an asterisk, in order to copy all files, including ASCII and DATA.

If you want to be a little more choosy, using something like PROG? in the COPY command will transfer PROG1, PROG2, PROG3 and so on.

There's also the option to change the name of the file. To take our first example again, you could type:

COPY "A:LONO.BAS" TO "B:SHARK.BAS"

This means that disk B will have a file called SHARK which is identical to the file called LONO on disk A.

Producing a back-up disk by copying can be done even when you have only one drive. The commands are exactly the same, but the computer, realising that a second drive isn't connected, prompts you to insert and remove the disks as appropriate.

The only problem with this technique is that several exchanges may be necessary for one file, as it isn't all copied in one go. In the case of BASIC programs it's a lot easier to LOAD the program conventionally, swap the disks over, and then SAVE it as normal.

Rather than copying a file you might want to get rid of it! This is achieved with the appropriately, if somewhat savagely, named command — KILL.

As you can see, the DISK BASIC is pretty simple to use. Sony seems to have gone for ease of use over comprehensiveness. Perhaps the company believes that MSX-DOS (whenever it arrives) will provide the more complex facilities.

The simplicity of the system is illustrated by the ease with which you can format a disk. Formatting sets up the tracks and sectors, and it has to be done to each disk before you can use it.

All you need to do is to type CALL FORMAT. You are then asked for a drive name, and after that told to: 'Strike a key when ready.'

SONY HBD-50 DISK DRIVE

Format: 3½inch micro floppydisk
Disk type: Single-sided
Capacity: 500K unformatted
360K formatted
80 tracks
Data transfer rate: 250K per sec
Access Time: 0.35 secs (average)
0.012 secs between tracks
0.03 secs settling time
Disk rotation speed: 300 rpm
Recording density: 8187 bits per inch
Power consumption: 25W
Operating temperature: 10°C-35°C

Dimensions: 160×67×260mm
Weight: 2.7kg (drive unit)
240g (interface cartridge)
Accessories included:
1×blank disk
3× disk labels
Interface ROM: 16K ROM including standard I/O and DOS routines, MSX-DISK BASIC and utility routines

Nothing is shown on the screen to indicate what it's doing. And unlike other systems, there is no VERIFY command to check that all went well. The manual says that a 'Disk error' report will appear if anything goes wrong. As we never saw it, we can only assume that verification is automatic and that the system works well.

And that's probably all that most people will use. However, there are numerous other commands available for more esoteric uses.

The system supports random access files, where the disk is effectively used as an area of memory. Data is read from and written to the disk as and when needed.

In addition, there are the normal file commands. Indeed, one of the strengths of this system is that the commands are very similar to those used with tape. Cassette-based programs will need little (if any) re-writing.

Adding a second drive is also very easy. You don't need a second interface, just a cable from the first drive to the second. Third and fourth drives can be added by using the other cartridge port.

But a single drive would probably be enough for most people. Each disk can hold 360K once it's formatted, which is pretty healthy. At the price you won't want to add many more drives anyway. The full complement of four would set you back around £1,400!

Apart from its excessive appetite for ackers, the HBD-50 is quite impressive. Access time is reasonably fast, except when you first boot up.

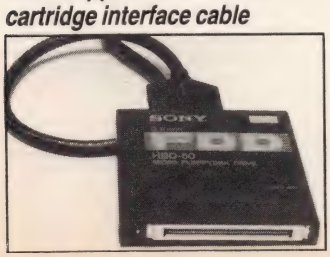
The manual follows the clear, if somewhat kindergarten, approach of the Hit Bit's tome. There are the same silly cartoons, and an overlong explanation of the advantages of using disks. If you've spent this much on a drive you probably know all the arguments already.

But the manual does explain the most used commands very well. And there is a welcome section on random access filing — something which is all too often skated over.

Like the rest of the MSX system, this disk drive is built with expansion in mind. Although it uses its own operating system, Sony has included the command CALL SYSTEM, which transfers control to MSX-DOS, assuming you have the appropriate system disk installed.

It's good to see MSX micros being supported by a disk system so soon. All we need now is for the price to fall.

Above: Back of the drive showing the sockets. Right: Microfloppies. Below: The cartridge interface cable



REVIEWS

PRINT

Welcome to *Printout*, the section of the magazine where each month you'll find reviews of all the latest books of special interest to MSX users.

The On-Line Handbook

by Ray Hammond
Fontana, £4.95

I knew I was going to like this book when I read the author's down-to-earth opening paragraph: ". . . You find it easier to keep track of the household bills on the back of an envelope . . . what can you really *do* with a personal computer?"

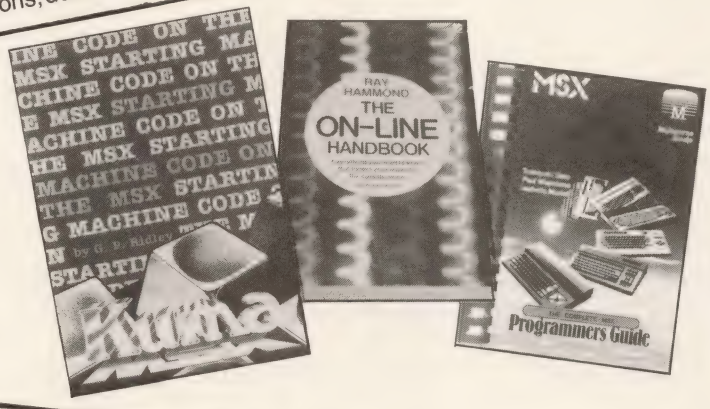
The book is a guide to what happens when you introduce your computer to the telephone system, and the entertainment and information that's available on it.

It's hard to think of anything that isn't covered in the book's 260 plus pages, as the author is that rare creature, the enthusiast who is able to communicate his enthusiasm to the lay-man, never forgetting that the lay-man may know absolutely nothing of the subject.

Hammond explains about serial connections, describes what a modem is, talks about baud rates, discusses different modems, what other equipment you might need, how to avoid spending too much money etc, before going on to list the many, many organisations that different people might find it advantageous to link up to.

He doesn't just stick with the obvious Micronet and Compunet (17 pages on the latter, so it's up-to-date), but also BLAISE (the British Library), LEXIS (the database of legal precedents and statutes), Medline (the world's medical literature) and the American DIALOG service, which will provide you with references on every subject from John McEnroe to a Boeing 767, with photocopies of articles, interviews (McEnroe, not the Boeing) and so on posted to you almost at once.

And if you want to know anything at all about expanding your micro to take in the world, then buy this book. It's over-priced, but it's one of the most informative reads I've had for ages.



The Complete MSX Programmer's Guide

by Toshiyuki Sato, Paul Mapstone and Isabella Muriel
Melbourne House, £14.95

Melbourne House has followed one recipe for success in producing this book, which is *Get in early, Get it right,* and though the price is high you are getting a book of almost 600 pages, covering Everything You Always Wanted To Know About MSX But Were Afraid To Ask.

The book is spiral-bound, as books intended for constant reference ought to be, and is written in a no-nonsense, informative style.

It's good to see DATA dealt with quite early on, as many authors seem to think it too hard for the beginner and leave it out which is crazy considering that 90 per cent of BASIC programs have DATA statements in them.

Starting Machine Code on the MSX

by G.P. Ridley
Kuma Computers Ltd, £7.95

The definitive introduction to machine code hasn't yet been written, and this attempt goes the way of so many others, being written by someone who knows his stuff but can't get into the mind of the reader. If, indeed, the reader is the target audience, as there does seem to be some confusion as to who the book is being written for.

The back cover suggests the book is for beginners and the more experienced, but the introduction says the book is aimed at 'the average user', whoever that might be. This lack of direction is evident throughout the text. You really must know who you're writing for before you start writing.

You also ought to know what you want to say, and the order in which you want to say it. Chapter One introduces some assembly language instructions, and adds that these are explained in Chapter Two, while Chapter Two intoduces Registers only to state that these will be discussed in more detail late in the book. The author seems to be improvising the book as he goes along, which is hardly the way to introduce machine code to beginners, average users and experienced programmers all at the same time. Nor is the text itself always lucid, as this example indicates: 'One does not need to write a separate program to demonstrate this routine, providing there is a fair amount of text presently on the screen, if there isn't put something on the screen, anything.'

The most useful parts of the book are some self-contained routines, and the various tables: Hex to Opcode, Hex to Decimal, and an alphabetical instructions set, but as the author himself doesn't know who he is writing for, it's hard to know who to recommend the book to.

MSX Games Book

by Andrew Lacey
Melbourne House, £5.95

Computing's answer to *The Book of Lists* is the book of listings, and here is the first MSX offering we've seen containing 27 programs for you to tap in, with the emphasis very heavily on the space/shooting style of game. At just over 20p per time they don't represent bad value, but nor will the 99 similar books which are going to follow over the next few months, and some of those are sure to offer a better range of programs.

The various preambles offer some basic but sound advice about typing programs in and using the ChexSum utility program provided here to aid you with any debugging that may be necessary, but note the author's comment: 'I hope that as you read and use this book, you will absorb the

T OUT

This month Mike Gerrard, himself an author of several microcomputer books, gets his teeth into the first batch to arrive here at the *MSX Computing* office.

Section Two is the Advanced Programming Guide, going on to look at the different MSX number systems, then a large chunk on advanced graphics including sprites, saving and loading in ASCII format, merging programs, error handling and so on.

I would like to have seen the Error Message Table in an appendix at the back of the book for easy reference, rather than hidden away in the middle, but as that's one of the few criticisms you could make of the book I'd be prepared to overlook it.

There are 240 pages on the BASIC keywords, all written to the same sensible format of Description, Syntax, Examples, Points to Remember, Bug Hunt (likely problems) and Associated Keywords and References. There are finally 60 pages on the operating system, for which the authors warn that you'll need a knowledge of Z80 assembly language programming, but if you have that then you're away.

principles of programming your MSX computer by osmosis.' Any programming skills will have to be learned by osmosis, as there is little attempt to explain to the user how the programs work.

Purely as a book of listings, some of the efforts aren't bad, with a healthy usage of sprites and machine code sub-routines, taking it a little beyond the usual BASIC-only efforts of *Hangman, Breakout* and so on. There is a *Breakout* variation, but it involves a footballer kicking a ball around the screen trying to keep it in the air, so some originality has been attempted.

The over-reliance on space games lets the book down, though, and the inclusion of an adventure, some utilities, some *real* educational programs and some practical programs would have perked it up no end. As it is, there will surely be better books along.

Interactive Video

by Eric Parsloe
Sigma Technical Press, £10.95

Interactive video to most people means laser discs and the stunning arcade games that result from them, but this is only a small area of their potential development. This book concentrates on the hardware and its applications in education, mass storage and the business world. In fact the book's title is something of a misnomer, as the majority of applications aren't interactive at all, unless you count the ability to fast-forward the Pink Floyd's *Live at Pompeii* as interaction, in which case tape recorders are interactive audio.

Although the book is in itself comprehensive and well-written, it will be of little value to most people. The subject itself is still in its infancy, and there is inevitably a great deal of emphasis, not on how you the reader can get in on the act, but how other people are using them, or, in many cases, how they're considering using them to realise their potential.

That the potential is there is not doubted, but it's a subject that is out of date before even this review copy was received—while reading in the text that one laser disc will store 40,000 pages of text, 5000 photographs, 1000 microcomputer programs and various other pieces of information, BBC Enterprises announced its Domesday Project: two million pages of text, 85,000 photographs plus figures and maps, all on the one laser disc.

Business users will no doubt be interested in reading about the experimental projects conducted by the likes of Sears Roebuck (putting its enormous catalogue on laser disc) and Mothercare (in-house promotion resulting in increased sales), but if you're looking for a book about the latest developments then this isn't it.

MSX: An Introduction

by Jonathan Pearce and Graham Bland
Century Communications, £7.95

Long before MSX machines were properly launched we already had *MSX: An Introduction* in the office, though the acknowledgement to Spectravideo and the appendix listing the differences between Spectravideo-BASIC and MSX-BASIC explains how the book came to be out so quickly. As indeed do the typographical errors at the rate of one or two per page.

The book claims to be 'perfect for both beginners and advanced programmers,' which is quite a claim for only 168 pages.

The first chapter, *Introducing MSX*, is actually an introduction to micro terminology in general, and a very clumsy introduction at that. It shouldn't take three pages and two diagrams to explain what 32K means, and the second paragraph of this explanation referring to the transmission of data at two different voltages is likely to send the beginner scurrying away in confusion. Nor is the statement that 'memory capacities of 8K and 16K are now common' very enlightening: I'd say that memories of only 8K are quite uncommon, myself.

The authors also commit the cardinal error of introducing terms before explaining them, such as referring to 'the default condition,' with this only being defined on the following page. The text also refers to strings before explaining them, and while there's a reasonable introduction to maths, music, graphics and BASIC programming, the MSX user would be better advised to cling on to his or her £7.95. The typographical errors don't help, though I'm grateful to the one which mentioned a 'primpt' on the screen: Inspector Clouseau lives, and is writing a computer book. OK?

CANON MSX V-20

64k Full Spec **£232** + VAT

MICROP CPP 40

£97 + VAT

Portable Printer Plotter for MSX
4-Colour with High Res Graphics

KONAMI MSX CARTRIDGE GAMES

10 Titles inc Track & Field, Test Pilot, Super Cobra etc. £5 off RRP
— Now Only **£13.90** + VAT

Telephone or write for full details

Delivery: £9.50 Hardware; £2.50 Software

FOLLY MICRO

0730 894078
0730 67057

10 College Street, Petersfield, Hampshire
9am-9pm every day or send SAE for full range
We have no connection with any other retailer

ESS MUSIC

NORTH LONDON
YAMAHA
HI-TECH CENTRE

MSX THE YAMAHA WAY

CX5M

MUCH, MUCH MORE THAN A MSX COMPUTER — THE **YAMAHA CX5M** IS A COMPLETE COMPUTER MUSIC SYSTEM PACKAGE — INCLUDING PIANO STYLE KEYBOARD AND FM SOUND MODULE. IF YOU WANTED TO BUY A MERE SYNTHESIZER THIS GOOD — THE PRICE WOULD BE £899

THE **CX5** GIVES YOU:—

- PROFESSIONAL SOUND QUALITY
- PLUS A MSX COMPUTER, AND ACCESS TO ALL THE FULLY COMPATIBLE MSX SOFTWARE
- PLUS THE OPTION OF YAMAHA'S SPECIAL MUSIC SOFTWARE WHICH IS GUARANTEED TO BRING OUT THE MUSIC IN YOU!

OUR PRICE OF £549 INCLUDES VAT PLUS A FEW HELPFUL EXTRAS TO HELP YOU ON YOUR MSX WAY!

To place your order or obtain help and advice call E S S on
01 440 3449
230 High Street Barnet Herts

RAYFORDS SUPREME COMPUTER CENTRES

BRING YOU MSX COMPUTERS

Rayford Electrics Ltd

22/23 SYDNEY STREET **BRIGHTON** Tel: 682883/683950
174 TERMINUS ROAD **EASTBOURNE** Tel: 35731
44 KEYMER ROAD **HASSOCKS** Tel: 4373
37 SUSSEX ROAD **HAYWARDS HEATH** Tel: 451089/450616
93/94 GEORGE STREET **HOVE** Tel: 722408
93 MONTAGUE STREET **WORTHING** Tel: 35516

SUPREME DISCOUNT STORES Ltd

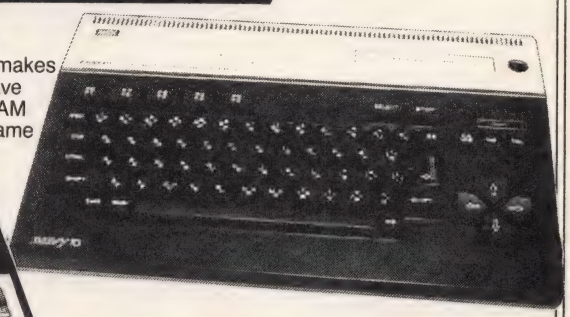
8/9 POTTERS WALK **BASINGSTOKE** Tel: 50542
348-350 HOLDENHURST ROAD **BOURNEMOUTH** Tel: 309436/7 TV Dept. 309438
BERKELY PLACE, CLIFTON **BRISTOL** Tel: 279152
62/63 SOUTH STREET **CHICHESTER** Tel: 784449/780297
112/118 HAZELWICK ROAD, THREE BRIDGES **CRAWLEY** Tel:26638/27250
54/58 CHURCH STREET **CROYDON** Tel: 681 8013
140/144 UXBRIDGE ROAD **EALING** Tel: 840 5485/5521
110 FORE STREET **EXETER** Tel: 53833
811 HIGH ROAD **FINCHLEY** Tel: 446 6753
14 LONDON ROAD **GLOUCESTER** Tel: 421486
274 HIGH STREET **GUILDFORD** Tel: 571027
120/122 QUEENS ROAD **HASTINGS** Tel: 427188
7 WEST STREET **HORSHAM** Tel: 59117
54/70 MOORBRIDGE ROAD **MAIDENHEAD** Tel: 73139/73130
47 NORTHBROOK STREET **NEWBURY** Tel: 35200
ALEXANDRA ROAD, Lower Level of Texas Homecare
MUTLEY **PLYMOUTH** Tel: 672261
277/283 COPNOR ROAD **PORTSMOUTH** Tel: 694731
305 HIGH STREET **SLOUGH** Tel: 76568
BACK O'THE WALLS (OFF EAST STREET) **SOUTHAMPTON** Tel: 37937
114/147 HIGH STREET **STAINES** Tel: 57571
51/53 BRIDGE STREET **SWINDON** Tel: 24429
1 BRIDGE STREET **TAUNTON** Tel: 54591
15/21 MARKET STREET **WATFORD** Tel: 50330
1/9 ST. JOHNS ROAD **WEMBLEY** Tel: 900 1533
93/95 MIDDLE STREET **YEOVIL** Tel: 26561

Prices correct at time of going to press, prices may be altered without notice.

SANYO MPC-10

The spacious 73 key alphanumeric keyboard makes programming easy. the MPC-10 has an 8 octave 3 channel sound synthesiser and total user RAM is 64K. This computer has a built-in 32 level game

ONLY £299.95 INC VAT



FREE
3 Cassette Software Pack
Our Normal Price £24.95
FREE
3 Year Guarantee

TOSHIBA HX10D

ONLY £279.95 INC VAT

A 64K memory allows sophisticated game, educational and small business programmes to be used. 32 sprite graphics can be moved around the screen. Plus 8 octave 3 channel sound synthesiser and low profile 73 key 'qwerty' keyboard for easy operation.

Guaranteed Lowest Prices!

In the unlikely event that any product you intend buying from us is advertised and in stock locally at a lower price, let us know and we will BEAT that price on the spot.

3 Months Interest Free Credit

On all orders over £100 subject to status.

the only choice

Kuma MSX

Eric and the Floaters | Binary Land | Driller Tank | Fire Rescue | Hyper Viper

Database | ZEN Assembler | WDPRO | Kuma FORTH | Home Budget

An outstanding selection from Kuma's rapidly expanding range of Entertainment and Application Software for the MSX Micro-computer.

Books:

- **Starting with the MSX**
- **The MSX Red Book**

Accessories:

- **RS232C Interface**
- **Speech Synthesiser**
- **Parallel Interface**

Available from your nearest MSX Stockist.

Kuma Computers Ltd., 12 Horseshoe Park, Horseshoe Road, Pangbourne, Berks RG8 7JW.

Please send full catalogue on MSX products.

Name .....

Address .....

.....

..... Phone.....

I own a ..... MSX Computer.

Trade Enquiries Phone 07357-4335

Starp

Star Micronics U.K. Ltd., Craven House,

stx-80.

The Silent.

Prints 60 characters per second with muffled serenity. Standard ASCII, selectable international characters. Block graphics and bit-image-graphics. The stx-80. At a price to start with. Soft on the ear. Easy on the purse.

gemini-10X.

The Bestseller.

No.1 in the range, the gemini-10X has swiftly soared to stardom. 120 characters fast per second. Economical. Reliable. And now compatible with IBM: gemini-10i. Any more details? Let us know. We support you.

gemini-15X.

The Economical.

At Pro-Range.

For professional output at a reasonable price the gemini-15X is hard to beat. The print-head provides you with more than 100 million characters. gemini-15X. The optimal price/output relation.

delta-10.

The Powerful.

Serial and parallel interface. 8k-byte buffer. Macroinstruction. 2 x 96 download characters. Bi-directional printing with logical seeking. Where others speak of extras we mean standard. The delta-10.

arade

40 Uxbridge Road, London W5. Tel: 01-831 9619

delta-15.

The Powerful.

At Pro-Range.

For full power, wide carriage output the delta-15 is your printer. Up to 233 columns width and 160 characters per second. Just great. Effortless efficiency at a standard price.

New: radix-10.

The Pro.

200 cps, automatic single sheet feed, 16k-byte buffer, near-letter-quality. For the professional use. radix-10. Setting new output standards. From Star.

New: radix-15.

The Pro.

At Pro-Range.

It's super duper. With super-wide action. Provided with everything a pro asks for. radix-15. Right on course.

New: PowerType.

The Typist.

For your computer.

Sets new dimensions in your correspondence. With over 100 type fonts. 18 clear characters per second. Serial and parallel interface. Proportional printing. PowerType. Prints as typed. At a surprising low price.

star

The power behind the printed word.

SOUND & VISION

Ever had that fuzzy-around-the-edges feeling? Maybe you feel that the leaping penguin or exploding spaceships aren't quite as sharp as they could be. And then there's the square-eyed sensation you get from staring too long at your latest program or word-processed epic.

All these problems, and more, can be solved, or at least eased, by hooking your computer up to a proper monitor. Not only will your eyes stop streaming and your image look brighter, the rest of the family never has to miss *Dallas* again.

To see how these miracles come about, let's take a brief look at how these things work. As MSX micros are such colourful machines, we'll stick to colour monitors.

But it's worth mentioning that monochrome versions (green and amber screen types) are useful for applications like word processing, especially with an 80 column format. That's because the resolution is usually good.

If you only ever play games with your micro then it's not really worth forking out the readies for a monitor — assuming you have sufficient access to a colour TV. But if you feel a monitor would be useful, or if you're thinking about buying a colour TV anyway, it's worth looking at the options.

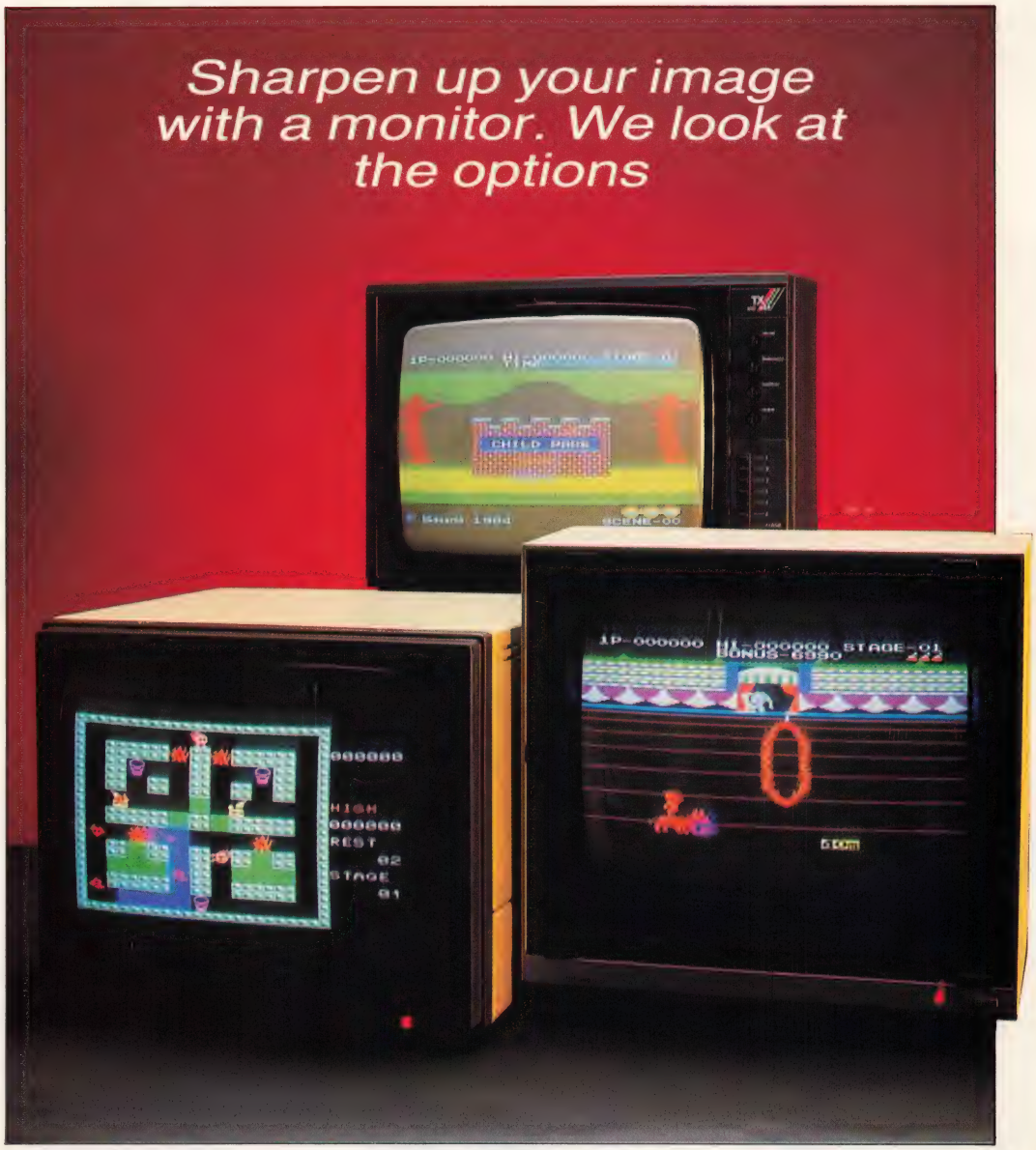
So what is a monitor anyway? In essence it's a TV which takes the picture signal from the computer via a much more direct route than the RF output. Initially the picture exists in the form of separate red, green, blue, sound and synchronising signals.

This RGB output is the most direct, and therefore most unadulterated signal, and so some computers make it available for use with special RGB monitors. But of the MSX micros currently available only the JVC and Sony models have this facility.

Normally the basic video signals are combined to give a composite output. All MSX machines to date have a composite video output, which can be fed to a composite monitor. This proceeds to split the signals back into the component RGB signals.

Inevitably there is some loss of image quality and stability involved in this coding and decoding, which is why RGB is best if you can get it. With the RF signal used by normal TVs, however, the situation is even worse.

Before leaving the micro the picture passes through an RF modulator. When it gets to the TV (via the aerial lead) it is demodulated into a composite signal and then split into the



MICROVITEC CUB

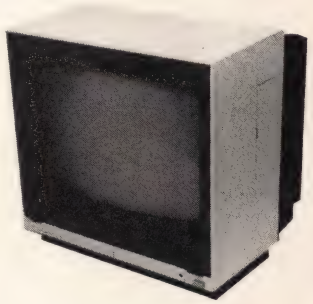
The Microvitec *Cub* is one of the best known computer monitors. We took a look at the 653 model, which gave an excellent picture with MSX machines. The picture was very steady and the colours well saturated.

The model we had gave the option of composite and RGB (TTL digital) inputs. RGB only versions are also available. A sound input is also provided, although it means making a special lead to connect it with MSX micros.

The Cub has a video bandwith of 18MHz, and is classed as medium resolution, having a dot pitch of 0.43mm and a horizontal pixel count of 653.

This monitor can be recommended for those looking for a high quality product. But you really have to need a monitor to fork out the £375 asking price. More details from: Microvitec plc, Futures Way, Bolling Road, Bradford, West Yorkshire, BD4 7TU Tel: (0274) 390011.

SANYO CD 3195B



We've been using the snappily-named Sanyo CD 3195B as our standard monitor. That's not because it is particularly high resolution. In fact, it's 14″ screen has only a TV-like standard resolution, with a dot pitch of 0.5mm.

But this screen does give a very stable picture, with good colour saturation. Input is composite only, with a standard BNC socket for the video and a phono socket for sound. This makes it very easy to connect to an MSX micro.

One particularly useful feature is the green screen switch. This turns the CD 3195B into a monochrome monitor, providing greater eye relief when doing things like word processing.

It's a well-made and attractive monitor. But at around £360 it's expensive, considering the comparatively low resolution. Details of this and other monitors from: Sanyo Marubeni UK Ltd, Otters Pool Way, Watford, Herts. Tel: Watford 46363

FERGUSON MC01

The new Ferguson MC01 is the latest TV/monitor to come onto the market. It looks like a normal 14″ portable colour TV — and a pretty stylish one.

What gives it away are the station buttons. Numbers seven and eight are marked RGB and VIDEO respectively. This is because, as well as the standard aerial socket, the MC01 also has two DIN sockets for RGB and composite video inputs.

The monitor automatically switches between the types of input when you select channels. Separate audio inputs are also provided.

The company was a little reticent about releasing bandwidth and resolution figures. But as the MC01 uses a normal TV CRT system resolution can safely be described as standard.

You don't get the resolution of a proper monitor. What you get is an excellent TV with the added bonus of computer inputs. And at a price of £229 it's good value for money. Details are available from: Thorn EMI Ferguson (Service Div), Video Advisory Service, PO Box 121, Lea Valley Trading Estate, Angel Road, London N18. Tel: 01-807 3060.

RGB information. No wonder the picture sometimes flickers!

So the main thing about a monitor is that it misses out all the intervening bits. But that also means you can't watch your favourite TV programmes on them, as there is no tuner. Considering there are bits missing, how come colour monitors often cost more?

Well, apart from the fact that they are specialist items, monitors frequently have higher resolution than TVs — that is, they use more dots to form the image.

Resolution is often quoted in terms of the *pitch*. This is the distance between the dots, so the smaller the pitch, the more dots you get and the higher the resolution. But quoting a figure for the pitch on its own is misleading, because a lot depends on the size of the screen.

Standard resolution for a 14″ tube gives a pitch of around 0.6mm and about 450 dots (or pixels) across the screen. This is fine for most graphics and 40 column text if you're not reading a lot of it.

Medium resolution monitors usually have a pitch around 0.43mm (for a 14″ tube). They give a much more comfortable read with 40 column text and are just about good enough for 80 columns.

With medium resolution you'll get something approaching 600 pixels across the width of the screen. This is ample for MSX computers, and as this type of monitor has come down in price recently it's the sort we'd recommend.

High resolution monitors are only really necessary if you're doing a lot of 80 column work. The horizontal resolution of 800 pixels (with a pitch of 0.31mm for a 14″ tube) results in extremely crisp and clear characters.

The other term you'll see bandied about is band width. In fact, you don't really have to worry about this too much.

A medium resolution screen needs a bandwidth of around 10MHz — anything greater is just icing on the cake.

The question still remains of what to go for. As far as colour screens are concerned, there are three main choices.

If you are buying a monitor specifically for the computer then a medium resolution composite model is ideal. It's a good compromise between price and quality. But be sure to get one with a sound facility. How could you possibly play *Antarctic Adventure* without the Skater's Waltz grinding on in the background?

If you have a micro with an RGB output then that type of monitor could be a good investment. But there is an even better alternative to both these options.

Increasingly, TVs are appearing on the market which have inputs for monitors as well as the standard aerial socket. This gives the advantage of bypassing the decoding and demodulating systems, although many TV/monitor sets only have standard resolution. But if you haven't already got a colour TV, one of these sets could be a good investment.

QUEN-DATA®

Dot Matrix and Daisy Wheel Printers

DP 80/81 ..... **£196.00**
DP 100 ..... **£263.00**
DWP 1120..... **£299.00**
PLUS VAT

10% DISCOUNT FOR PAYMENT WITH ORDER

All customers whose orders are received before Jan 31 will get a QUEN DATA pocket calculator absolutely *FREE!*

NEW YEAR OFFERS!

- ★ 80 columns/100 CPS
- ★ 9 × 11 matrix for letter-quality printing
- ★ High resolution graphics
- ★ Adjustable tractor feed
- ★ 2 interfaces selectable by dip-switch; parallel/Centronics + serial/EIA RS232C

SOUTH COAST CASH REGISTERS LTD
FREEPOST, BLANDFORD, DORSET
Your hotline telephone number
(0258) 56700

Credit facilities available

Please allow 14 days delivery

MSX

REYNOLDS

79 ORSETT ROAD, GRAYS, ESSEX RM17 5HH

COMPUTER CENTRE

Tel: 0375 5948

MSX

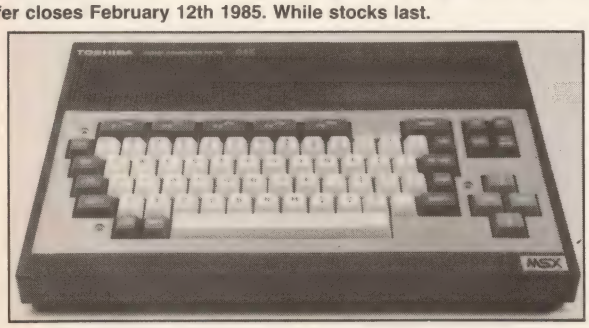
FREE — 2 JOYSTICKS

★ **THREE FREE MSX TITLES** ★

FRENCH IS FUN
MANIC MINER
HUNCH BACK

★ **3 YEAR GUARANTEE** ★

Offer closes February 12th 1985. While stocks last.



The versatile HX10 — for business use and computer games

- MSX* standard
- 64K Memory
- 16 colours
- 73 Full stroke keys
- ROM cartridge slot
- Cassette recorder interface
- Centronics printer interface
- RF and video connections
- Audio output connection
- Twin joystick ports

MSX SPECIAL OFFER WORTH PLUS £58.50

ABSOLUTELY FREE
SPECIAL SOFTWARE TAPE
INTRODUCING MSX
FREE COPY OF **MSX COMPUTING** MAGAZINE

TOSHIBA HX10

PRICE ONLY
£239.95

MSX Software (Printers) and Peripherals in stock — top titles

ORDER NOW. DEALER ENQUIRIES WELCOME. SEND SAE FOR LEAFLET.
MAIL ORDER SERVICE. POST FREE.
Remittances will not be cashed until goods are ready to be dispatched.

I enclose a cheque/postal order for £_____made payable to H Reynolds
Please debit my Access Card No._____for £_____
Barclaycard No._____for £_____
Signature_____
Name_____
Address_____
_____ Tel No:_____

ESTABLISHED 29 YEARS

SERIOUS SOFT SELL

Make your micro work for you. Simon Craven gives you some tips

For anyone interested in the more serious side of home computing the choice of an MSX machine should provide the basis of a more capable system than most existing home computer installations.

Briefly, if you are going to spend more than a couple of hundred quid on a micro, it had better offer some *useful* functions, rather than being merely an amusing toy.

Fortunately for MSX users and manufacturers alike, the Holy Specification Sheet incorporates most of the goodies we need to get some useful work done, and what isn't incorporated into the basic specification is well up the list of future bolt-ons.

At this point it might be sensible to define the sort of applications we are likely to be interested in.

The MSX micro looks like filling a role in this country which has long been a part of the US personal computer scene. It's a tricky area to define, and the best catch-all title that I've heard in general use is 'home/professional' computing.

This is not your full-blown IBM PC with vast roaring daisywheel printer, thundering forth wads of spreadsheets, reports, and pretty *Lotus 1-2-3* graphics.

Home/professional computing mostly consists of people using relatively inexpensive machines for personal word processing, record keeping, spreadsheet calculations and the like, to help them with whatever they do in real life. Naturally, most of them play games too, and quite a few get into fairly heavyweight programming projects.

The classic computer for this kind of user in the US is the Apple II, and the Macintosh looks like taking over a large part of the future market. In Europe, though, higher prices and significantly lower disposable incomes mean that we have to set our financial sights a little lower, and the MSX machine could well be the answer.

The most common microcomputer application is word processing, which is hardly surprising when you consider the number of uses to which a good word processor can be put.

Its role in the production of any printed document is obvious, but how many people consider its potential as a sophisticated editor for programming in almost any language?

MSX owners have a better BASIC editor than most micro users, but even so the use of a dedicated text editor is a revelation the first time you give it a try.

How often have you listed a program and wished that you could scroll *up* the listing as well as down? Have you ever wanted to jump straight to a particular REM statement? Maybe even incorporate parts of a program listing into a letter or article without typing it in all over again? It's easy with the right word processor.

Another potential use is

These are some examples of the first business software to appear for MSX microcomputers

illustrated by the micro user who keeps his lists of names, addresses and phone numbers in a WP text file and uses the SEARCH function to recall the information he is after.

Rather less popular in the home are spreadsheet programs. To an extent this is the fault of spreadsheet manufacturers whose marketing hype is aimed at accountants and middle managers in large companies, not the general public.

Drop the word 'spreadsheet' into the coversation down at the local computer club and you'll be stared at as if you had two heads. Who wants to know about that financial planning stuff? It's for preparing corporate budgets and the like, right?

Wrong. Everyone understands a word processor — it's like a clever typewriter. A spreadsheet program, however, has no obvious manual equivalent. It *isn't* a specialised piece of financial management equipment any more than a pocket calculator is. Unlike a calculator it can perform an operation on an entire row of figures at once.

If you ever work with numbers, the chances are a spreadsheet will be useful.

'If you ever work with numbers, a spreadsheet will be useful'

Like a word processor, it can act as a specialised kind of database, storing figures and formulae instead of words.

The spreadsheet and the word processor, then, are the two basic programs which every serious MSX user should possess.

Having just bought an MSX machine and, if you are feeling especially affluent, a printer of some description, the computing budget will probably be stretched rather thin, so the expense of disk drives is likely to be unwelcome at this stage.

Added to this point is the cloudy veil hiding MSX-DOS from an eager public. Not many disk drives are available as yet — only the £350 Sony seems a viable contender — and the prudent user might well be waiting for things to settle down a little on this front.

But can anything useful be achieved with cassette storage? It seems to go against micro folklore but never mind. Console yourself with the fact that by the time you can afford to expand to a disk system, the drives will probably have come down in price by a hefty percentage.

Still, there are undeniable advantages to disk storage. Most important is its speed. It's a rather tedious process to load your word processor from tape and then load the text before work can begin. That's why the manufacturer of your MSX machine saw fit to put BASIC in ROM rather than loading it into RAM when it is required (standard practice with disk systems).

If you can do it with BASIC, you can do it with a word processor. A ROM cartridge can be plugged into the MSX machine's cartridge slot, where it can override BASIC and have 32K of RAM all to itself (assuming, of course, that you have bought an MSX micro with the full complement of memory).

'At the moment cartridge programs are relatively few and far between'

The cartridge loads instantly, and the tedious mucking about with cassette is limited to loading and saving your deathless prose.

Since tape is rather less versatile than a good disk system, the size of your document is limited by the amount of memory within the machine. Disk-based machines, on the other hand, often use some clever programming to 'page' parts of a document in and out of RAM as required, so that the maximum size is limited only by disk capacity.

The 32K you will have available is enough to store around 5000 words at a time, which most people find adequate.

At the moment, cartridge programs are relatively few and far between, but this will change as the facilities for cartridge reproduction in this country are improved. Meanwhile, it isn't worth making too large an investment in cassette software for serious purposes.

Another reason to hold on to your funds for a few weeks is that in areas other than games, MSX is not yet well-supported. There is a lot of high-quality software just round the corner, but for every good program that comes out there will be at least one bad one.

If you aren't used to word processing or handling a spreadsheet, even a below-par offering seems like an improvement over a manual typewriter. However, even if that typewriter is unexciting, it is reliable, and new software frequently leaves something to be desired in that field.

Over the next couple of issues, we'll show you what to look for in professional software — which features are genuine time-savers, and which are merely useless gimmicks.

We'll also endeavour to answer your questions and sort out your business computing problems through our pages.

Let us have your views — and tell us about any difficulties that you encounter with your professional home computing.

UP FOR GRABS

For the price of a stamp, you could be the proud owner of a Toshiba HX-10 MSX computer — and a bundle of the latest MSX software.

All you have to do is identify the eight parts of Toshiba computer products pictured here. If yours is the first correct entry drawn out of the bag on Friday, 1st February you'll receive three programs — *Manic Miner* from Software Projects, *Hunchback* from Ocean and *French Is Fun*, from CDS — with your HX-10.

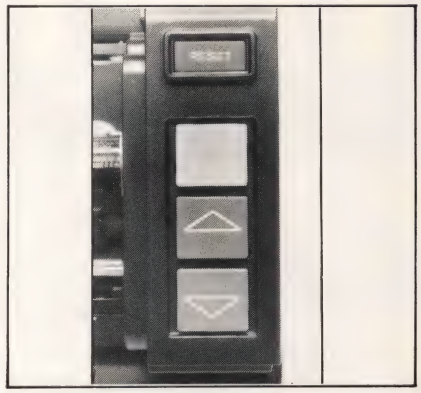
Just identify the eight pictures shown. For instance, if you think that picture A shows the function keys of the HX-10, write it on a card. Each picture shows a small part of one of Toshiba's products. We want to know the name of the product as well as which part is shown.

Write your answers on the back of a postcard, together with your name and address, send it to us, to arrive not later than 1st February, 1985.

RULES

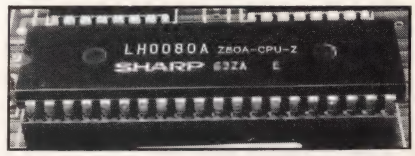
1. The judges' decision is final and no correspondence will be entered into.
2. The competition is not open to employees of Haymarket Publishing, their agents or suppliers, nor the employees of Toshiba (UK) Ltd. No overseas entries can be accepted.
3. Entries must be addressed to Toshiba Competition, MSX Computing, 38-42 Hampton Road, Teddington, Middlesex TW11 0JE, to arrive by 1st February, 1985.

Picture A

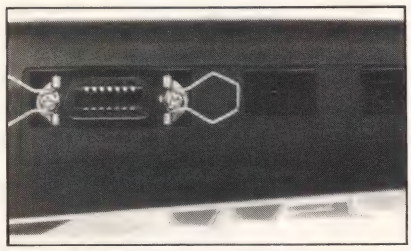


Picture B

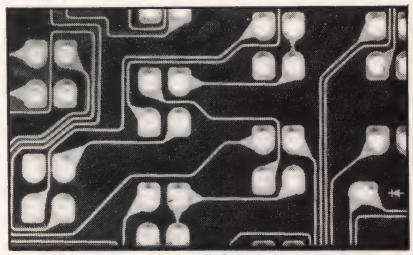
Picture C



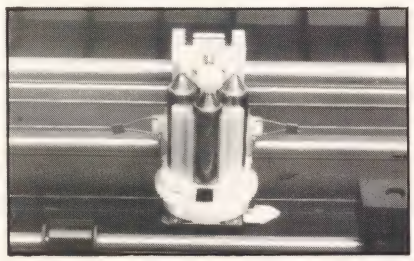
Picture D



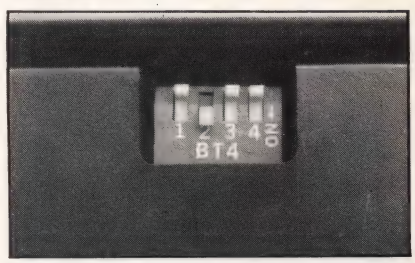
Picture E



Picture F



Picture G



Picture H

The new Mitsubish

For those in the know

Anyone conversant with home computers will know precisely why MSX was worth waiting for.

The sheer proliferation of computer and software systems flooding the market loudly underlined the need for a unified standard.

So the major companies jointly developed a single computer and software system. The result – MSX – the format that will be standard for all time.

And those in the know will not be surprised that Mitsubishi are in the vanguard of the MSX movement. For, with the F-series, Mitsubishi offers everything that MSX is and more.

GRAPHICS

Maximum resolution of 256 x 192 pixels with all 16 colours available on the screen at the same time. 32 sprites in two sizes and two magnifications allowing easy creation of '3D' graphics. 255 pre-defined characters all of which can be used as straight text or easily mixed with graphics.

JOYSTICK AND CASSETTE PORTS

SOUND

Three independent channels which can be output through the TV loudspeakers at any volume, individually or simultaneously, at any of the available 8 octaves. All three channels can use the 'noise' generator for stunning sound effects.

KEYBOARD

73 moving keys, ergonomically designed for many hours of fatigue free use. Large cursor control keys which are excellent for both programme editing and game playing. 5 function keys giving 10 pre-defined functions which can easily be redefined from 'BASIC' using the 'KEY' command.

BASIC

MSX BASIC is possibly the most comprehensive version of the original language. There is a complete set of commands for creating graphics and sounds, manipulating text and moving sprites. In addition to this there are 'built-in' interrupt routines for detecting sprite collisions, function key selections and joy-stick fire buttons.

EXPANSION

The Mitsubishi 64k ML-F80 and 32k ML-F48 are both equipped with 2 cartridge ports, 2 joy-stick ports and a centronics compatible parallel interface. It is through these devices that the MSX system can be expanded for use with disc-drives, printers, serial interfaces, modems and other peripherals.

SOFTWARE ON CASSETTE

The MSX system can load and save data onto cassette at 1200 or 2400 baud and unlike certain other home computers, the Mitsubishi F-series can be used with a normal domestic tape recorder for this purpose.

When you put all of these features together, with the knowledge that Mitsubishi is the largest manufacturer of Mainframe computers in Japan, those in the know will immediately recognise the true potential of the Mitsubishi F-series.

hi MSX Computers

For those who aren't

The Mitsubishi MSX family computer is everything you wanted to know about computers, but didn't know who to ask.

It's friendly, it's fun and so simple, a grown man can use it. Yet so versatile even his computer-versed children would be hard-stretched to over-tax it.

It operates with any colour TV set. Just plug it in, and the full power of the computer is instantly at your fingertips.

FOR FATHER

The Mitsubishi MSX can do many things, from keeping a simple check on the bank balance to running a complete business with customer account files, stock control programmes and word processing. It is just as much at home keeping control of your record or stamp collection or playing 'strategy' games such as chess, othello or contract bridge.

FOR MOTHER

There is the opportunity to store recipes and other household information or keeping record of the children's progress at school. Household accounts can also be recorded so that savings can be planned for holidays and other seasonal expenses.

FOR THE CHILDREN

There is education, particularly computer education. In a world where computer literacy is now of foremost importance, MSX offers a broad base of educational software. With simple programmes for the very young through to complex programmes for older students like language learning.

Also, the graphics system of the Mitsubishi computer ensures that the MSX versions of your favourite games are reproduced with incredible speed and accuracy.

Undoubtedly, MSX is the format for the future, and will become the byword for computer education and entertainment.

And you can be secure in the knowledge that regardless of future developments, any investments made in MSX hardware, software and peripherals today will always be compatable with the Mitsubishi F-series.

So if you've waited until now to buy a computer, you couldn't have timed it more perfectly. Get to know one today.

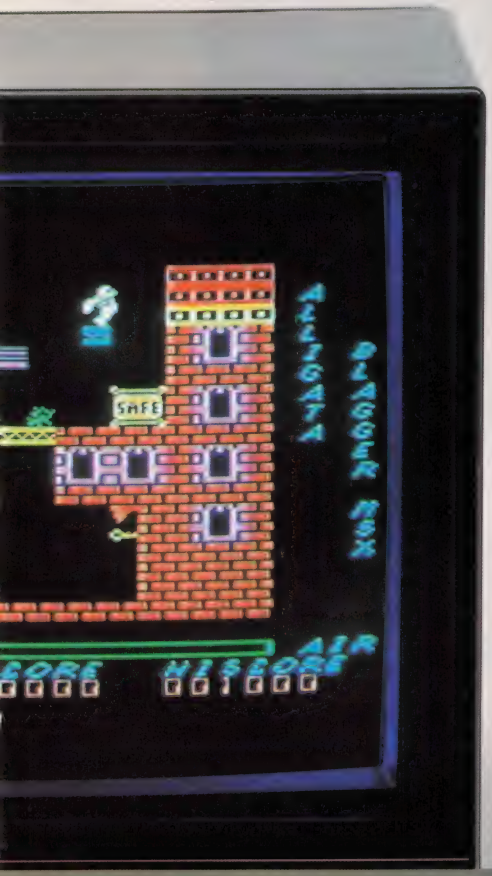
MITSUBISHI COMPUTERS

Mitsubishi Electric (UK) Ltd., Hertford Place, Denham Way, Rickmansworth, Herts WD3 2BJ. Tel: 0923 770000.

SPECIFICATIONS

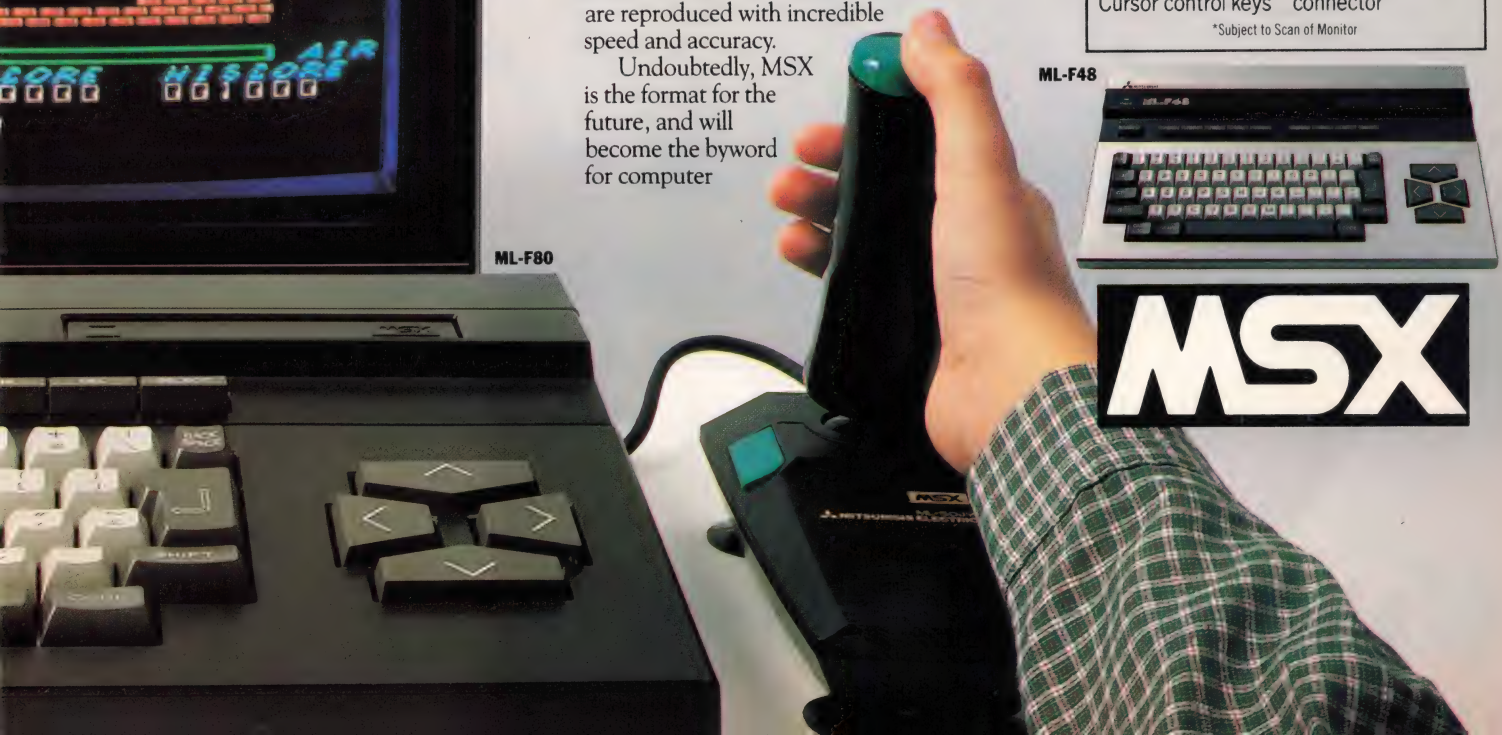
CPU:
Z80A (3.6 MHz)
Memory:
ROM: 32 KB
RAM: 64 KB (F80)
RAM: 32 KB (F48)
Video Ram: 16 KB
Screen Displays:
*Text Mode:
40 columns x24 lines
*Graphics:
256 x 192 pixels
Colours: 16 (15+transparent)
Sprites: 32
Output: RF, Composite Video
Keyboard:
73 moving-key keyboard
5 function keys
Cursor control keys
Special keys for screen editing
Sound:
8 octaves
3 channels for sound or 'noise'
Output by TV sound or External Audio Amplifier
Cassette Interface:
1200-2400 baud
Motor controlled by CPU
Parallel Interface:
Centronics
Joy-Stick:
2 x 9 pin connectors
Rom-Cartridge:
2 x 50 pin connector

*Subject to Scan of Monitor



ML-F80

ML-F48



MSX

MSX **AVAILABLE NOW ON ROM CARTRIDGE** **MSX**

Track and Field I
Track and Field II
Hyper Sports I
Hyper Sports II

Konami's Tennis
Time Pilot
Super Cobra
Athletic Land

Antarctic Adventure
Comic Bakery
Monkey Academy
Circus Charlie

Konami®

KONAMI LTD., TELEVISION HOUSE, 269 FIELD END RD, EASTCOTE, MIDDLESEX HA4 9LS,
ENGLAND. TEL: (01) 429 2446 TLX 883978 KONAMI G

MAKING

Make lots of noise with your computer. Isabella Muriel demonstrates

Anyone interested in producing computer generated sound is well served by MSX. That's because MSX micros use a special chip called a Programmable Sound Generator (PSG), which can produce all kinds of sounds without interrupting the operation of the central processor — an extremely useful feature.

Last month we investigated how to use this chip, via the PLAY command, to produce music. But by controlling the chip directly, using the SOUND statement, all sorts of different sound effects can be generated. This month we explain the workings of the Sound Generator and show you how to create these special sound effects.

Before delving into the technicalities of the SOUND command, try typing in the next two short example programs to hear the sort of effects your MSX is capable of producing.

```
10 REM gunshots
20 SOUND 6,20
30 SOUND 8,16
40 SOUND 11,103
50 SOUND 12,30
60 SOUND 13,8
70 SOUND 7,55
```

```
10 REM insect sounds
20 SOUND 0,31
30 SOUND 1,0
40 SOUND 8,16
50 SOUND 11,179
60 SOUND 12,45
70 SOUND 13,14
80 SOUND 7,62
```

You're probably wondering what the numbers stand for in the sound command. All will be explained shortly, but first a few essential points about waves that you'll need to fully understand this command.

Sound waves are often compared to the water waves formed by throwing a stone into a still pond. The wavelength is the distance between two advancing crests. Alternatively, this distance can be measured in terms of time, ie the time it takes for a wave to travel one wavelength. The reciprocal of this time gives you the frequency of the wave. So the frequency of a wave tells you the number of waves passing a fixed point in one second — the higher the frequency of a sound wave, the higher the pitch of the sound. Frequency is often measured in units of Hertz. The human ear can hear sound waves over a pretty large range of frequencies, from around 20 to 20,000Hz.

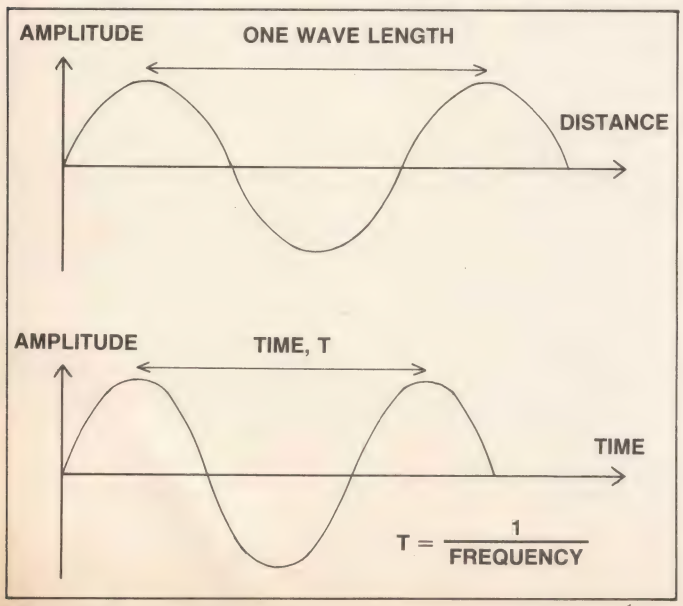


Figure 1: Wavelength = distance between two crests, $T = \frac{1}{Frequency}$

The amplitude of a wave tells you how much energy the wave has. The larger the amplitude of a sound wave, the louder it will sound. Figure 1 illustrates these points; we've drawn a sine wave as it's the simplest! All other waves can be represented by a sum of sine waves.

As well as producing tones, MSX can produce 'white noise' for the more unpleasant or interesting sound effects. The sound waves for this vary randomly in amplitude and in frequency about a central frequency.

MSX micros can produce sound on three channels at once, which means they can output three sound waves simultaneously. To do this the machine uses 14 registers. As you are probably aware, although computers can accept decimal numbers, and will give the answer of a sum as a decimal, all the working inside the computer is actually done in binary (see page 69).

A number in the computer is stored as a series of ones and noughts called Bits, this being short for Binary digIT. Each register used by the PSG is just a collection of 8 bits, and is used to store a number between 0 and 255. It is the values of these stored numbers which determine what sort of a sound you hear.

For each of the three channels, Channel A, B and C, two registers are required to store the wavelength of any square sound wave emitted by the tone generator; one register to control the coarse wavelength number, one for the fine.

So Channel A uses registers 0 and 1 for this, Channel B, registers 2 and 3, and finally Channel C, registers 4 and 5. Register 6 is used when producing a white noise — this register sets the frequency of the noise and can be used by any of the Channels.

Registers 8, 9 and 10

WAVES

control the volume of the sound produced by the three channels. Finally registers 11 to 13 deal with the envelope of the sound wave. More on all these later, but first let's look at register 7, the mixer register.

Register 7: The Mixer

This register controls the sound output of each of the three channels. It switches each of the channels ON and OFF, and when ON, selects the source of the sound wave, whether this is a square wave from the tone generator or white noise from the noise generator.

Bits 0, 1 and 2 of register 7 switch on and off the tone generator, depending on whether these bits are set to 1 or 0, 1 indicating off and 0, on. Bits 3, 4 and 5 switch on the noise generator for each channel. The last two Bits, 6 and 7, are not used so they can be set to 0. Take a look at figure 2.

The SOUND command is used to set the mixer register. To enable Channel B to emit noise, and at the same time, Channel C to emit sound, bits 4 and 2 must be set to 0. This effect is demonstrated overleaf on page 49.

The sound statement which does this is:

SOUND 7, &B00101011

The first number is the register number, the second number after the comma is the number held by this register. To indicate to the computer that this is a binary number, the number has been preceeded by the ampersand sign and the letter B. However, this number doesn't have to be in binary; the following command would do just as well:

SOUND 7,43

If you like, you can switch all the channels on to emit both sound and noise in the one statement, ie set all the bits to zero, as in figure 4:

SOUND 7, &B00000000
or
SOUND 7,0

Registers 0,1,2,3,4,5: the tone generator

Each channel uses two of these registers to set the wave length of the tone generator. The coarse tune wavenumber can be set to any value between 0 and 15, the fine between 0 and 255 (figure 5).

To calculate the overall wavenumber the settings of both the registers for a particular channel must be taken into account.
For Channel A, the wavenumber is given by:
Wa=(Register 0) + (Register 1) × 256
For Channel B:
Wb=(Register 2) + (Register 3) × 256
For Channel C:
Wc=(Register 4) + (Register 5) × 256
The smaller the wavenumber, the higher the frequency and so the higher the note produced sounds. Therefore the highest note which can be produced on Channel A by the tone generator is given by the following commands:

SOUND 0,0
SOUND 1,0

and the lowest by:

SOUND 0,255
SOUND 1,15

computer peripherals...

Just look at some of our prices!
ALL KINDS OF PRINTERS:

3000 TEC MS AVAILABLE! SEND NOW FOR YOUR FULL PRICE LIST SAVE POUNDS ON ALL YOUR OFFICE AND HOME CONSUMABLES! 24 HOUR DELIVERY

BROTHER EP44 — THE QUALITY SILENT AFFORDABILITY

EP44 ACCESSORIES:
EP44 TYPEWRITER PRINTER £230
EP44 BLACK CASSETTE RIBBON (MIN 3) £2.23
EP44 THERMAL PAPER — 100 SHEETS £4.89
EP44 PLAIN PAPER — 100 SHEETS £2.24
EP44 ROLL PAPER HOLDER £6.84
EP44 THERMAL PAPER ROLL £4.03 EP44 PLAIN PAPER ROLL £2.88
(£1.00 TOTAL P&P PER RIBBON/PAPER ORDER)

SEIKOSHA COLOUR MATRIX PRINTER — 7 COLOURS

GP700A	£378
GP250X	£202
GP100A	£145

STAR DELTA-10 PRINTER

GEMINI 10 120cps/80COL	£236
GEMINI 15 120CPS/132COL	£340
DELTA 10 160CPS/80COL	£378
DELTA 15 160CPS/132COL	£511

JUKI 6100
Amazing Daisywheel Printer capable of 20CPS print speed, all Wordstar features, emulated diablo photocolours
JUKI 6100 WITH 2K BUFFER — **£378**

PROTECT YOUR FLOPPY & MINI DISKS WITH OUR LOCKABLE BOXES

M35 5¼"×40	£16.10
M85 5½"×90	£21.85
F40 8"×40	£23.00
F90 8"×90	£34.50
MD60 3½"×60	£18.40

Please add £1.95 P&P per box

BROTHER DAISYWHEEL PRINTERS

MODEL	PRICE
HR1	£283
HR15	£417
HR25	£710

Please specify if Senal or Centronics interface required

SMITH CORONA AUTHORISED DISTRIBUTOR

Fastex-80 80cps/80col	£185
D-100 120cps/80col	£235
D-200 160cps/80col	£396
D-300 160cps/132col	£523

MANNESMANN TALLY AUTHORISED DISTRIBUTOR

MT80 80cps/80col	£228

☐ ALL PRICES INCLUSIVE OF 15% VAT
☐ PLEASE ADD £8 FOR P&P AND INSURANCE
☐ PLEASE ADD £1.95 P&P PER DISK BOX ORDERED

CONWAY is a maxell Distributor
SEND FOR OUR PRICE LIST NOW!

● PRINTER RIBBONS ● TYPEWRITER RIBBONS ● TELEX RIBBONS ● PRINT WHEELS ● DOT MATRIX PRINTERS ● DAISYWHEEL PRINTERS ● INK JET PRINTERS ● GRAPH PLOTTERS ● CABLES ● DISKETTES ● MAGNETIC TAPES ● CONTINUOUS STATIONERY ● BESPOKE STATIONERY ● COMPUTER LABELS ● STORAGE MEDIA ● FIREPROOF CABINETS ● PRINT-OUT CABINETS ● OFFICE SUPPLIES ● ANTI-GLARE FILTERS ● CLEANING KITS ● COMPUTER FURNITURE ● BESPOKE SOFTWARE, ETC

AND MUCH MORE!

HOW TO ORDER
You may purchase any of the items listed by MAIL ORDER ONLY. All you have to do is list your requirements on a piece of paper and post to us with your cheque or PO made payable to CONWAY COMPUTER SERVICES LTD. Allow 7 to 14 days for delivery

CONWAY COMPUTER SERVICES LTD. Tel: (01) 800 1796
OPEN AN ACCOUNT NOW! SAVE POUNDS!
DATA PROCESSING SUPPLIES & PERIPHERALS
39 CONWAY ROAD, LONDON N15 3BB

MSXC12.84

GoldStar

MSX COMPUTERS

Also authorised dealers for

TATUNG and MEMOTECH

Wide range of computers, software and accessories for the home and small business user. (Please send large SAE for list, stating interest).

COMMUNICATION SPECIALISTS

★ ★ SPECIAL OFFER ★ ★

Commodore SX64

Portable computer with free-easy script, easy file, future finance and high flyer.

£729.95 (inc. carriage)

SOFTWARE CENTRE
52a Bromham Road, Bedford, Bedfordshire
Tel: (0234) 44733

S.P. ELECTRONICS

for MSX

Specialists in software and associated peripherals

TOSHIBA

48 Linby Road, Hucknall, Notts.
Tel: 0602 640377

To calculate the frequency (in Hertz) of these waves from the wavenumber, the following formula may be used.

$$f = \frac{1789800}{(16 \times W)} \text{ (Hertz)}$$

Where 1789800 is the clock frequency of the PSG in Hertz. You can also use this formula to find the appropriate wavenumber for a particular frequency. The following short program calculates the fine and coarse tune register settings for any input frequency.

```
10  INPUT "FREQUENCY IN
    HERTZ" ; F
20  W=INT (1789800#/
    (16*F))
30  PRINT "FINE
    REGISTER" ;W MOD 256
40  PRINT "COARSE
    REGISTER" ;W DIV 256
```

If you run this program and input a frequency of 1500Hz, you'll find that the correct setting for the fine register is 74 and for the coarse register is 0. So, to output this tone from Channel A you'll need the following short program:

```
10  SOUND 0,74
20  SOUND 1,0
30  SOUND 8,15
40  SOUND 7, &B00111110
```

The first three lines set up the registers, line 40 just enables Channel A to emit a tone. To stop the sound press <CTRL><STOP>, or alternatively add a delay loop, to give you time to hear the sound, and then end with:

```
SOUND 7, &B00111111
```

to turn off Channel A.

Register 6: the noise generator

Register 6 controls the frequency of the noise generator. This register can hold any number between 0 and 31. The lower the number the higher the pitch.

The next program illustrates this. White noise of decreasing pitch is generated through Channel C:

```
10  SOUND 10, 15
20  SOUND 7,&B00011111
30  FOR N=0 TO 31
40  SOUND 6,N
50  FOR DELAY=0 TO 300:
    NEXT DELAY
60  NEXT N
70  SOUND 7,&B00111111
```

Registers 8, 9, 10: volume control

Register 8 controls the volume for Channel A, Register 9 for Channel B and Register 10 for Channel C. These registers can be set to any value between 0 and 16. There are, however only 16 volume levels corresponding to register settings 0 to 15. When set to 0, no sound can be heard.

Registers 11, 12, 13: envelope

When the envelope registers are not used, the sound emitted stays constant at the same pitch and volume as determined by the registers 0 to 6 and 8 to 10, which is rather dull. It is however, possible to change the amplitude of the sound periodically, using Registers 11, 12 and 13, to produce more exciting effects.

This is done by superimposing an envelope upon the original wave. The shape of the envelope can be selected by setting Register 13 to a value between 0 and 15. However, there are only 8 different envelope patterns available on the MSX, so some of these register settings produce the same effect. Figure 6 shows this.

The envelope period can be varied using Registers 11 and 12. Both registers can be set to any value between 0 and 255. Register 11 sets the fine period change, Register 12 the coarse. The overall period is given by:

p=(Register 12) + (Register 11) × 256

Although only one envelope can be defined at any one time, each of the three channels can use this envelope simultaneously. For example:

```
10  REM gong
20  SOUND 0, 170
30  SOUND 1, 15
40  SOUND 2, 190
50  SOUND 3, 15
60  SOUND 4, 200
70  SOUND 5, 15
80  SOUND 8, 16
90  SOUND 9, 16
100  SOUND 10, 16
110  SOUND 11, 250
120  SOUND 12, 250
130  SOUND 13, 9
140  SOUND 7,
&B00111000
150  FOR DELAY=1 TO
5000:NEXT DELAY
160  SOUND 7, 63
```

Bit	B7	B6	B5	B4	B3	B2	B1	B0
Channel			C	B	A	C	B	A
Generator				NOISE			TONE	

Figure 2: The last two bits are not used

Bit	B7	B6	B5	B4	B3	B2	B1	B0
Channel			C	B	A	C	B	A
Generator				NOISE			TONE	
State	—	—	OFF	ON	OFF	ON	OFF	OFF
	0	0	1	0	1	0	1	1

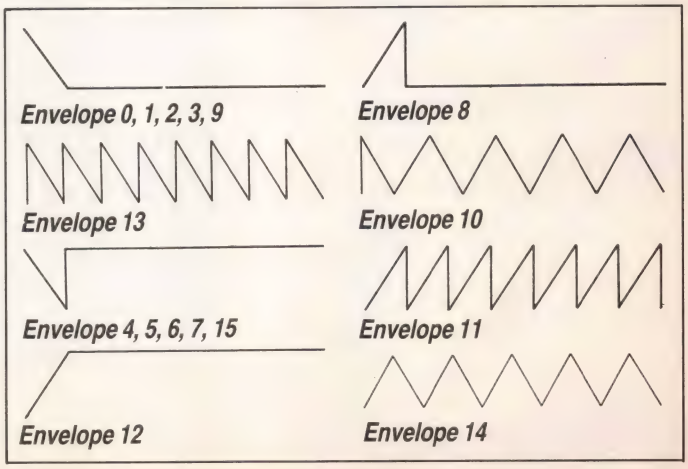
Figure 3: Noise from channel B, sound from channel C

Bit	B7	B6	B5	B4	B3	B2	B1	B0
Channel			C	B	A	C	B	A
Generator				NOISE			TONE	
State	—	—	ON	ON	ON	ON	ON	ON
	0	0	0	0	0	0	0	0

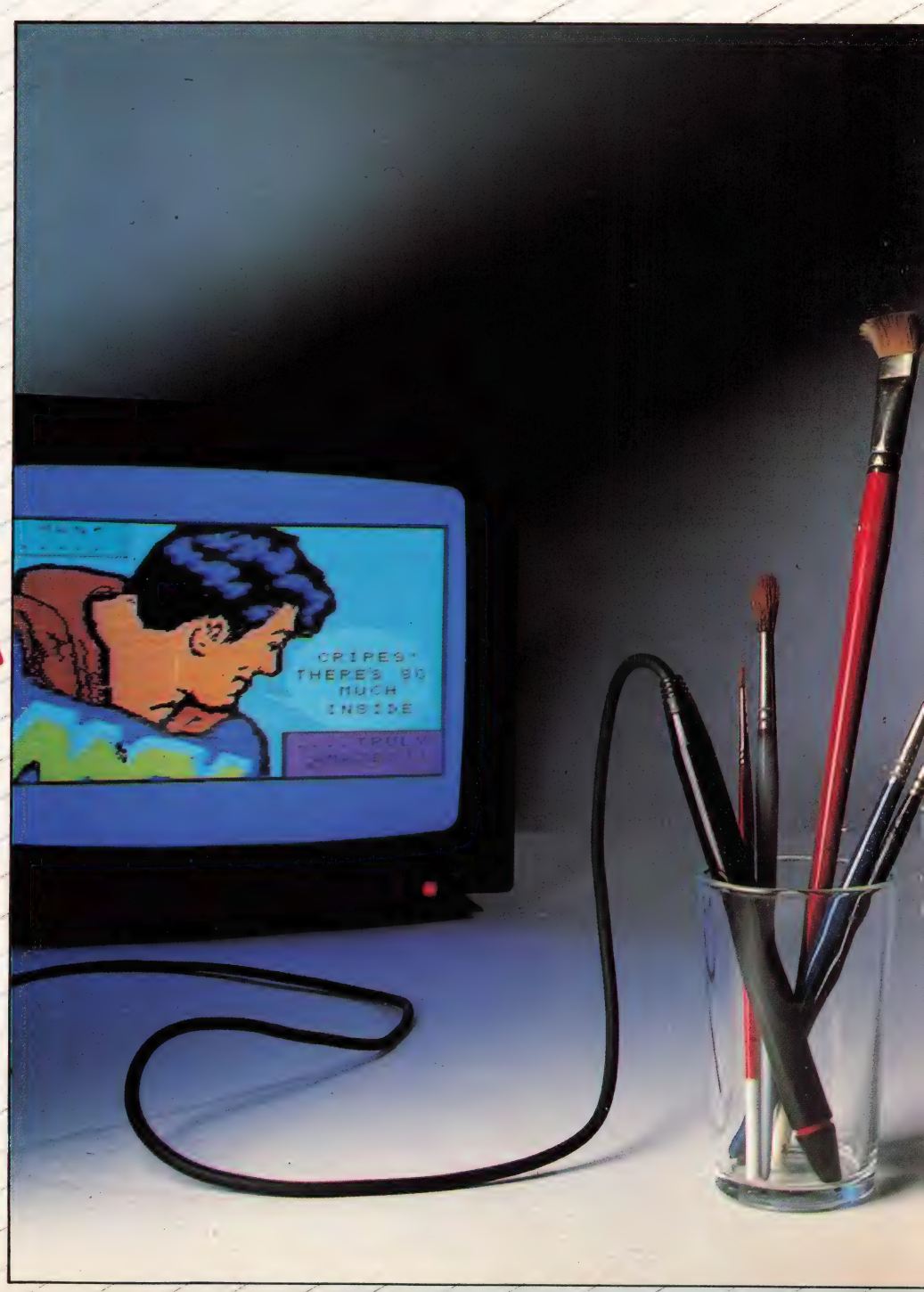
Figure 4: All channels emitting sound and noise

Register	Frequency	Range	Channel
0	FINE	0 — 255	A
1	COARSE	0 — 15	A
2	FINE	0 — 255	B
3	COARSE	0 — 15	B
4	FINE	0 — 255	C
5	COARSE	0 — 15	C

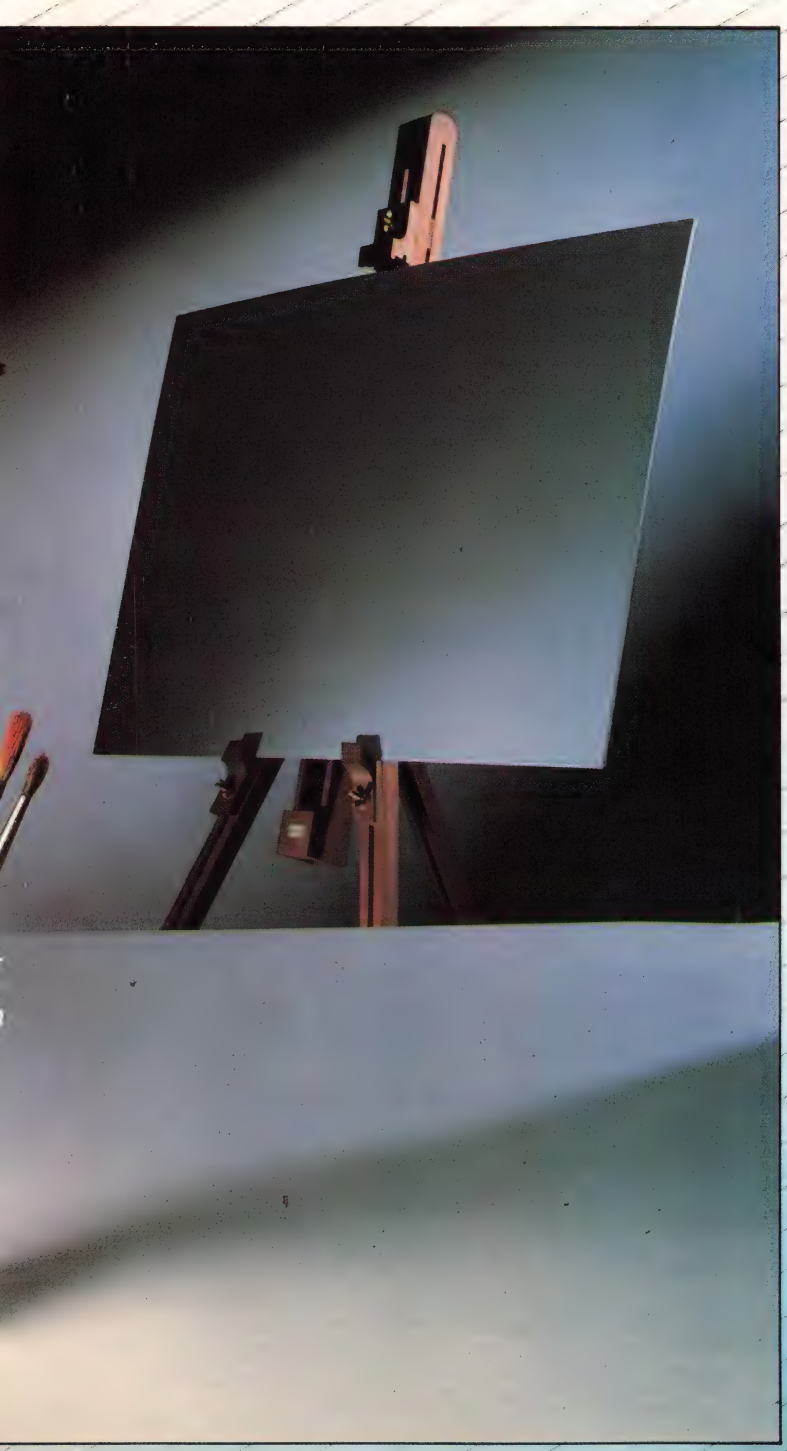
Figure 5: Coarse and fine tuning ranges



FANTASTIC



TASTIC



Lightpens and graphics tablets can add a new dimension to your micro

Ever fancied yourself as a budding Leonardo? Well, one of the most compelling features of the latest generation of home micros is their powerful graphics.

Using a few simple commands the home computer user can very quickly produce designs, exotic patterns and colourful animated graphic sequences.

Manufacturers are busy making such graphic effects more easily accessible with the development of such input devices as lightpens and graphics tablets.

These tools allow more direct and tactile control of screen graphics without the need for detailed programming knowledge.

Lightpens are not new, they have been around since the dawn of computers, helping users indicate menu choices and create diagrams.

What are new are lightpens, packaged together with software, geared towards education, entertainment and graphic art.

A lightpen looks very much like an ordinary fountain pen with a cord that connects it to the computer. It lets you interact directly with what you see on the monitor, turning the TV screen into a canvas or sketch pad for drawing or painting.

A system which bypasses the keyboard is obviously going to be particularly useful for use with young children. Working with a lightpen is very similar to colouring with a wax crayon or pointing a finger. Children don't need the ability to read or recognise shapes that using a keyboard demands.

And as they are so easy to use, lightpens are particularly beneficial for handicapped or disabled people, young or old.

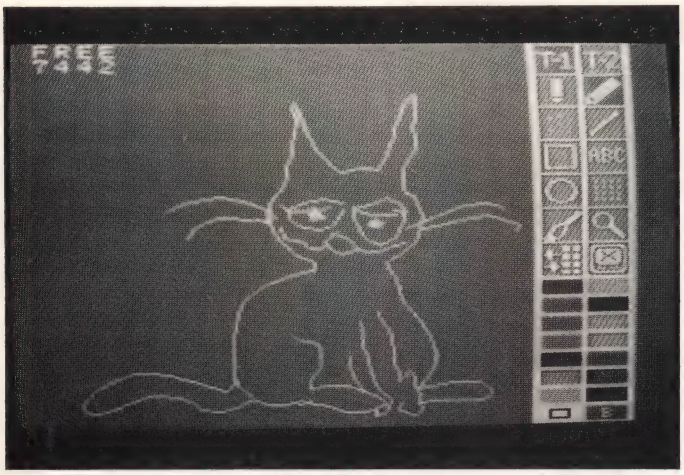
Of course, lightpens aren't just for kids. Anyone remotely interested in computer graphics should see for themselves what a lightpen can do.

A graphics program together with a lightpen is like a word processor in that they both offer the same ease of revising creations.

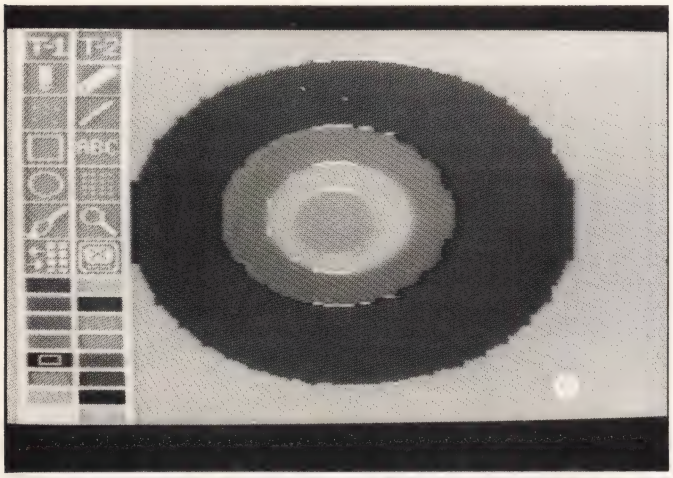
You can try a colour then erase it if you don't happen to like the way it looks. Would a wide brush stroke be more effective or should you fill in the shape with a geometric pattern? Both methods can be tried on two different versions of the same picture. With a lightpen you simply point to the part of the picture you wish to change, and away you go.

Lightpen graphics programs have surprisingly sophisticated design capabilities. For instance, some let you enlarge a portion of the picture and work on details pixel by pixel.

Many help you create incredibly accurate geometric



Our first attempt. The panel is the main function menu



Filling shapes with colour is easy, if a little slow at times

shapes within the original picture. You won't be able to use the old excuse that you can't draw a straight line!

The quality of a lightpen is usually determined by its resolution, or degree of accuracy. When you hold a lightpen in front of a screen, a lens in its tip catches the light from the monitor's scanning beam and sends it to a photoelectric cell in the pen.

The photocell creates an electrical impulse which the computer synchronises with the scanning beam to determine the location you've selected with the pen.

Once established, the computer sends the location (usually expressed in X, Y co-ordinates) to the graphics software which then knows what portion of the image you want to modify.

Enough light must reach the photoelectric cell to trigger this process. If the photocell isn't very sensitive the lightpen must use a larger lens. Unfortunately some larger lenses accidentally capture light from neighbouring picture elements and give the computer inaccurate co-ordinates. This often happens with low resolution pens.

Your computer also effects the degree of resolution you can expect from a light pen. For example, an IBM PC provides twice as much resolution as Commodore or Atari computers. TRS-80 computers cannot store X, Y co-ordinate information at all, so users have to place a flashing character on the screen for the lightpen to read, a requirement that limits resolution to the number of characters on the screen.

Another factor which affects the overall performance of a lightpen is its on/off switch, which can be either a mechanical part of the pen or incorporated into the software.

With a mechanical switch, you usually push a button on the side of the pen, touch a specific key, or touch the tip of the pen to the screen to select a location on the screen.

An automatic software switch means that the program constantly checks the screen location and assumes you've selected a location when the pen stops moving.

Graphics tablets are another way of creating detailed graphics without having a background

THE SANYO LIGHT PEN

Sanyo is currently the only MSX manufacturer to offer a lightpen. Priced at around £90 it may sound a bit expensive but having borrowed one for a couple of weeks we found that it has a lot to offer.

Once you've sorted out how to connect the pen, the rest is a piece of cake! With the computer switched on, a menu appears in a matter of seconds showing table T-1, offering a choice of 12 functions and 15 colours.

This first table is specifically for free drawing and designing. Any shape and size can be drawn; straight lines, circles, and rectangles are easily created with just a couple of presses of the lightpen.

By simply touching the screen with the pen you can colour in a square, draw a thick line instead of a thin one and erase the drawing altogether if you're not entirely satisfied with the end result.

One of the most useful functions is the zoom or enlargement feature. This magnifies a specific portion of the drawing eight times, and elaborate corrections can be easily made.

To display all your drawings within programs, save them on tape or dump them to a printer, the conversion table needs to be utilized. This is done by touching the lightpen on symbol T-2 on the main menu.

Like the main menu the conversion table also contains a set of 12 functions which include three different ways of saving and loading illustrations on a cassette/data recorder:

'BASIC save/load' converts a drawing into an EXPANDER BASIC program and saves it to a cassette recorder.

EXPANDER BASIC is an extra command facility stored in the lightpen unit in addition to MSX-BASIC. There are four EXPANDER BASIC instructions; Bold Line, Super Paint, Light Line and Super Point Set. These add to the graphics facilities already available.

'BASIC save load' is a particularly useful command as it enables a saved picture to be combined within another BASIC program. You could, for example, use a picture as a background for a game.

'Program save/load' instructs the computer to memorize the steps which created the illustration in the correct order as a collection of data — that is, according to the kinds of instructions (circle, square etc) and their co-ordinates.

For example, if you draw a circle and then a square round it and a triangle around the square, they will be reproduced in the order that you first drew them.

'Screen save/load' instructs the computer to store just the screen information about your drawing (colours, dots

knowledge of programming. The way they do this, though, is rather different from lightpens.

Professionals such as designers of cars, aeroplanes and even fashion wear have been using various types of graphics tablets for quite some time.

Once their basic designs are safely installed inside the computer's memory, additions and alterations can be tried without wasting valuable raw materials.

Only recently have reasonably low cost tablets like the Touchmaster (£145), Cumana (£69.95) and Atari's touch tablet (£49) become generally available to the home user.

Graphics tablets are also known as digitizers because they convert analogue shapes and images to digital information to produce the picture on the screen.

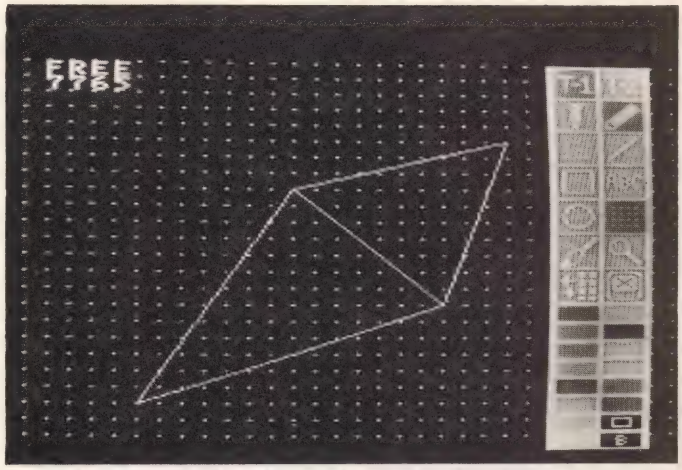
All digitizers feature a flat baseboard, onto which the image (drawn or painted) is laid. A stylus, which may be an ordinary pen or an electronic device that looks like an ordinary pen, is then traced over the image.

The position of the stylus is detected by the digitizer and transmitted as a changing pair of co-ordinates to the computer.

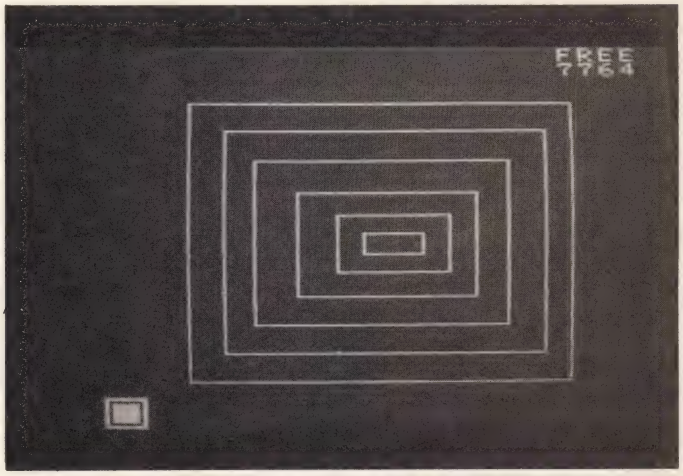
The most accurate system can resolve an image to around ¼mm (1/100th of an inch) — sufficiently accurate for any engineer or draughtsman.

A graphics tablet can also be used as an editing tool, allowing colour to be added or changed and shapes to be modified. The surface of the tablet can be programmed to act as a menu that selects standard options from the program so that the keyboard need only be used for selecting the main functions. Most efficient computer animation systems that have been developed have high quality graphics tablets as their main form of input.

Whether you are an artist, a parent or simply a believer in computer magic you could find a lightpen or graphics tablet very useful. Not only can they help keep open the line of communication between you and your computer, but they can also be great fun to use. And this is usually enough to justify the (sometimes) high price.



Special straight-line functions make precise drawing easy



N-FIRST IMPRESSIONS

and other expressions) as a block data.

This time the instructions are not saved. When you re-load a program-saved picture, you see it being redrawn from the beginning.

A screen-saved picture forgets everything that went before, and when you re-load it simply restores the final picture intact. The biggest advantage is that when the picture is loaded you still have the maximum amount of memory at your disposal.

Being able to convert your drawing into a BASIC Listing is a very useful feature. It provides you with an instant listing, which can save a lot of time particularly if you're a busy designer.

On-screen illustrations can be copied straight onto a printer once the copying size (8×7cm or 16×14cm) has been specified.

But in practice we found this wasn't so easy. We tried hooking a Canon printer (PW 1080A) to our Sanyo MPC-100 with lightpen attached and nothing happened. A quick phone call to Sanyo revealed that the printer has to be configured to graphics mode in order to dump the drawings. Be warned — this is not explained at all in any of the manuals.

The scrolling function is another useful aid. It allows drawings to be shifted to the right or the left of the screen. This trick provides for fairly crude animation-like movement too.

Although we enjoyed using the lightpen there were a couple of annoying features, but maybe our expectations were just too high.

For instance, when drawing straight lines they appear slightly jagged when closely examined. But according to Russell Fawlks, Sanyo's customer sales support manager, 'This is perfectly normal even with a very high resolution graphics system.'

The other annoying feature is the inability to erase mistakes. For example if you draw one too many lines on a red background, the system doesn't allow you to simply rub out the offending line. Instead you have to revert to the background colour which in this case is red and colour over the mistake, an operation which uses up a lot of memory.

The problem is compounded when you decide to change your background colour, to, say, blue. The part that's been covered over will then show up on the blue background as a horrible red mess!

The solution to the problem is relatively simple — plan what you're going to do before you do it.

Overall, the lightpen can be a very useful addition and it creates some pretty spectacular effects which are limited only by your own imagination.

FUTURE MUSIC

202 NEW KINGS ROAD,
FULHAM, LONDON SW6
(OPP. PUTNEY BRIDGE TUBE)
Tel: 01-731 5993

10 BADDOW ROAD,
CHELMSFORD,
ESSEX
Tel: 0245 352490

104-106 ELM GROVE,
SOUTHSEA, PORTSMOUTH,
HANTS.
Tel: 0705 820595

85 ST. MARY'S STREET
SOUTHAMPTON,
HANTS.
Tel: 0703 26798

INSTANT CREDIT AVAILABLE
(SUBJECT TO STATUS)

ALL PRICES SHOWN
INCLUDE VAT

NEW!

YAMAHA CX5 MUSIC COMPUTER

If you're looking for a personal computer to make music, look no further! Yamaha's amazing CX5 offers the same incredible FM sound synthesizer quality as its famous DX synthesizer series! Plus all the features of the innovated MSX computer system!

CX5M Music Computer

The CX5M is an extremely versatile computer specifically designed for a wide range of music generation, programming and editing tasks, and for interfacing with other Yamaha digital instruments and components. The CX5M is a MIDI compatible computer, allowing it to serve as a control centre for playback and automatic sequencing of the Yamaha DX series synthesizers, RX drum machines and other MIDI compatible equipment.

The CX5M also has a Yamaha digital FM voice generator built-in — the same type of voice generator that has put our DX series Digital Programmable Algorithm Synthesizers at the forefront of the digital keyboard field. That means it is capable of producing rich, realistic sounds that are almost indistinguishable from acoustic instruments. In fact, 46 fine voices are provided pre-programmed. But you can also program your own to create virtually any voice you like. And you can save your original voices on a standard cassette tape.

A wide range of applications programs, interface units and accessories expand its music making potential enormously.

Sophisticated Music Software YRM101 FM Music Composer
This optional program cartridge is a must for all composers and arrangers. It is simply the most sophisticated, versatile, easy-to-use music composition and arrangement package in its class. You get an on-screen music staff onto which you "write" notes by inputting them either from the computer keyboard or directly from the music keyboard. The ability to input notes from a piano-type keyboard is a real bonus for musicians. Up to eight parts can be entered, and each part can be assigned a different "instrument". You can use the superb pre-programmed FM voices in the CX5M, or voices you have programmed yourself. You also have full control over time signature, key signature, tempo, dynamics and phrasing. What's more, any parameter can be changed at any time during the piece. Of course, your compositions can be saved on a standard cassette recorder and reloaded whenever needed.

Furthermore, compositions written on the FM Music Composer can be used to "sequence" MIDI synthesizers, drum machines, etc via the CX5M's MIDI interface. The possibilities of this software package are virtually endless.

YRM102 FM Voicing Program
This program gives you precise control over the CX5M digital FM voice generator to edit and alter the pre-programmed voices or create totally new voices of your own. The FM voice generator employs 4 operators, each with a sophisticated envelope generator, and a choice of 8 algorithms (different configurations of operators with different modulator-to-carrier relationships). The YRM102 FM Voice Program lets you precisely set all parameters relating to the operators and algorithms, as well as extras like amplitude and pitch modulation, LFO waveform, keyboard scaling, transpose, etc. With a little practice you should be easily able to program just about any voice you can imagine. Save your original voices on any standard cassette recorder, and build up an original voice library. Voices you create can be used in arrangements created with the FM Music Composer program.

YRM103 DX7 Voicing Program
DX7 owner's, here is the key to easy DX7 voice programming. This program displays all DX7 voice parameters right on the video monitor, and lets you program from the CX5M computer keyboard. The data is transferred to the DX7 via the built-in MIDI interface. Voice parameters are displayed in easy-to-understand graph form. For example, when programming envelope generator parameters you can actually see what the programmed envelope curve looks like, rather than having to think entirely in terms of numbers. The DX7 voicing program makes programming the DX7 so easy, that even if you're not interested in the CX5M's other capabilities, it's worth having one just to program your DX.

YRM104 Music Macro
The Music Macro is for people who want to incorporate top-quality musical voices into their BASIC computer programs. The Music Macro adds a special set of commands to the CX5M MSX BASIC language, permitting control of the digital FM voice generator from within BASIC programs. This makes it possible to program games or audio/visual type programs incorporating music or sound effects using FM voices for real quality and impact.

£599 inc VAT

System includes CX5 MSX computer, YK01 Mini keyboard, YRM12 FM voicing software and FM cartridge hardware!

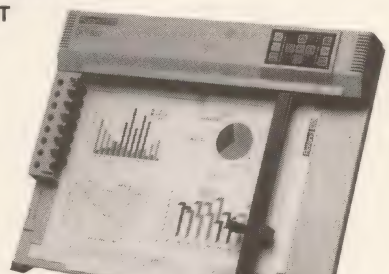
NEW!

ROLAND DG DXY880 INTELLIGENT XY PLOTTERS

Incredible sophistication and unbeatable price of £699 inc VAT

Quick and Accurate. The DXY-880's maximum plotting speed is 200 millimetres per second in all plotting directions. Thus, the DXY-880 ensures stable line quality at all times. The DXY-880 plots with a resolution of 0.05 millimetres per step. The graphics produced by the DXY-880 are excellent, even when projected on a screen by an overhead projector.
Compact. The DXY-880 has an effective plotting area of 380×270 millimetres (ANSI B or DIN A3 size). But the complete unit is only 553 millimetres wide and 435 millimetres deep. Furthermore, the DXY-880 can operate on a 60-degree incline to minimise installation space using a stand. The stand can be folded up inside the body when not in use. And the DXY-880 weighs only 4.3 kilograms so you can easily carry it anywhere.
Compatibility. The DXY-880 has both Centronics parallel and RS-232C serial interfaces. It is compatible with the IBM PC, Apple and other micros. The DXY-880 can also operate on most programs written for the H-P 7470, H-P 7475, and our DXY-800. The Lotus 1-2-3, pfs Graph, and BPS are only a few examples. New software will be introduced to the market continually. For the user who wants to write a program by himself, DXY and RD-GL commands are provided.
And Much More. Roland DG also supplies a variety of options, including an overhead transparancy kit, several kinds of pens, and connection cables. Use the Roland DG's optional accessories to create beautiful graphics.

DXY-880 SPECIFICATIONS. Plotting area: X-axis 380mm, Y-axis 270mm. **Plotting speed:** 200m/sec in all directions. **Recording paper size:** 420×297mm (ISO A3) 17×11in (ANSI B). **Recording paper setting:** Paper holder and magnet strip. **Resolution:** 0.05mm/step. **Distance accuracy:** ±0.5% or less of travelling distance. **Repeatability:** ±0.3mm or less. **Switches:** Pen up/down, Home, Pause, P1, P2, Enter, Position(, <, >,), Fast, Power. **DIP switches:** SW-1, SW-2. **LEDs:** Power/Error, Pen up. **Data buffer:** 3K bytes (expandable to 10K bytes. **International character font sets:** English, German/French, Scandinavian, Spanish/Latin, Japanese, Special Symbols. **Number of pens:** 8 (black, red, blue, green, purple, brown, orange, pink). **Power supply:** AC adapter (DC 9V, 28V). **Power consumption:** 35W. **Operation temperature:** 0°C to 40°C (32°F to 104°F). **Operation relative humidity:** 20% to 80% (no dew forming). **Dimensions:** 533(W) × 90(H) × 430(D) mm (21.0" × 3 1/2" × 16 15/16"). **Weight:** 4.3kg (9.5lb) without AC adapter. **Accessories:** XY-4SPB-WN pen set × 1, XY-4SPC-WN pen set × 1, Magnet strip for holding paper × 2, Positioning seal × 1, XY-4PH pen holder set × 1, AC adapter × 1, Vinyl cover × 1. **DXY-880 INTERFACE SPECIFICATIONS. Centronics Parallel Interface. Input signal:** STROBE (1 bit), DATA (8 bits). **Output signal:** BUSY (1 bit), ACK (1 bit). **I/O signal level:** TTL level. **Transfer system:** Asynchronous. **RS-232C Serial Interface. Transfer system:** Asynchronous, Half-duplex data communication. **Baud rate:** 50, 70, 110, 134.5, 200, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200 or 9600 baud. **Stop bit:** 1 or 2 bits. **Parity check:** Odd, Even, None. **Data bits:** 7 or 8 bits. **Connector:** DB-25S



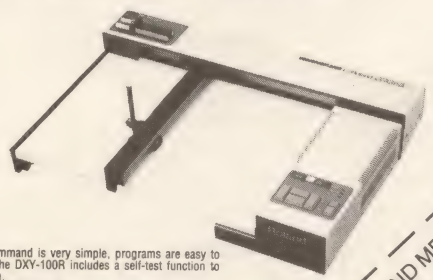
REAR PANEL

SPECIAL OFFER!

ROLAND PLOTTER PRICE MADNESS!! DXY 100R PLOTTERS

Ideal for BBC, Apple, Spectrum, etc ~~£699~~ now only £299 inc VAT

Bulk purchases make these Roland DG DYX100 A3 Plotters available at under HALF PRICE!! With free extension ROM 30 software and one year warranty! Future Music is a main agent for Roland DG computer peripherals. Call us for further information, demonstrations or advice!!



● Plotting speed of 70mm/s, Plots up to 360 × 260mm (14.2" × 10.2")
The DXY-100R, the first of its kind, is offered at an extremely reasonable price. This revolutionary plotter is characterised by full high-performance plotting and tabulating capacity. Quiet operation is an absolute requirement for a practical plotter. The DXY-100R successfully reduces mechanical noise to a minimum. It is suitable for use either at home or in the small-scale office. Effective plotting and tabulating size is up to 360 × 260mm. Since each step equals 0.1mm, calculation during programming is simple.

● Multiple intelligent functions
Fourteen control commands are included in the DXY-100R. The DXY-100R also provides eight vector commands for plotting and tabulating as well as drafting continuous lines, dotted lines and coordinates; five character commands to select English capital or small letters, numerals, various other symbols, and to set their size and slant. There is also a built-in mode command. Since each command is very simple, programs are easy to master, even with BASIC. In addition, the DXY-100R includes a self-test function to quickly check performance and operation.

● Optional ROM for expanded intelligent functions
The DXY-100R has an added intelligent function for graphing, including circular arcs, curves, hatchings, etc. with the optional ROM #1 (XY-0R1). This allows simple programming to generate more sophisticated tabulating. Moreover, with the DXY-100R, it is possible to tabulate original characters such as trade marks and symbols simply by writing them into the PROM (2716).

● Compatible with virtually any personal computer
The DXY-100R can be connected to any computer with Centronics specification printer compatability. Since computer output connectors differ, the DXY-100R is not supplied with connecting cords. Use appropriate connecting cords available separately.

PLEASE SEND ME THE FOLLOWING POST FREE MSXC 285
☐ ROLAND DXY880 ☐ DXY-100R
NAME.....
ADDRESS.....
DEBIT MY ACCESS/BC

SHOPPING AROUND

What can you do if your micro dies on you? We look at the options

When you've still got problems after trying to load a cassette or cartridge for the umteenth time and the keyboard's feigning dead, what do you do?

For starters, take a tip from the *Hitch Hiker's Guide to the Galaxy* . . . Don't Panic!

There are several options open to you. Either take your micro back to the retailer or send it to the manufacturer. But perhaps you ought to make sure it really is broken and not incorrectly connected.

Check out your machine. Make sure that it is switched on and that the red 'Power On' light is illuminated.

Then make sure that all the connecting leads and plugs are clean, undamaged and inserted in the correct sockets. Putting plugs in the wrong sockets happens to us all!

When you have satisfied yourself that your computer is correctly connected up, that you are not using damaged tapes and that your kid brother hasn't stuffed chewing gum between the keys, then's the time to dig out the manufacturer's guarantee and your receipt as proof of purchase.

Once you've got all the necessary bits of paper and the original box your machine was packaged in, take the lot back to the shop you bought it from.

They will then either replace the machine, repair it or send it back to the manufacturers. Or will they?

This is one of the major questions that has been lingering in the back of our minds ever since the launch of MSX computers.

Many of the more established home computer manufacturers like Sinclair, Atari, Acorn and Commodore offer twelve month guarantees and back-up after sales service.

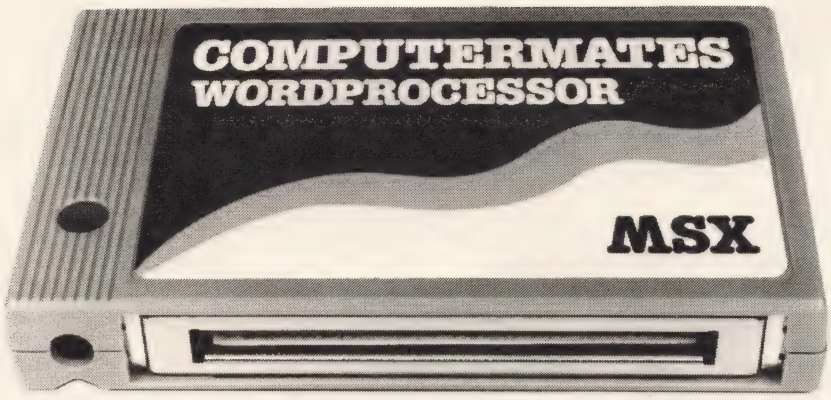
But what of MSX? As it is still a relatively new force in the home computer market we have been wondering what sort of provisions have been made, if any, for dealing with damaged or faulty machines.

So, we have put the likes of Spectravideo, JVC, Toshiba Sanyo and the other major MSX manufacturers under the microscope to see how they shape up.

Posing as potential buyers we actually visited retailers like Curry's, W H Smith's, Dixons and Rumbelows to see what sort of after sales service they were offering in conjunction with the manufacturers.

All the manufacturers we talked to offer a standard twelve month guarantee. This covers faulty parts and general wear and tear.

So, should your micro grind to a halt, and you can honestly say that it wasn't dropped on the floor or left to melt on top



MEET OUR TYPING POOL

It can type letters and reports, personalise circulars, prepare invoices and produce mailing labels. In fact, anything a typing pool can do Computermates Wordprocessor can do in a fraction of the time. You can make as many alterations as you like and it won't answer back!

Computermates Wordprocessor is a software package with a difference.

☐ *First, it's produced to MSX standards so it's compatible with any MSX machine.*

☐ *Second, it's in plug-in cartridge form. That gives you a two second start-up and, because there are no moving parts, it's more reliable.*

☐ *Third, Computermates can store information on tape, floppy disk or Computermates' own MSX Memory Box (Battery Rampack), which makes storage so easy.*

☐ *Fourth, we doubt whether you will find a word processing package which is easier to use.*

☐ *Finally, you can buy it direct from Computermates, a company specialising in the production of MSX software. That means you will get better value for money.*

FOR £49 YOU COULD HAVE YOUR OWN

Simply post this coupon to Computermates, P.O. Box No. 2, Stockbridge, Hampshire SO20 6LE and we'll send you your Computermates Wordprocessor.

Please send me ..... Computermates MSX Wordprocessor cartridges at a cost of £49.00 each including packing and postage.

I enclose a cheque for £ ..... made payable tc Computermates.

Name .....

Address .....

.....

.....

MSXC12.84

of a radiator, any repair work will be carried out under the manufacturer's guarantee.

When a fault does occur with your micro, Spectravideo like most of the other manufacturers expect you to take your machine back to the retailer, and not send it directly back to them.

This is because, under the *Sale of Goods Act,* the retailer who actually sold you the computer is liable for any repairs or correcting any faults. And secondly, many manufacturers just don't have the facilities for carrying out repairs and usually farm them out to independent workshops.

Some manufacturers have actually trained dealers to carry out repair work. Toshiba has made sure that all its retailers selling the HX-10 are fully equipped to deal with any problems.

Each dealer has been supplied with a device called a Test ROM I which can be slotted into the machine's cartridge slot and will then indicate where the fault is, so that minor repairs can be carried out.

Toshiba will shortly be issuing all its dealers with another fault finding gadget, Test ROM II, which will plug straight into the Z80 socket. Dealers will then be able to carry out all repairs.

Sony and Spectravideo include a specially devised check list inside each box which includes questions like 'is there a problem loading the cartridge' and a gummed pre-paid label.

Steve Dowdle, Sony's computer and hi-fi manager, doesn't expect users to have any problems with the Hit Bit. But he admits that: 'From time to time things do go wrong'. When that happens, users fill in the detailed questionnaire indicating the problem and send the machine back.

Unfortunately we could not get hold of anyone at Mitsubishi, but its machines also come under a standard twelve months guarantee.

When we approached JVC, it was quite adamant about company policy. Dealers are expected to take full responsibility for repairs and faults. We were even quoted parts of the *Trade Descriptions Act* and the *Sale of Goods Act.*

Tony Wright in the company's customer services department told us: 'Computers do break down — all hi-tech products do — and we expect our dealers to initially sort out the problem'.

Many of the retailers that sell MSX micros such as WH Smiths, Curry's and Dixons,

'Our advice is that before you buy make sure the retailer is capable of handling any problems'

all offer their own guarantee in addition to the manufacturer's.

Several retailers have their own service departments to carry out repairs or if this isn't possible machines are re-routed back to the manufacturer.

Others like WH Smiths farm out guarantee work to independent service agents like Interservice Electronics in Southend.

Interservice effectively take over and honour Smiths' guarantee as long as the machine has not been 'damaged by accident, undue wear and tear, misuse, neglect or incorrect adjustment or modified by anyone else'.

This is standard practice, so if your micro does break down don't be tempted to get out a screwdriver and try to fix it yourself. If you do, you'll automatically invalidate the guarantee.

Having been told by most of the MSX manufacturers that the retailers would take responsibility and carry out repairs, we decided to follow this up and see what policy the retailers had adopted.

Most of the high street stores agreed with the manufacturers and will either repair the fault, replace the machine with a new one or send it back to the manufacturer.

However, Curry's in Shepherd's Bush appear to have a different policy. According to one of its sales assistants if you buy a Toshiba HX-10 from them and it doesn't work, Toshiba will send out one of its vans to your home to carry out the repairs.

It sounded too good to be true, so we rang Toshiba's Chris Greet who told us: 'That's not the case — they are obviously not aware of our policy'. We think someone ought to tell Curry's the policy as they appear to have got it wrong.

The top people's store down in Knightsbridge (*Harrods* to the uninitiated) doesn't offer its own guarantee, but will automatically replace faulty machines or send them back to the manufacturers.

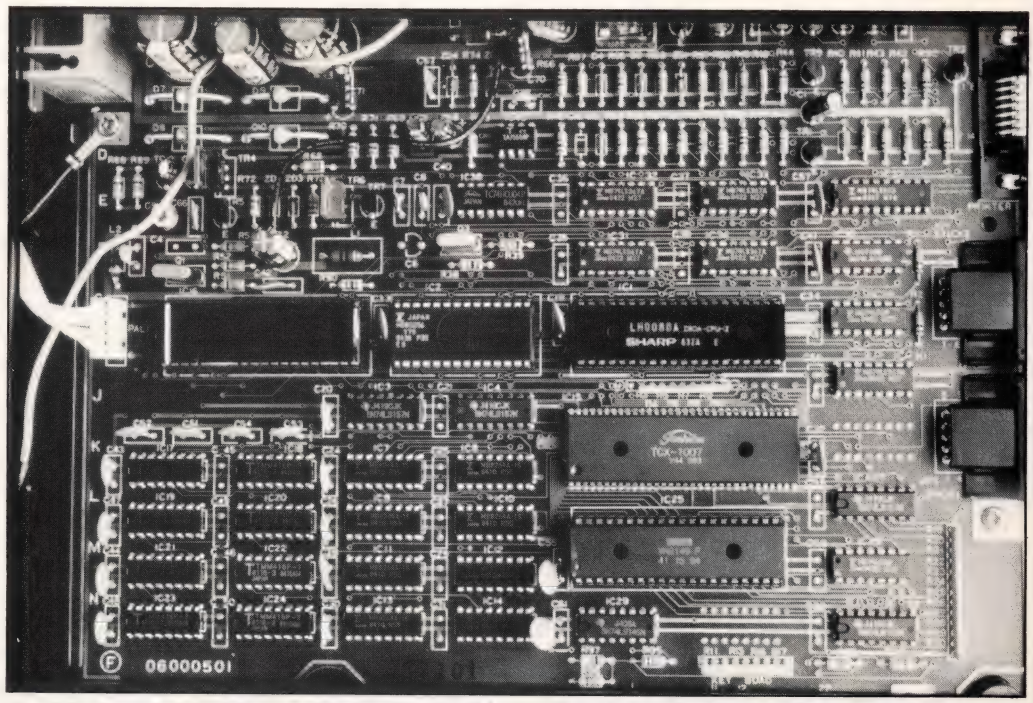
And D G Leisure Centres has also adopted the same policy. A spokesman told us that, normally, a replacement will be supplied without any quibbling.

As we'd heard so much about consumer rights from many of the retailers we contacted our local Trading Standards Department.

The Trading Standards Officer told us that British consumers are extremely well protected. And he said: 'Anything that you buy must be of merchantable quality. In other words, it has got to do the job it was designed for'.

Our advice is that before you buy make sure that the retailer is capable of tackling any problems and is not going to leave you high and dry.

Make sure, before you part with any money, of your supplier's ability to respond to any problems you might have.



Don't be tempted to take a soldering iron to this lot! Repairs are best left to the experts

REIDY'S BLACKBURN

LANCASHIRE'S HI TECH DEALER PRESENTS
THE AMAZING NEW YAMAHA CX5

★ 8 NOTE POLYPHONIC SYNTHESIZER (DX9) ON BOARD
★ 64K RAM MICRO COMPUTER
★ 32 SPRITES

★ LANGUAGE — BASIC
★ 16 COLOURS
★ FULLY COMPATIBLE WITH ALL OTHER MSX PERIPHERALS

COMPLETE WITH DX SOUND MODULE
WITH 4 OPERATORS AND 8 ALGORHYTHMS
49 NOTE KEYBOARD (8 NOTE POLYPHONIC)
WITH VARIABLE MONO/POLY SPLIT AND 48 PRESET SOUNDS

Compose and write your own music without any musical knowledge and the CX5 will play it for you

Telephone: (0254) 65212 and ask for Paul for details and a demonstration

9-11-13 PENNY STREET, BLACKBURN, LANCS

MUSIC MAKER

Just to let you know, we've decided to take over the computer market.

We're proud to announce the launch of our first computer.

JVC MSX

MSX is a trademark of
Microsoft Corporation

IN THE NET

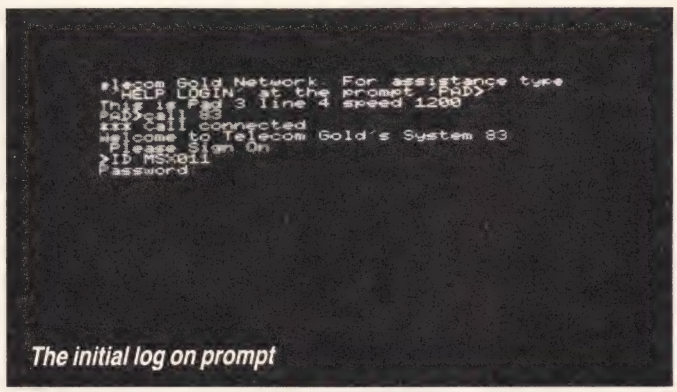
Now your micro can talk to others, just by picking up the phone

Don't look now, but there's going to be a lot of people with MSX computers out there. That means a lot of people who might want to help you with your programs, swap ideas, discuss the meaning of life or even buy you a drink.

Fortunately, there's an easy way to get in touch with other MSX micro users. A network has been set up specifically for MSX owners, so that they can send each other messages, read the magazine sections, download software and generally make the most of their machines.

Not surprisingly, the system is called MSX-NET. It's part of the Telecom Gold service, although the MSX part itself is run by a private company.

Telecom Gold is based around the concept of mailboxes. When you join, you're given a mailbox ID, which in this case will begin with the letters MSX. This is a bit like a telephone number. Anyone on the system can send messages to you simply by quoting this ID.



The initial log on prompt

Usually you will see ID numbers printed with another two-figure number at the beginning. For example, *MSX Computing*'s mailbox is 83:MSX013. The first number simply refers to the particular system that the mailbox is held on. All MSX-NET numbers start with 83. But if the mailbox you want to get through to is on another system (82, for example), don't worry. Prefixing the mailbox address with the system number will make sure your message gets through.

This means you can communicate with anyone on Telecom Gold or other Dialcom systems, not just in the UK but in 37 countries worldwide. Incoming and outgoing mail can be filed on the central computer, and a spelling checker is available.

This checker can also be used with text files. You can create and edit files on the system which can later be called up and sent as mail or printed out.

The Telecom Gold system is based around large mainframe computers. In addition to handling mailboxes, these also hold a large number of other files. For example, you can find technical, scientific and mathematical programs and information.

These files are held in a huge database, including up to 40 mainframe computer games. The quality of these is variable, and some of them use crude graphics which won't work on a 40 column display. But others are great fun, especially the adventures.

But possibly of most interest to the home micro owner is the electronic publishing area. This is where you'll find information of special interest to you.

For a start, there's daily news covering not just computers but all areas of electronics, including hi-fi and video. Added to that, there's also a listing of all MSX computers, software and peripherals currently available.

Here at *MSX Computing* we'll be running our own part of the system. Full details will be announced when we finally go online in the New Year, but we can give you a taste of what we'll be offering.

To begin with, you'll be able to find out what's in the current issue, and get an idea of what you'll see in forthcoming ones.

To help you get the most out of your machine there'll be a section on programming hints and tips. Hopefully most of these ideas will come from you, the readers, so if you know something that might help others, let us know.

Another hints and tips section will deal with games. If we hear of anything interesting coming up we'll let you know straight away. Should you find out how to get a high score with *Time Pilot*, tell us and we'll pass it on.

The 'NET will also give us an opportunity to tell you all the latest news and gossip from the industry as it happens. Finally, you'll be able to send us your hints, tips, comments, praises and insults via the network, using our reader reply mailbox (83:MSX013).

As MSX-NET expands, so will the services we will be offering. It's quite possible that in the future we will be able to provide software downloading, including the listings in the current magazine.

The system is extremely versatile, making use of a large vocabulary of interactive commands, rather than the very passive, menu-driven approach of Prestel. Once you've signed-on you're presented with the system prompt. To get into the mailbox area you just type MAIL. Or if you want the electronic publishing area, type MSXMAGS.

In fact, there's a vast number of commands. Some take you to different areas of the system, while others allow you to configure the output to suit your terminal.

Although Telecom Gold is complex, you'll find that you only have to use a few commands. The rest are there in case you need them.

It can be fun experimenting with the system. For example, late one night I typed ONLINE to see who else was accessing MSX-NET at that time. The computer responded with the mailbox number of MSX-NET's system manager, Trevor Preece, who was also burning the midnight oil.

I then typed CHAT followed by his mailbox number. This caused my number to be flashed up on his screen. All he then had to do was respond with CHAT and we were into a two-way, real-time conversation.

CHAT is a good way of meeting like-minded strangers. But it's important that protocols are observed. To let the other person know when you've finished typing you should type an extra carriage return, giving a blank line, or hit CTRL G, which sounds a beep on his/her machine.

By this time you're probably wondering how you go about getting on to MSX-NET. Well, before you do anything else you have to buy an MSX micro. The system is only open to genuine MSX users. That's to stop the phone lines being clogged up by all those C*mm*d*re and Sp**tr*m owners.

You will need an RS232 card. These are presently being made by JVC and Kuma. The JVC has the edge because most of the software you need is built-in. A simple three-line BASIC program configures it for Telecom Gold use. With the Kuma you need to buy software separately.

As well as an RS232 you also need a modem. As communications becomes more popular the price of modems is dropping rapidly. We'll be taking a look at modems in a future issue.

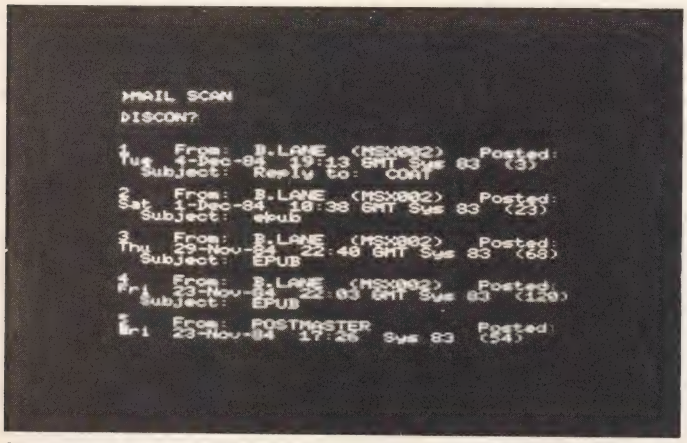
There are three ways of accessing Telecom Gold. The first two involve ringing TG's computers directly. The difference between the two is the baud rates at which they work.

The baud rate is the speed at which data is sent. Slow speeds (typically 300) are more reliable but fast speeds (usually around 1200) take up less of your valuable computer and telephone time.

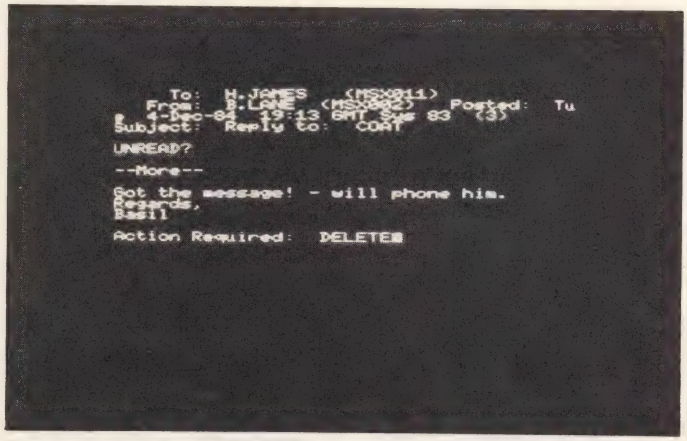
Telecom Gold operates at the two most popular rates. There is the very common 300 baud send and 300 baud receive system. In addition, it also operates at 1200/75, like Prestel. The mainframe sends data to you at 1200 baud, while you reply at 75 baud. This means that your responses get there safely, and the incoming information (which forms the bulk of the traffic) gets to you fast.

The third system is via PSS. The letters stand for Packet Switch Stream, and it's another British Telecom service. The main advantage with this system is that international calls are very cheap. Rather than phoning the computer directly you dial into a local node which packets and redirects the information.

If you go abroad, or even somewhere else in the country, PSS is a useful way to check your mailbox. Telecom Gold is as portable as your micro, so you can use



The MAIL SCAN checks which messages you've kept on file



You can opt to keep, DELETE or reply to messages after reading

You'll need a modem. This model offers different access speeds

MSX-NET as easily from an hotel room as from your living room.

The point of all this is that you'll need a suitable modem. We've been using the Prism 1000, a 1200/75 model designed primarily for Prestel, but equally useful for Telecom Gold. But it's a bit restrictive. You might find yourself wanting to use 300/300 to access PSS or one of the many computer bulletin board systems around. So we'd recommend that you look at multi-standard modems.

As far as availability is concerned, there's no problem with modems, but RS232 cards are a lot harder to find. Neither Kuma nor JVC have started shipping them in bulk.

In about six weeks, MSX-NET hopes to be able to offer exclusive deals on JVC cards. Two packages will be sold, both including membership and an RS232, and one including a modem too. Prices have yet to be finalised.

So any shortage is only temporary. When you do eventually get hold of an RS232 you'll find a card in the box inviting you to join MSX-NET. This is not only your application form but also proof that you're an MSX user.

Should other models appear without in-box cards, you will still be able to join so long as you can prove you have an MSX machine.

The advantage with applying via the proper card is that you get your first year's subscription, worth £10, free.

There are, of course, other expenses apart from the subscription. There are your telephone bils to take into consideration. Then, on top of that, there are online charges. These vary depending on the time of day.

During office hours, you'll be charged at the rate of 10.5p per minute. But this goes down to 3.5p per minute between 7pm and 8am on weekdays, and all day on Saturdays, Sundays and bank holidays. Telecom Gold also nominates a few other days (often around Christmas) when you can access the system cheaply.

MSX-NET asks that you make a monthly deposit of £10 as an advance on your online charges. This gives you 95 minutes of access time at peak rates, and a lot more during the cheaper hours. Should you not use all this time, the balance is refundable.

The mailbox and electronic publishing services are free of charge. But there is a charge for access to many of the information and program files held in the main database. That's where most of the games are stored. The charge is 3p per minute, irrespective of the time of day.

This makes MSX-NET more expensive than other services like Prestel and Micronet, but the system is far more versatile — Micronet may be prettier but it's not as useful.

One feature which highlights MSX-NET's serious potential is the availability of a sophisticated telex facility. You can send telexes from Prestel, but it's a very limited service. You can only send, not receive, the size is limited and there are no editing facilities.

For £15 per year extra you can have a full incoming and outgoing, worldwide telex facility on MSX-NET. It's an extremely sophisticated service, allowing full text editing, filing and preparation. Multiple copies can be sent and there's a full back-up service so that you can find out exactly what's happened to any telexes you've sent.

This feature alone should make MSX-NET attractive to small businesses. It's much cheaper than buying a proper telex machine.

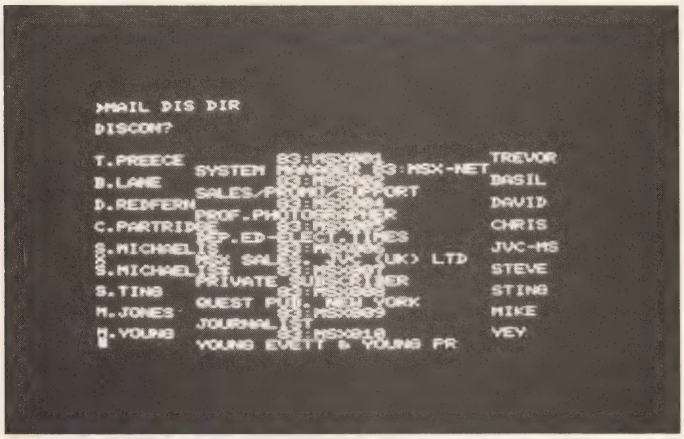
Although it's already fairly versatile, MSX-NET is bound to grow. Early next year, the American operation will be set up, so news and software listings will start making their way here from across the Atlantic.

DETAILS

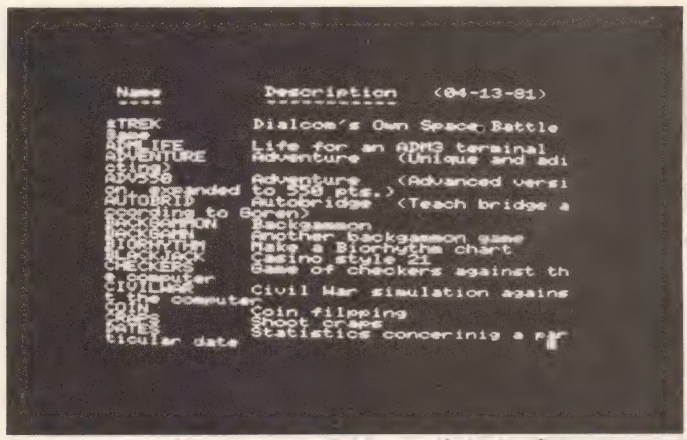
If you're interested in MSX-NET and want more details, write to:

MSX-NET
75h Putney Hill
London SW15 3NT

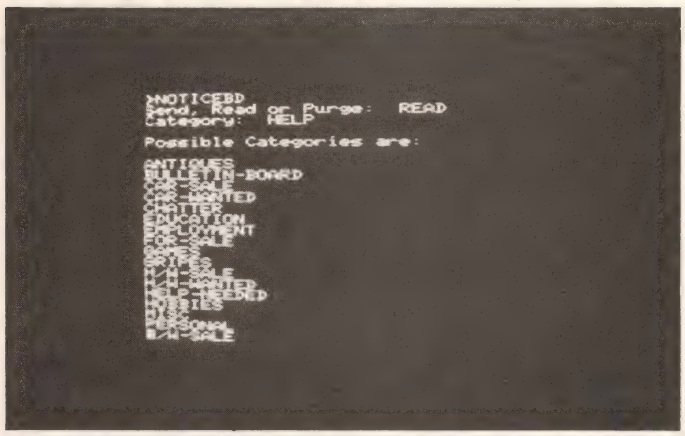
If you already have access to Telecom Gold you can send a mailbox message to 83:MSX002. Alternatively, you can talk to us at *MSX Computing* on 83:MSX013.



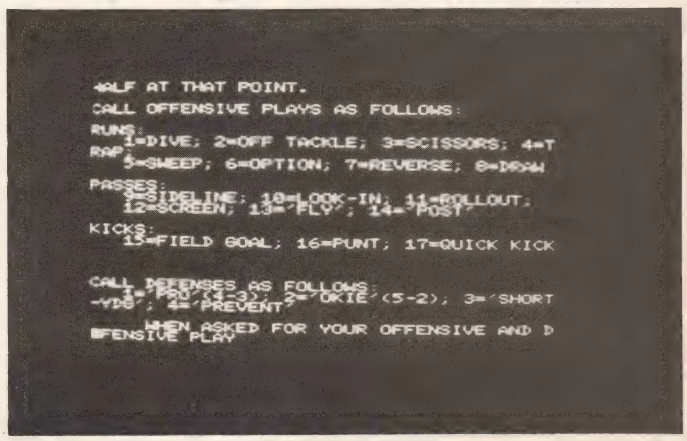
It's easy to get a list of all people on the MSX-NET system



Some samples of the games available, mostly text-only types



There are several noticeboards catering to special interests



Part of an American football game – text only, but fun

TALK TO US!

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.

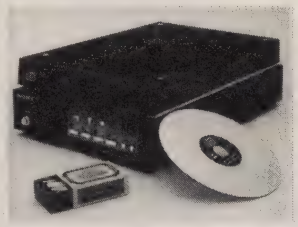
Any interesting messages or questions will be printed in *MSX Computing,* unless you specifically request otherwise. We'll try to get back to you as soon as possible with the answers to your technical queries, although difficult ones may take a little time, and impossible ones a little longer.

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.

NEXT MONTH

Futures
The hottest development on the MSX front — computer programs on compact disc



Typing tutor
No more two finger typing — master those keys with our special feature for keyboard klutzes

Machine language
Bits, bytes, nibbles and stacks. Adam Denning delves further into the intricacies of machine code

BASIC bits
Tom Sato continues his A-Z of MSX BASIC

Japan
Keep up-to-date with the MSX scene in Japan

Soft scene
We put the very latest software releases through their paces

DIY listings
Get those fingers tapping — the results will amaze you

Don't miss out
Order your copy today — the magazine for MSX users

Cash & Carry COMPUTERS

TOP SHOWROOM SERVICE

ROCK BOTTOM PRICES

PERSONAL CALLERS WELCOME AT OUR EXTENSIVE SHOWROOMS
MOST EQUIPMENT ON DEMONSTRATION

The UK's Best Printer Prices

Only a sample of our massive range of printers shown here — phone for further details

DAISYWHEEL LETTER QUALITY		
Smith Corona TP1 (P or S)	£189.00 + VAT =	**£217.35**
Juki 6100 (P)	£335.00 + VAT =	**£385.25**
Brother HR15 (Pors)	£329.00 + VAT =	**£378.35**
Daisystep 2000 (P)	£239.95 + VAT =	**£275.94**
PRINTER/TYPEWRITERS		
Brother EP22 Dot Matrix (S)	£119.00 + VAT =	**£136.85**
Brother EP44 (S)	£189.00 + VAT =	**£217.35**
Modems available for Easylink and Telecom Gold		
Juki 2200 Daisywheel (P or S)	£239.95 + VAT =	**£275.94**
DOT MATRIX PRINTERS		
Brother HR5 (P or S)	£125.00 + VAT =	**£143.75**
Canon 1080A NLQ (P)	£279.00 + VAT =	**£320.85**
Canon 1156A NLQ (P)	£349.00 + VAT =	**£401.35**
EPSON RX80 (P)	£195.00 + VAT =	**£224.25**
EPSON RX80 F T PLUS (P)	£220.00 + VAT =	**£253.00**
EPSON FX80 (P)	£324.00 + VAT =	**£372.60**
EPSON RX100 F T (P)	£339.96 + VAT =	**£390.95**
EPSON FX100 F T (P)	£430.00 + VAT =	**£494.50**
Seikosha GP100A (P)	£129.90 + VAT =	**£149.39**
Seikosha GP50A (P)	£79.90 + VAT =	**£91.89**
Seikosha GP50S (Spectrum)	£79.90 + VAT =	**£91.89**
Seikosha GP500A (P)	£139.90 + VAT =	**£160.89**
Seikosha GP550A (P)	£179.90 + VAT =	**£206.89**
Seikosha GP700A Colour (P)	£279.90 + VAT =	**£321.89**
Shinwa CT80 (P)	£175.00 + VAT =	**£201.25**

(P)=Parallel-Centronics (S)=Serial RS232

Smith Corona range of printers Now in Stock — Phone or write for details

INSTANT CREDIT Up to 36 months to pay

All items over £150 available on our easy credit terms. Written details available on request.

12" MONITORS — GREEN SCREEN		
Sanyo 2112 Med Res	£65.00 + VAT =	**£74.75**
Sanyo 8112 High Res	£88.00 + VAT =	**£101.20**
14" MONITORS — COLOUR		
Commodore 1701 Composite/Sound	£173.00 + VAT =	**£198.95**
Fidelity CM14 RGB/Comp/Sound	£179.00 + VAT =	**£205.85**
Microvitec 1431MS Norm Res RGB	£173.00 + VAT =	**£198.95**
Microvitec 1431MZ for ZX Spectrum	£199.00 + VAT =	**£228.85**
Microvitec 1451MS Med Res RGB	£229.00 + VAT =	**£263.35**
Microvitec 1451DQ for Sinclair QL	£234.74 + VAT =	**£269.95**
Microvitec 1441MS High Res RGB	£379.00 + VAT =	**£435.85**
Sanyo 3125 Norm Res RGB	£173.00 + VAT =	**£198.95**
Sanyo 3117 Med Res RGB	£285.00 + VAT =	**£327.75**
Sanyo 3115 High Res RGB	£399.00 + VAT =	**£458.85**
Commodore		
Plus 4 NEW 64K Computer	£243.43 + VAT =	**£279.95**
C16 Starter pack inc. cassette deck	£113.00 + VAT =	**£129.95**
Commodore 64	£165.17 + VAT =	**£189.95**
SX64 Portable inc D. Drive and Col. Monitor	£478.22 + VAT =	**£549.95**
C2N Cassette	£32.61 + VAT =	**£37.50**
1541 Disk Drive	£182.57 + VAT =	**£209.95**
DPS1101 Daisywheel Printer (by Juki)	£309.95 + VAT =	**£356.44**
801 Tractor Printer	£165.17 + VAT =	**£189.95**
802 Friction Tractor Printer	£260.83 + VAT =	**£299.95**
1520 Colour Printer Plotter	£60.83 + VAT =	**£69.95**
1701 Colour Monitor	£173.00 + VAT =	**£199.00**
Amstrad		
Amstrad CPC464 Green Monitor	£209.00 + VAT =	**£240.35**
Amstrad CPC464 Colour Monitor	£301.00 + VAT =	**£346.15**
SANYO MBC 555 Business Computer		
128K including Wordstar, Calcstar, Infostar	£795.00 + VAT =	**£914.25**
BBC		
BBC Model B	£339.09 + VAT =	**£389.95**
Model B inc Disk I F	£399.96 + VAT =	**£459.95**
Cumana 1x100K DD CSX100	£105.00 + VAT =	**£120.75**
Cumana 1x200K DD CSX200	£191.26 + VAT =	**£219.95**
Cumana 2x100K DD inc PSU	£321.70 + VAT =	**£369.95**
Cumana 2x200K DD inc PSU	£347.78 + VAT =	**£399.95**
Cumana 2x400K DD inc PSU	£434.74 + VAT =	**£499.95**
All above Cumana Disk Drives include Cable, Manual + form. disk.		
Sinclair		
QL 128K Computer	£334.74 + VAT =	**£384.95**
NEW Spectrum 48K PLUS inc. 6 Free Programs	£147.78 + VAT =	**£169.95**
Spectrum 48K + 6 Free Games (worth £56)	£106.91 + VAT =	**£122.95**
Microdrive + Interface 1 + 4 Free Programs	£82.60 + VAT =	**£95.00**
16K-48K Upgrade	£21.70 + VAT =	**£24.95**

Apricot Computers — Fantastic Prices — Phone NOW!

MSX Computers — In Stock Now

Toshiba HX10 64K	£217.35 + VAT =	**£249.95**
Sanyo MRC10 64K	£234.74 + VAT =	**£269.95**
Sony HB75B 64K	£252.13 + VAT =	**£289.95**
JVC HC7GB 64K	£226.04 + VAT =	**£259.95**

Full range of MSX accessories available

SUPERDISKS

LONDON'S LOWEST PRICES ON FLOPPY DISKS

Prices per box of ten ex VAT

	SSDD 40TR	DSDD 40TR	SS96TP1 80TR	DS96TP1 80TR
BASF 5¼"	**£10.95**	**£18.20**	**£19.80**	**£22.50**
3M 5¼"	**£13.55**	**£19.50**	**£20.05**	**£24.00**
VERBATIM 5¼"	**£15.50**	**£23.50**	**£22.50**	**£30.50**
DYSAN 5¼"	**£16.80**	**£24.90**	**£24.90**	**£32.00**
TDK 5¼"	**£17.50**	**£25.50**	—	**£33.00**
BASF 3½"	**£34.90**	—	—	—

Add 70p for P&P per box of 10 disks

CASH & CARRY COMPUTERS
53-59 High Street,
Croydon, Surrey CR0 1QD.

Mail Order + Export + Trade
Hot Line Phone 01-686 6362

Delivery by Securicor (3 day) please add £5.00 + VAT per item.
Delivery by T.N.T. (overnight) please add £9.50 + VAT per item.

Send off the coupon or order by 'phone quoting your Access, Barclaycard No. 'Phone 01-686 6362. Immediate despatch on receipt of order or cheque clearance.

Or you can Telex your order on: 946240 Attn 19001335

We accept official orders from PLC's, Government Departments and Educational establishments.

These prices correct until superceeded by next advertisement.

To: Cash & Carry Computers, 53-59 High Street, Croydon, Surrey CR0 1QD.

Please supply _____

_____

I enclose my cheque for £_____ including delivery by Securicor/T.N.T.*

or charge my Access/Barclaycard No _____

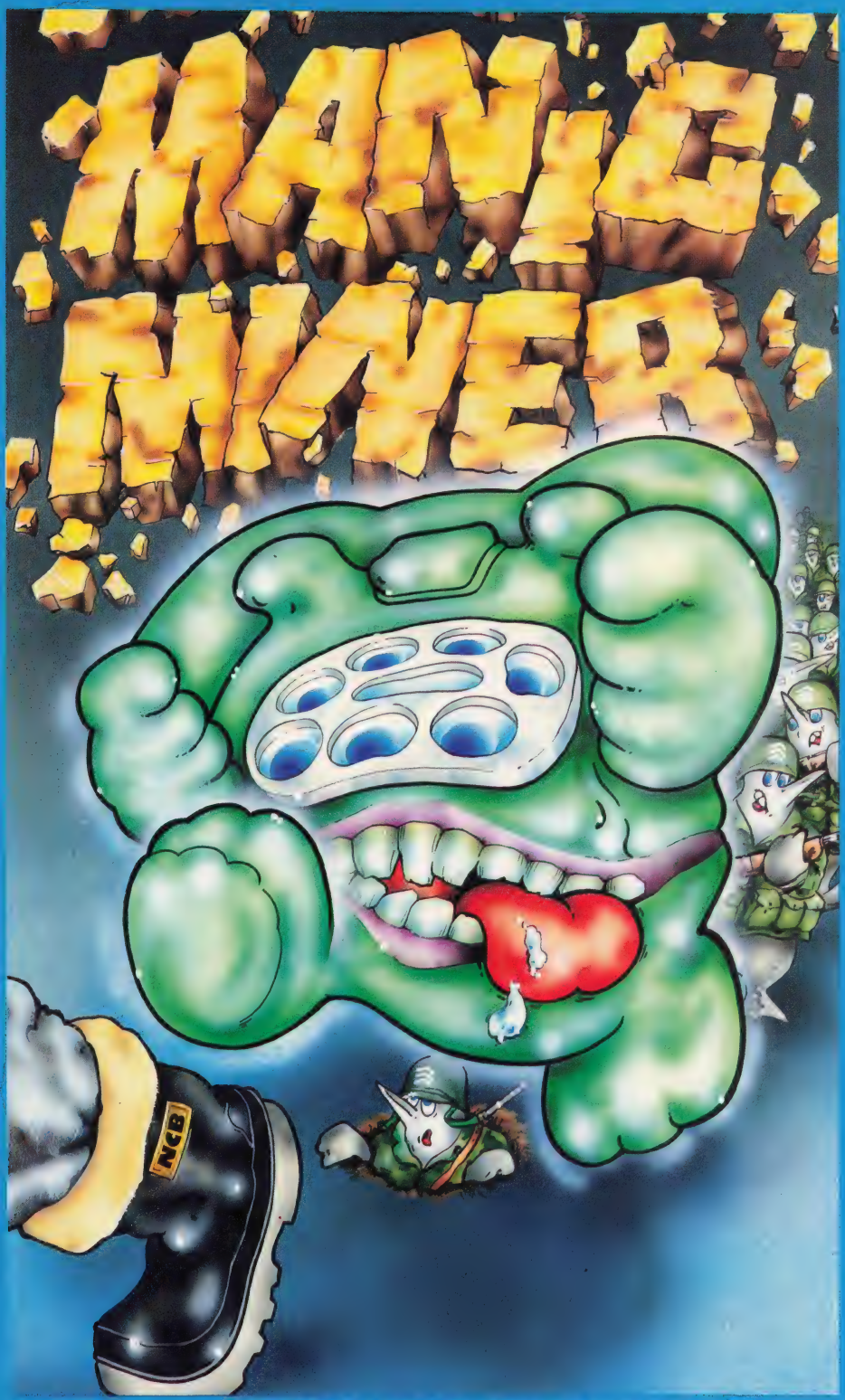
Name _____ Signature _____

Address _____

_____

*Please Delete

MSXC 2/85



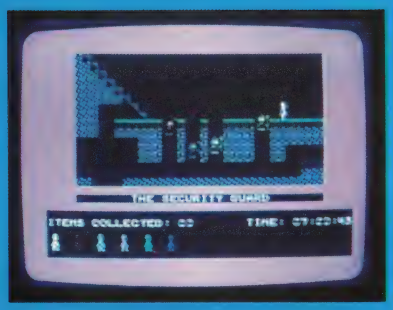
Miner Willy, while prospecting down Surbiton way stumbles upon an ancient, long forgotten mineshaft. On further exploration, he finds evidence of a lost civilisation far superior to our own, which used automatons to dig deep into the Earth's core to supply the essential raw materials for their advanced industry. After centuries of peace and prosperity, the civilisation was torn apart by war, and lapsed into a long dark age, abandoning their industry and machines. Nobody, however, thought to tell the mine robots to stop working, and through countless aeons they had steadily accumulated a huge stockpile of valuable metals and minerals, and Miner Willy realises that he now has the opportunity to make his fortune by finding the underground store. In order to move to the next chamber, you must collect all the flashing keys in the room while avoiding nasties like Poisonous Pansies and Spiders and Slime and worst of all, Manic Mining Robots. When you have all the keys, you can enter the portal which will now be flashing. The game ends when you have been 'got' or fallen heavily three times.

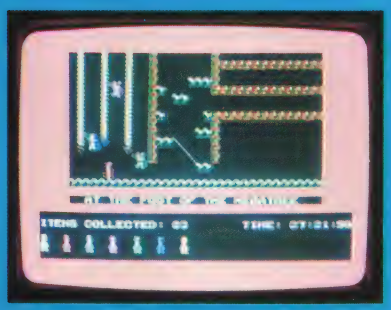
MANIC MINER is available on Spectrum, Amstrad, BBC, Dragon, CBM 64,Oric/Atmos, MSX.

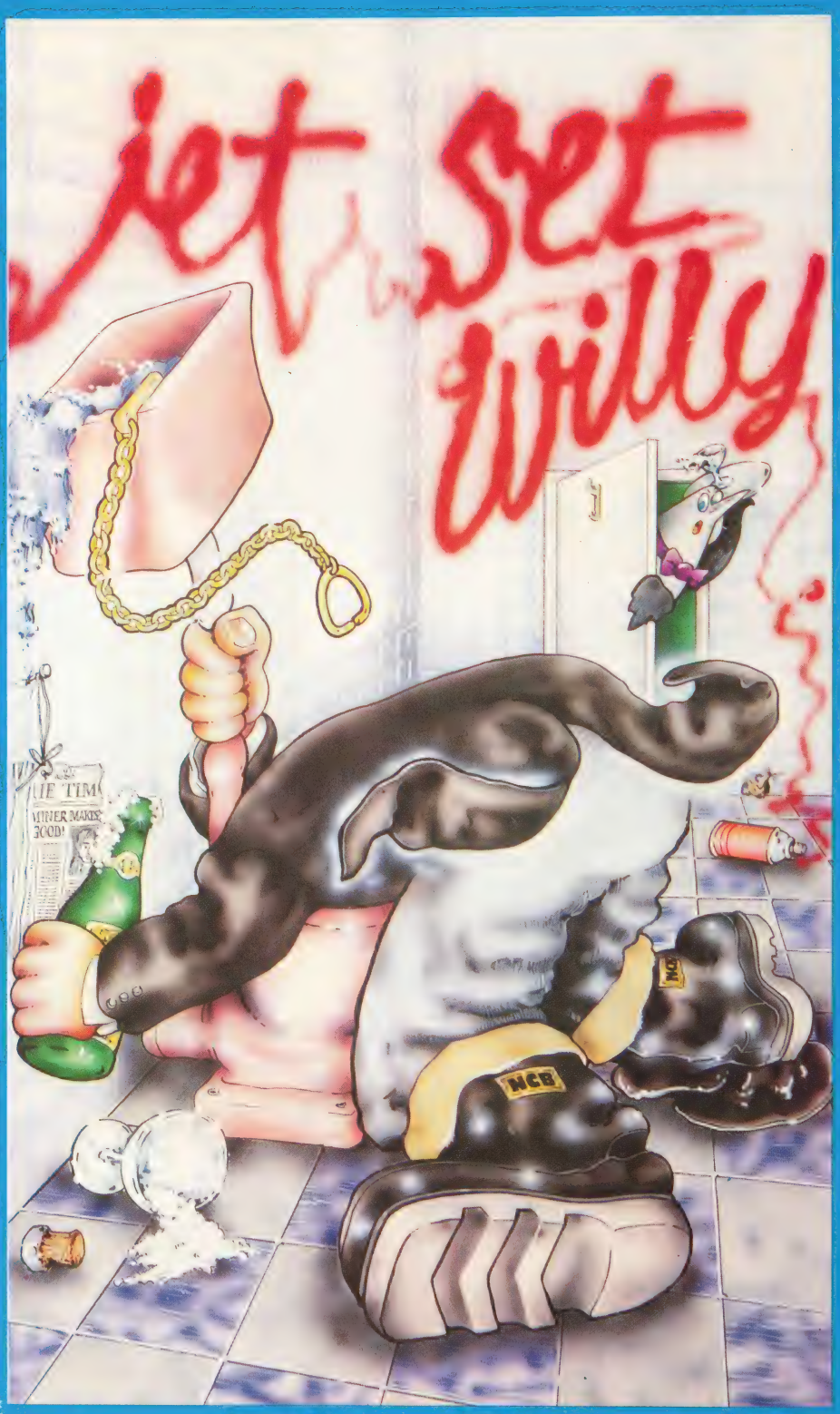
The above screens are from the BBC version.

SOFTWARE PROJECTS

Software Projects Limited, Bearbrand Complex, Allerton Road, Woolton, Liverpool L25 7SF. Telephone: 051-428 9393 (4 lines). Telex: 627520.







Miner Willy, intrepid explorer and nouveau-riche socialite, has been reaping the benefits of his fortunate discovery in Surbiton. He has a yacht, a cliff-top mansion, an Italian housekeeper and a French cook, and hundreds of new found friends who really know how to enjoy themselves at a party. His housekeeper, Maria, however, takes a very dim view of all his revellery, and finally after a particularly boisterous thrash she puts her foot down. When the last of the louts disappears down the drive in his Aston Martin, all Willy can think about is crashing out in his four-poster. But Maria won't let him into his room until all the discarded glasses and bottles have been cleared away. Can you help Willy out of his dilemma? He hasn't explored his mansion properly yet (it is a large place and he has been very busy) and there are some very strange things going on in the further recesses of the house (I wonder what the last owner was doing in his laboratory the night he disappeared). You should manage O.K. though you will probably find some loonies have been up on the roof and I would check down the road and on the beach if I was you. Good luck and don't worry, all you can lose in this game is sleep.

This is a Computer and Video Games Hall of Fame Game.

JET SET WILLY is available on Spectrum, Amstrad, CBM, MSX.

Send a large stamped addressed envelope for more detailed information on our new releases, plus a free large poster.

All sales enquiries to:
Colin Stokes
(Sales and Marketing)

For Mail Order only:
Software Projects, P.O. Box 12, L25 7AF

Selected titles available from:–
John Menzies, HMV, Boots, W. H. Smith, Woolworth, Spectrum and other large department stores and all good major software retailers.

Please send me a copy of — **Please tick were applicable**

JET SET WILLY · AMSTRAD £8.95 ☐
MANIC MINER · AMSTRAD £8.95 ☐
JET SET WILLY · MSX £7.95 ☐
MANIC MINER · MSX £7.95 ☐

I enclose cheque/PO for .....

(Please add £1.00 for orders outside UK)

Access Card No. .....

Name .....

Address.....

.....

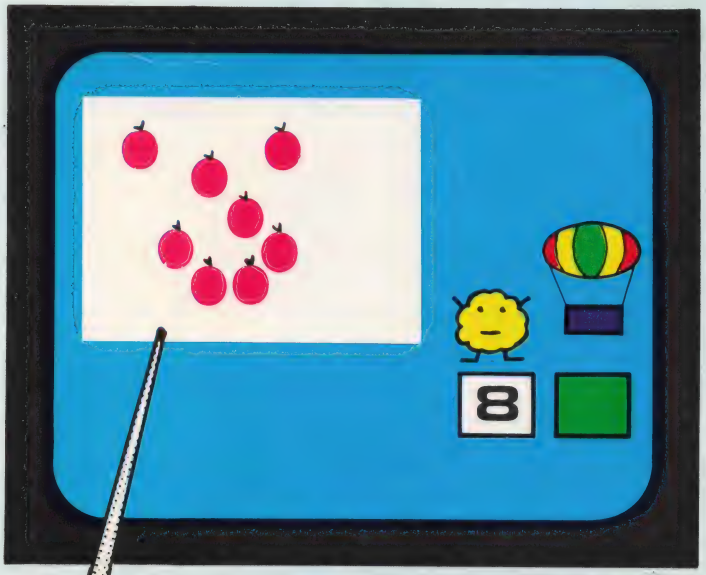
For Mail Order only:
Software Projects, P.O. Box 12, L25 7AF

PUDDLES©

CHILDREN'S EDUCATIONAL SOFTWARE SERIES

MSX

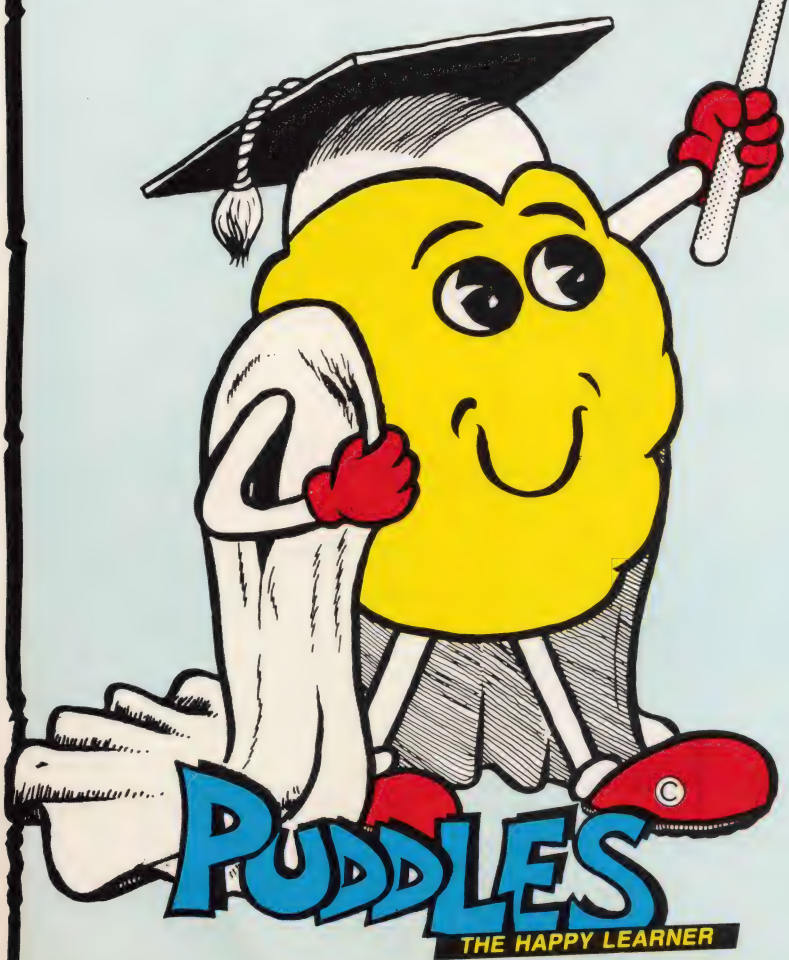
STIMULATE THE MIND IN THE CRUCIAL YEARS



INTRODUCTION TO NUMBERS (4–7 yrs)
Helps children to learn number skills by counting objects. It provides the fundamentals of arithmetic.
Tape 1 Learn to count
Tape 2 Numbers adding up to 10
Tape 3 Numbers up to 120

CALCULATION 1 (4–8 yrs)
Teaches the basics of addition and subtraction and is very helpful for children beginning to study arithmetic.
Tape 1 Calculate the missing number
Tape 2 Addition and Subtraction
Tape 3 Subtraction from fixed numbers

CALCULATION 2 (5–8 yrs)
Consolidates basic addition and subtraction skills preparing children for more advanced exercises.
Tape 1 Count the missing objects
Tape 2 Number size and sequences
Tape 3 Calculate using a grid



MEMORY (5–8 yrs)
Develops the childs ability to arrange, classify and memorize using numbers shapes and the alphabet.
Tape 1 Memory Game
Tape 2 Numbers and the alphabet
Tape 3 Shapes and numbers

REASONING (5–8 yrs)
Teaches children to calculate using objects with assigned values and identify points on a graph.
Tape 1 Assigned values 1
Tape 2 Assigned values 2
Tape 3 Points on a graph

REFLEXES (5–8 yrs)
Helps keyboard familiarity and sharpens and develops reflexes which is important for all fields of learning.
Tape 1 Exercises with numbers
Tape 2 Exercises with the alphabet
Tape 3 Exercises with shapes

Selected Titles available from larger branches of:
and other good Computer Stores.

Boots

MORWOOD

Morwood Products Limited
Maple Walk, Bexhill
East Sussex TN39 4SN ENGLAND
Tel: National 04243 · 5840
Tel: International +44 4243 5840
Telex: 957485

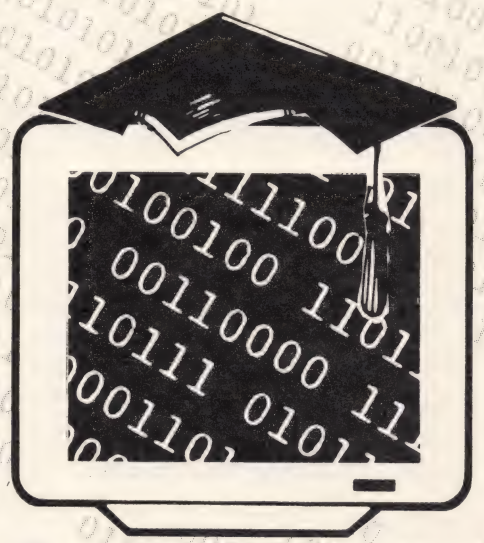
MSX is a trade mark of MICROSOFT Corporation

PUDDLES Software developed by R&D Computer Company

EACH PACKAGE CONTAINS **THREE** SEPARATE TAPES!!

CRACKING THE CODE

Adam Denning kicks off our new series with an introduction to the principles of machine code



Part 1 – the basics

When you remember that in essence all a computer can do is move numbers from place to place and perform only the most basic of mathematical operations, it seems surprising that everyone describes them as powerful machines. And considering that they can only talk in terms of numbers it seems stranger still. Yet home computers undoubtedly are powerful tools!

One of the reasons for this is that home micros are supplied with a system which allows us to tell them what to do in a language that more nearly approaches English than the machines' own language. We program the machines in BASIC, a computer language specifically designed to make general programming fairly simple.

In effect, the BASIC language is the means to an end, the end being the production of a piece of code which the computer understands and acts upon in the way we originally intended. But the computer knows nothing of BASIC, nothing of variables and very little about anything which we could consider as useful. It speaks a totally different, extremely unsophisticated language called machine code.

Machine code consists of streams of rather meaningless (to us) numbers which the machine examines and then reacts to in a way dependant on the design of one of the chips inside the computer.

This chip is the *microprocessor*, which in all MSX computers is a Z80. This processor is one of the most versatile chips of its kind but it is still unable to communicate with us in an immediately useful way.

When we program an MSX micro in BASIC, it still needs to receive its instructions in its own machine code, which is unique to the Z80 and unintelligible to any other microprocessor.

So how does the computer know how to react to the BASIC instructions we give it? In much the same way as we would attempt to understand someone talking to us in Swahili — through an *interpreter*.

In computing terms, an interpreter is a program which converts the instructions from the language we use into the machine code the processor uses. As this task is fairly complicated and must be carried out with maximum efficiency both in terms of speed and memory usage, the interpreter is generally written in machine code itself.

A BASIC interpreter works by examining each particular instruction we type and then executing a predetermined set of machine code instructions to carry out the desired function.

An interpreter is not very intelligent and is in fact incapable of remembering most of what has gone before, so it has to do exactly the same thing over and over again.

This makes the act of interpretation very, very slow. Although a program we write may appear to run at lightening speed to us, in terms of what the machine is capable of it's very slow. So what does this mean? Simply, if you want to write a very fast program, BASIC just won't do.

Using BASIC also means that very often various 'low level' machine facilities are not available to us from the interpreter.

An ideal example to illustrate both these points is a games program where we're trying to move an object smoothly and quickly across a certain area of the screen. The speed cannot be realised in BASIC, and there are no BASIC instructions which allow us to carry out such an operation. In this kind of situation we are invariably forced to program in machine code itself.

We've just seen that machine code is no more than a series of numbers, so at first sight it would appear that machine code programming is not going to be a fun occupation. Thankfully, this is not true. Various programming tools exist to make life much easier, but first we need to know the principles involved and the techniques which we can use to our advantage.

The first principle is that the most basic element of a microprocessor is a switch. A switch can only be in one of two position — on or off. Microprocessors are no more than vast banks of switches, with special circuits to alter the state (position) of a specified switch or group of switches, and other special circuits to examine the states of another group of switches and inform yet more switches of these states.

That a switch can only have one of two states at any given time is both useful and annoying. It makes it easy for us to build microprocessors and it makes it fairly easy to conceptualise them. It makes it tedious to program them, though!

To make things easier to

understand we follow a common computing convention. When a switch is in the 'on' state, we say that it has a logical level of 1, and when it is off, it has a logical levelof 0. If you like, you can consider on as representing a measurable voltage and off as representing no voltage. This is a reasonably accurate view.

If the state of a switch can be represented uniquely by the numbers 0 and 1, it follows that a microprocessor's natural language must be based around a number system which also consists only of 0s and 1s. This is of course the *binary* number system, or base 2. Binary numbers are to us very unwieldly, but we have to get used to them.

Number systems

Consider the decimal system which we are all familiar with. The rightmost digit in a number represents the number of 1s, the next number the 10s, the next the 100s and so on. A closer examination reveals that each digit in fact represents an integral power of 10, starting at 0 ($10^0 = 1$). This makes it a little clearer to us why the decimal system is known as base 10.

We've said that the binary system is base 2, so as any good mathematical rule is general and can be applied to any analogous situation, it follows that each digit in a binary number represents the number of times each power of two occurs in the complete number.

There's also a way of calculating the largest number that can be represented in a given number of digits. In decimal, for example, a number occupying three digits cannot be larger than 999, in other words $10^3 - 1$. From this we can derive a general formula which says that the maximum number that can be held in a specified digit length is:

10 number-of-digits — 1

By replacing the 10 with whatever base we are using, we arrive at the largest number which can be represented in a string of digits in our chosen base.

An important concept in computing is that of a constant number size, which is now standardized on eight digits. This gives us a range of numbers from 0 to 255, as 2^8 is 256.

So, if our microprocessor has a bank of eight switches we can make that they *notionally* represent any number from 0 to 255 in binary. A bit of terminology here — a single switch represents a single binary digit, and this is often referred to as a *bit* (derived from binary digit). The same jargon leads us to calling a collection of eight switches (ie 8 bits) a *byte*. A byte can hold any value between 0 and 255. This is fundamental, so remember it!

It so happens, by design of course, that the Z80 microprocessor handles all the numbers it can deal with in terms of bytes. It is certainly possible to consider individual bits of each byte, but in most applications we need not worry about that.

As we're talking about number systems we must take time out to consider another base which is thoroughly useful to us. This is base 16, known as *hexadecimal* or more usually just *hex*.

'Binary, although fundamental, is a very difficult system to get to grips with'

Why would we choose to forsake binary and decimal for hex? Decimal is essentially irrelevant to computers, so we must try to forget about it. Binary, although fundamental, is a very difficult system to get to grips with as even small numbers are large collections of digits.

For example, take the decimal number 123. In binary this is 1111011, and 251 decimal is 11111011 in binary. Although the numbers are quite distinct in decimal, the difference in binary is very difficult to see. We can't afford to make mistakes in computing, so we invariably choose not to program in binary. This is where hex comes in.

Sixteen, the base of the hexadecimal system, is a power of 2 (2^4 in fact) and so a natural relationship between binary and hex is fairly obvious. Let's examine the decimal numbers from 0 to 15, in binary and hex. These are shown in figure 1. You can instantly see that each group of four binary digits (ie every group of four bits) is responsible for one hex digit. Since we have to represent numbers from 10 to 15 in hex, but do not have any more single integers left, we use instead the letters from A to F.

DECIMAL	BINARY	HEXADECIMAL
0	00000000	00
1	00000001	01
2	00000010	02
3	00000011	03
4	00000100	04
5	00000101	05
6	00000110	06
7	00000111	07
8	00001000	08
9	00001001	09
10	00001010	0A
11	00001011	0B
12	00001100	0C
13	00001101	0D
14	00001110	0E
15	00001111	0F

Figure 1. Counting up to 15 in decimal, binary and hexadecimal

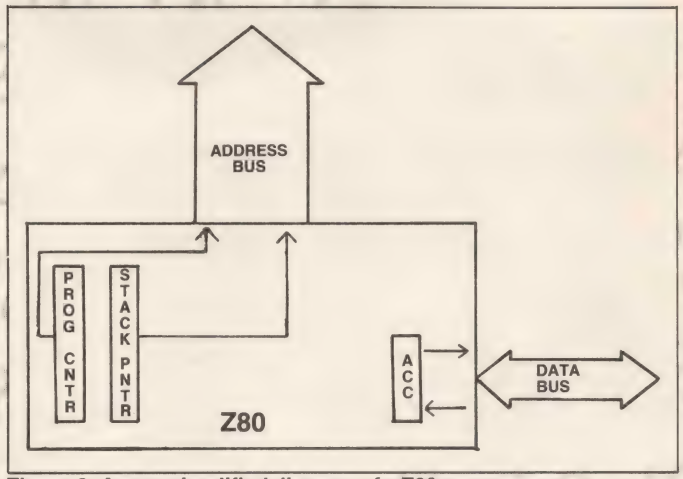


Figure 2: A very simplified diagram of a Z80 processor

So a binary digit is a bit, and eight bits form a byte. What do you think we call a collection of four bits? Sorry about this . . . a *nybble*! Each hex digit therefore corresponds to a nybble and each byte can be represented as no more than two hex digits, as it comprises two nybbles. Hex, therefore, becomes the easiest system in which to represent numbers in computing, and a quick bit of practice will soon have you familiar with it. The only maths you'll need to perform on hex numbers are addition and subtraction, so don't worry about long hex division and multiplication.

Although all this theory and maths might make machine code seem interminably boring, don't worry — once you understand these principles you don't really need to think of them again.

If that seems odd, think of programming in BASIC — although you have to learn many boring facts, once you know them it's no big deal.

Now for the Z80 itself. The processor must be able to communicate with its memory, and it does this by a collection of wires which are collectively called the *address bus*. On the Z80 this bus consists of 16 wires, which are connected to switches inside the Z80.

Therefore each wire represents a binary digit, and as there are 16 of them we

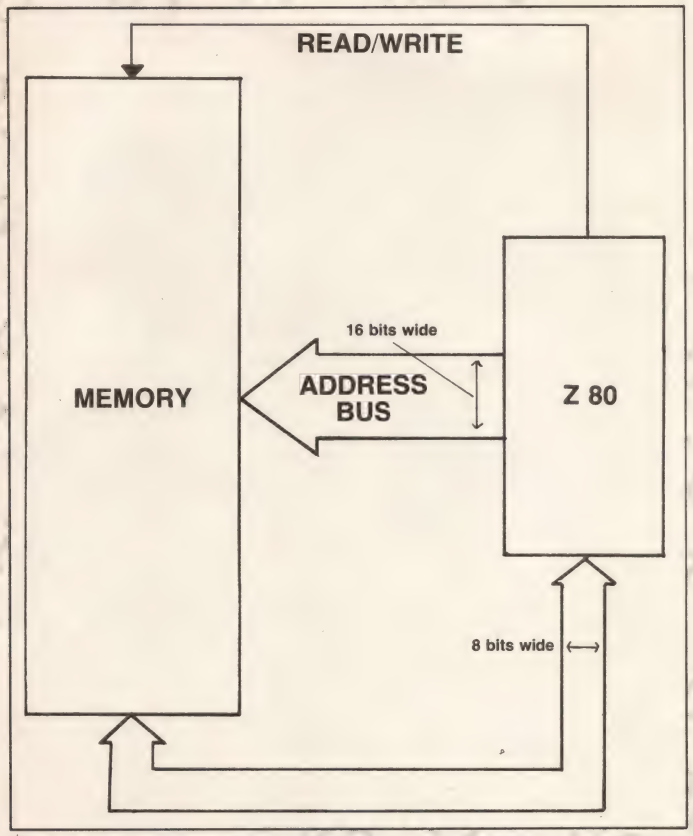


Figure 3: This shows the basic components of a Z80 system

can have any value from 0 to 65535 on the address bus (2^{16} is 65536). This means that we can use the address bus to uniquely reference any one of 65536 different *memory locations* numbered from 0 to 65535.

Each memory location's number is called its *address* and each memory address references a byte of memory. Each of these bytes can therefore hold any number between 0 and 255, which must somehow be sent to or received from the Z80 whenever that memory location is referenced on the address bus.

This communication is achieved by means of a collection of eight wires called the *data bus*. With eight wires, it can notionally hold any number between 0 and 255, which is of course a byte.

There is another wire on the Z80 which decides whether the memory being addressed is going to send its contents to the Z80 or get a new value from the Z80. This wire is called the *read/write* line, as sending a value to memory is known as writing to it, and receiving a value from memory is known as reading it. The data bus can therefore have numbers travelling along it in either direction, and is known as a bi-directional bus.

There are two main types of memory within home micros, known as ROM (read only memory) and RAM (random access, or read-write memory). It is no use writing to ROM, as nothing will happen, but RAM can be used for both operations.

Most computer systems therefore use ROM to hold permanent programs, such as the BASIC interpreter, and RAM as workspace. Fortunately, the contents of ROM are not lost when the computer is turned off, but RAM, which is known as *volatile* memory, loses all of its contents.

So far we have a system in which there are 65536 different memory locations, some which we can read and write to, others that we can only read from. Each of these memory locations is connected to the Z80, which is capable of selecting one particular location and reading its contents, or writing a new value into it. But the Z80 has to be able to do something constructive with all this.

The Z80 has a small amount of RAM built into it, divided into groups of bytes. Each of these bytes is known as a *register.*

Fundamental registers are the *program counter (PC)*, the *stack pointer (SP)* and the *accumulator (A).*

The first two are a little odd in that they are actually two bytes joined together, giving them the ability to hold numbers between 0 and 65535, which is coincidentally just what the address bus is capable of.

'The Z80 processor has a small amount of RAM built into it'

The program counter is used to tell the Z80 where its next instruction is held in memory, so it needs to be able to address all of the possible memory locations.

The stack pointer is used to point to an area of memory known as the *stack*, where various information is temporarily held by both the system and the program.

The accumulator is one byte wide. It can be used to receive the contents of a specified memory location as well as to send information to memory as its contents can always be put onto the data bus — which is the same size.

The accumulator is the Z80's general purpose register, and is the one in which most of the operations which the Z80 is capable of performing are carried out (or more accurately, where the initial information for an operation is obtained and the result is stored).

PLEASE NOTE...

ASCII Microsoft, the Japanese arm of Microsoft which developed MSX BASIC, has drawn our attention to some aspects of machine code programming that all serious hackers should be aware of.

BIOS

First, it is important that you don't access the hardware via I/O ports using the IN and OUT Z80 commands. Instead, use the Basic Input Output System which isolates the software from the hardware so that any future hardware changes will not effect existing software.

The BIOS has a jump table starting from memory location &H0000 which contains the jump vector of the various BIOS routines which access the hardware via I/O ports. If you access hardware this way, your software will remain unaffected by any hardware changes.

For example, MSX uses a chip called i8255 PPI to access the keyboard. But if in future there was a separate keyboard with an infra-red communication link, the i8255 PPI would be replaced by a serial interface.

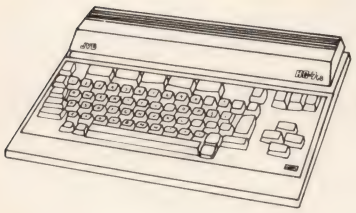
If your program accessed the keyboard directly using the I/O port, you'd have a problem, but if you used BIOS the entry point would be exactly the same — no problem. In this case, the BIOS routine itself would be modified to cater for the infra-red communication device.

All devices, such as the PPI and PSG, should be accessed via BIOS. There is, however, an exception — the VDP. To ensure fast data transfer between the CPU and the VDP, the ROM stores the location of the read address of VDP in location &H0006 and the write address in location &H0007.

System RAM area

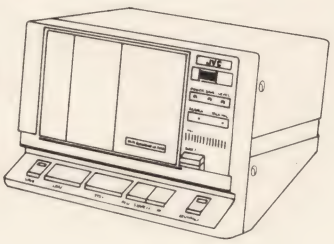
The area in RAM between &HF380 and &HFFFF is reserved for system work and shouldn't be used unless you know exactly what you're doing.

JVC MSX



HC-7GB
Personal Computer

HC-R105
Data Recorder



HC-J615 Joystick

MSX Basics from JVC at

EDGTRONIC

194 Edgware Road, London, W2 2DS Tel. 723 1465

ORIENTAL STAR AGENCIES LTD

548-550 Moseley Rd, Birmingham B12 9AD

Authorised **SONY**® *dealer*

Ring NOW for details of the new **MSX**

021-449 6437

SOUNDS GREAT

182 WILMSLOW ROAD, HEALD GREEN, CHESHIRE

YAMAHA CX5M MUSIC COMPUTER

The CX5M Computer is specifically designed for a wide range of music generation, programming and editing tasks, interfacing with other Yamaha digital instruments and components.

★ MIDI-COMPATIBLE – For playback control, auto-sequencing of Yamaha DX Synthesizers, RX Drum machines and other MIDI compatible equipment.

★ YAMAHA DIGITAL FM VOICE GENERATOR – With 46 built in voices. Plus your own.

OPTIONAL PROGRAMMES:

★ YRM 101 FM MUSIC COMPOSER
★ YRM 102 FM VOICING PROGRAM
★ YRM 103 DX7 VOICING PROGRAM
★ YRM 104 MUSIC MACRO

YAMAHA MUSIC KEYBOARD

Available with ¾ or full size keys.

All keyboard options and software on demo and in stock.

PHONE (061) 437 4788

MANCHESTER'S ONLY HI-TECH AGENTS

THE TOSHIBA HX-10 IS HERE!

BONEL & CURTIS AUDIO

29 Emscote Road, Warwick
Tel: 0926-492827

Swan Street, Warwick

Call in now for personal service and a full demonstration of the HX-10

Come and try MSX at:

HELETOP LTD

75 KINGS STREET, STIRLING
Tel: (0786) 73004

4-6 ETTRIC SQUARE, CUMBERNAULD, GLASGOW
Tel: (02367) 24991

FOR A DEMONSTRATION OF THE HX-10 COME TO:

R. J. PRATT & SON

35-35A HIGH STREET STEVENAGE
Tel: (0438) 312885

MILLER BROS

Doncaster, Bradford, Thorp Arch, Leeds and Nottingham

JATALA ELECTRONICS

488-490 CHISWICK HIGH ROAD, LONDON W4
Tel: 01-995 8535

Stockists of computer software and accessories

D. P. LEAKE TV LTD

TOSHIBA STOCKISTS AT:

WALTHAM ABBEY
Tel: (0992) 716384

WOODFORD GREEN
Tel: 01-504 3156
01-505 6325

COME AND TRY OUT THE HX-10 AT

J. CRYER LTD

64 Abbey Street, Accrington
Tel: (0254) 391440

J.& H. RUSSELL

21-22 COVENTRY STREET, KIDDERMINSTER, WORCS.
Tel: 0562 2686

HOWES LTD

146 London Road
Southborough
Tunbridge Wells
Tel: (0892) 28682 or 37288

Wilemans

16 Kingsway
Kirby in Ashfield
Nottingham
Mansfield 753015

Brook Street
Sutton in Ashfield
Mansfield 552551

Full range of Toshiba MSX hardware and software. Come in for a demonstration

---

For a personal demonstration of the **HX 10**, see Derek & Mick at:

D. F. BROWNE LIMITED

418 Portland Road
Hove
BN3 5SJ
Tel: 0273 417120

COME AND TRY OUT THE HX-10 AT

J. CRYER LTD.

87 Bank Street,
Rossendale
Tel: (0706) 216305

COMPUTER DEPARTMENT

OSSETT CO-OPERATIVE SOCIETY

Full range of Toshiba MSX hardware and software. Come in for a demonstration.

DALE STREET, OSSETT, YORKS

EMPIRE ELECTRO CENTRES

11-13 JOHN WILLIAM ST
HUDDERSFIELD
Telephone:
(0484) 513955

Come and see the HX-10 at:

JACKSONS

9 HARTFIELD RD
FORREST ROW
SUSSEX
Tel: (034282) 2885

A. F. SMITH & SONS LTD

2 STAR HILL
ROCHESTER,
KENT
Telephone:
MEDWAY 45184

BRYSON'S TV, HI-FI & VIDEO

28 HAMILTON ROAD, MOTHERWELL, STRATHCLYDE
Tel: Motherwell 63406

Full range of HX-10 on display. Come in for a demonstration.

GEOFFREY BARNARD LTD.

3 Pitt Street,
Barnsley
Yorks.
Tel: (02262) 84572

SUNWIN HOUSE

FOR TOSHIBA

SUNBRIDGE ROAD
BRADFORD 1
Telephone:
(0274) 729500

EMPIRE ELECTRO CENTRES

783-789 LEEDS ROAD
BRADFORD
Telephone:
(0274) 662476

PETER TYSON HI-FI CENTRE

6 Abbey Street,
Carlisle,
Cumbria
Tel: (0228) 46756

P. R. HARTLEY LIMITED

Ruddington, Keyworth and Radcliffe on Trent
Tel: Nottingham 211149

FRENCH

52 DORDON ROAD
DORDON
TAMWORTH
Tel: (0827) 892252

Stockists of: **Toshiba HX-10; disc drives; printers; joysticks; cassette-recorders, and excellent range of software available. Plus Sony, JVC, Mitsubushi etc.**

No. 1 in Calderdale

FRED MOORE LTD.

15-17 Southgate, Halifax
2-6 Commercial St,
Halifax 0422 67763

1 Wellington Arcade,
Brighouse 719660

CHARLES H. SHAW

60A New St, Huddersfield
32443

HARRY GARLICK THE TV CENTRE LTD.

10 Howe Walk, Burnley, Tel: 37118
2 Swan Court Yard, Clitheroe, Tel: 22661

1 Church Street, Barnoldswick, Tel: 813309
11 Scotland Road, Nelson, Tel: 62600

41 Victoria Road, Earby
Tel: 842319

Full range of Toshiba MSX hardware and sofware available

For the best demonstration of the HX-10 come to

JOPLINGS LTD. COMPUTER CENTRE

JOHN STREET
SUNDERLAND
Tel: (0783) 657601

For a demonstration of the HX-10 come to

MANX RADIO RENTALS LTD.

14 Victoria Street
Douglas, Isle of Man
Tel: 3507

66 Parliament Street
Romsey, Isle of Man
Tel: 812292

Software Scene

We review all the very best – and the rest – in the latest MSX software

FRENCH IS FUN

Supplier: CDS Microsystems (0302) 21134
Type: Educational
Format: Cassette
Price: £7.95

This program presents the French language in an interesting and stimulating way.

Included are six different pictorial scenes with plenty of vocabulary and useful phrases.

There is also a section dedicated to teaching the time and how to count.

We chose the 'House Scene' for our first introduction to French and found it quite easy. The most difficult word was fence — for all of you who aren't bi-lingual the French is *La cloture*.

The street scene was much more difficult; the French for traffic lights, zebra crossings and drains are words we can't remember being taught at school. This section was therefore particularly useful.

The pictures are very gradually built up, the English then appears in the top left hand side of the screen and it's up to you to write in the French equivalent.

Any mistakes will be reflected in the mistakes counter shown at the end of each section. Typing in a question mark will automatically display the next letter should you get stuck . . . we often did!

Although the instructions reckon that pressing 'enter' at any time will return you to the main menu, this didn't work for us. Instead a question popped up on the screen asking if we wanted to exit the program.

The graphics are exceptionally bright and very attractive, and managed to hold our attention. Each scene looks like a picture postcard with many objects that may well be missing from most people's vocabulary.

The only fault we could find in the program is that you can cheat.

For example if you don't know the word for cat (*le chat*), by working your way through the keyboard you will eventually hit the right keys and register them on the screen. If you hit a wrong key then a pipping noise can be heard. It's a long winded way of doing things, but it works.

There are other titles in the series — *Italian, German* and *Spanish is Fun.* The manufacturer is obviously onto a good thing as they all have exactly the same graphics but are written in each language.

This sort of program is useful for those just learning a new language and wanting to broaden their vocabulary in a short time.

The program is suitable for people of all ages — and for last minute brushing up for holidays.

Graphics: *Lively and interesting*
User appeal: *Suitable for all age groups*
Conclusion: *Good example of its type*

LES FLICS

Supplier: PSS (0203) 667556
Type: Arcade
Format: Cassette
Price: £7.95

Allo?, Ah ahm Unspecteur Cleudeau of the Surete. Ah neu yew are geuing tew trah en steal a gem steun in ma care!

Yes, you've guessed it, this game is based on the famous detective Clouseau and the even more famous Pink Panther.

The idea is that you control the Pink Panther and try to find and steal the Purple Puma — a priceless gemstone.

Naturally the police will be hot on your tail including Gendarme Kaolin (disguised as a chef), and of course Cleudeau himself.

There are nine buildings to enter, each contains a strange variety of objects ranging from a knife and fork to a spanner and the diamond.

You have to pick up the objects as you find them.

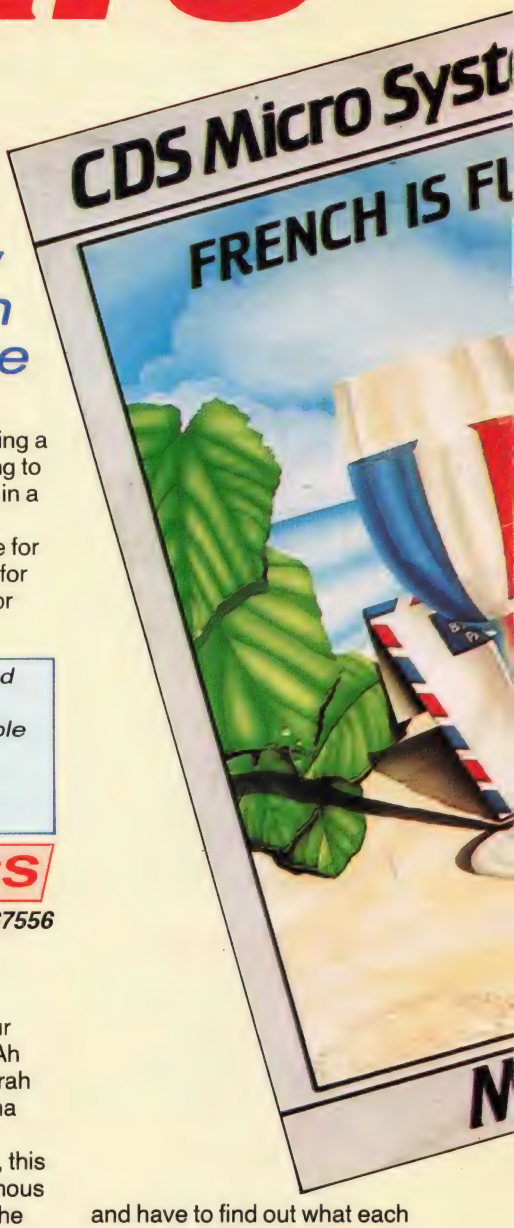
As there are no instructions with the game you are left entirely to your own devices and have to find out what each object does.

Obtaining a high score seems impossible as you've no way of knowing what each of the objects is worth — except by tedious trial and error.

If you fail to get anywhere and the police finally catch up with you, a message flashes up on the screen informing you that the rest of your days are to be spent in the Bastille. A somewhat sobering thought!

Les Flics reminded us somewhat of the board game 'Cluedo'. The same principles are involved, and you get bored after a short while just as easily.

All the time the game is being played a police siren



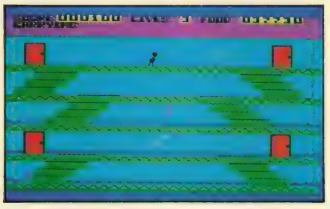
keeps wailing. This gets *very* annoying. Migraine sufferers take note!

As for the graphics they are pretty uninspiring. Staring at an insipid green and puce pink screen isn't good for the eyes.

Starting the game off, the most niggling aspect is the lack of instructions. All you are told is that the Pink Panther can be controlled either by a joystick or the cursor control keys.

A message then flashes onto the screen declaring: 'The rest you have to work out yourself'.

Only after you have played the game for a considerable length of time do you discover in which buildings each object



is kept. And only then do you find out which ones are the most useful, by which time you are so fed up trying to suss the game out that it gets switched off in sheer frustration. Maybe this game will appeal to the under-12s, but us old 'uns quickly lost interest.

Overall, then, *Les Flics* is a bit of a let down. The cover picture and brief description leads you to expect much more action and adventure than actually exists.

Graphics: *Disappointing*
Sound: *Repetitive*
User appeal: *Maybe for the kids*
Conclusion: *Disappointing for Pink Panther fans*

DISC WARRIOR

Supplier: Alligata (0742) 755796
Type: Arcade
Format: Cassette
Price: £7.95

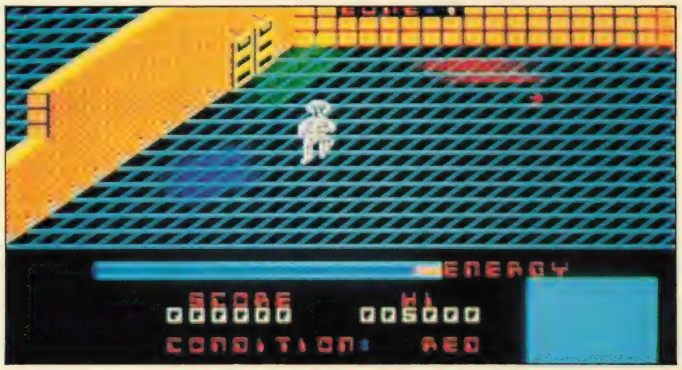
If you have ever had a secret craving to go round an intergalactic maze now's your chance.

Disc Warrior from Alligata revolves around a space man trapped inside a very extraordinary room.

The poor devil has to find a way out and this is not as easy as it sounds. In order to escape, a key has to be found which is hidden in one of the eight chambers.

The warrior, controlled by you, wanders somewhat aimlessly round the chambers trying to avoid all the obstacles in his path, which range from other spacemen lying in wait to zap him to atomic bombs.

Some of the chambers have dead ends and although the spacemen that are after you can walk through walls you can't. Nobody said this was going to be a fair fight!



But there is some help. Many of the chambers have ladders built into the walls which can be used to access the next chamber.

At one stage we did manage to find the key but trying to get out within the time limit just wasn't possible.

The time is measured by a coloured bar chart at the bottom of the screen. The warrior starts off in a 'cool' condition. As the time ticks by he gets nearer and nearer to the most dangerous condition . . . red!

Although the game is very addictive we also found it fairly frustrating, as it takes a long time to actually sus out what's going on.

It's only after you've played the game three or four times that you start to realise exactly what to avoid and how to move through the maze.

Firing, or rather attempting to fire, back at the obstacles is quite a problem as the game doesn't allow you to protect yourself.

Picking up the key when it is eventually found is another problem. We kept walking over it several times until we worked out the technique and managed to grab hold of it. Mind you, we haven't yet seen any documentation, which might shed some light on it.

The graphics are very vivid and add to the attraction of the game. The warrior is an almost transparent white, while the pursuer's are a hazy looking red with the bombs an almost invisible orange.

Because the figures are not solid it is sometimes extremely difficult to see them.

When *Disc Warrior* arrived in our offices for review it came without any instructions. And after playing the game several times we are convinced that there is more to this than meets the eye.

This is simply because no matter how well we appeared to be doing it just was not possible to find a way out of the maze within the time limit. We must be doing something wrong!

Young children will not appreciate it, though, as it requires intense concentration and strategic planning. It would be a lot easier if the manufacturer included more detailed instructions, instead of the few lines that appear immediately after loading.

We also think that the time ticks away far too quickly and could be slowed down.

Graphics: *Somewhat confusing*
User appeal: *Great for adventure buffs*
Conclusion: *Well worth the money for the Discerning games player*

CRAZY GOLF

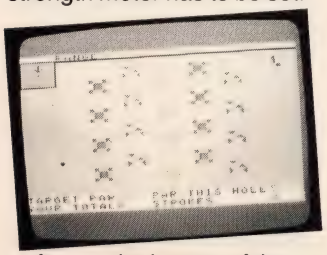
Supplier: Mr Micro 061-728 2282
Format: Cassette
Price: £7.95

Crazy Golf really is a crazy game! We found it to be unpredictable, occasionally frustrating and extremely slow. Still, for all the criticism, the idea is original and anyone fed up with the zap 'em arcade games may welcome the change.

Ten different crazy golf scenes await the player who controls the ball with either the keyboard or a joystick. At the beginning of each hole, the ball lies at one end of the course and the hole and flag at the other with the obstacles in between — just like in crazy golf.

But instead of the windmills and bridges, characteristic of the real crazy golf courses, Mr Micro has put various geometric shapes and lines.

The direction meter is situated in the corner of the screen and the strength meter lies across the top. The controls are extremely simple to use. The idea is to judge what direction the ball should go in to successfully negotiate an obstacle, be it a straight line or several scattered dots, and to move the arrow around accordingly. Once the direction has been established, the range or strength meter has to be set.



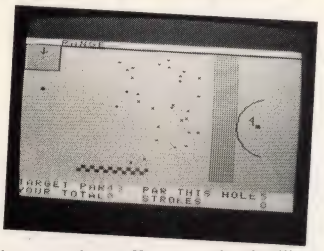
Across the bottom of the screen runs an information box with the target par of 56, the player's total score, the par for the individual hole and the number of strokes the player has taken on the hole.

On the first hole the obstacles are fairly uninteresting with simple lines to navigate around. We had a lot of trouble getting the right angle on the direction meter.

Once a shot has been played the ball moves extremely slowly over the screen and the only indication that there is any power in the shot is when the ball bounces onto the walls.

On the second hole we thought we could see water hazards, but on closer inspection they were boxed off and the blue watery-looking substance was for decoration only. A shame, that a few water hazards might have lightened the load of 10 rather boring hole scenarios.

A variation on the rectangular boxes and small gaps theme are what seem to be boxes, but which are in fact jagged shapes. They have an



interesting effect on the ball's bounce. Getting the ball into the hole is not always easy as the flag always seems to be in the way. At one hole the ball was actually over the hole, but the program would not register that it had gone in.

On the final hole, the triangles and circles seem to have fairly solid lines, but in fact the ball actually passes through at some places and then refuses to come out again — it just bounces around and around!

Eventually the walls do open up but seemingly for no reason at all and the game can be resumed —with a bonus extra six points.

Crazy Golf is apparantly one of Mr Micro's most popular games, and as a company spokesman told us, 'some people really do like boring games!' A two-player facility would have made a great difference as competition livens up any game.

Graphics: *Could be more imaginative*
Sound: *Plunk, plonk, plink — adequate*
User Appeal: *I'm not sure why, but it does have appeal*
Conclusion: *Crazy, slow, but quite fun*

NUG-IT

Supplier: Microcom (0626) 4583
Type: Arcade
Format: Cassette
Price: £6.95

If you have ever fancied yourself as a gold digger, then *Nug-It* is bound to be very appealing.

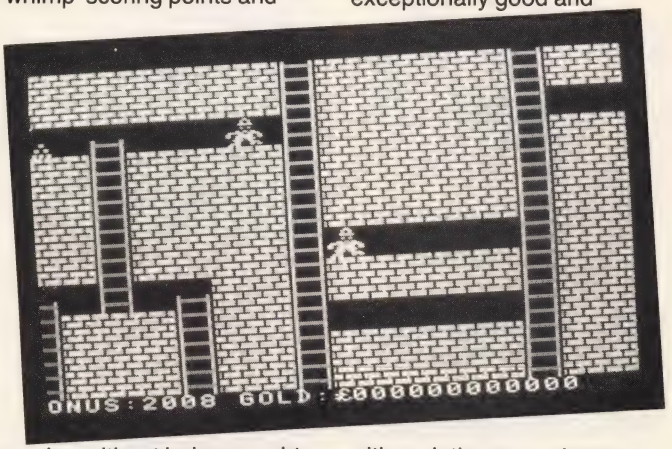
The scenario is, as the title suggests, a gold mine. Piles of gold are liberally scattered about. But, there is an added bonus, a whopping great diamond is buried waiting to be discovered.

However as in most good games there's a catch! The mine is overrun with some 'nasty yellow' miners.

According to the instructions, the miners suffer from Bubonic plague with some horrific complications.

There are five levels of difficulty at which you can play. Whimp is the easiest and Skargill (presumably named after a well known trade unionist) is the toughest.

In practice we found this not to be the case. By playing as a 'whimp' scoring points and



moving without being caught is virtually impossible.

But, when in Skargill mode the miner really whizzes around the screen.

The game has a few useful devices built into it. For instance if you get fed up trying to get the gold and feel that you're not getting anywhere press the ESC key.

This facility allows you to 'hyper dig' and locate the booty but a life has to be given up in return.

By pressing the space bar the screen freezes itself and you can take as long as you like to have a look round and suss out where the diamond is lying. However we found that if the space bar is pressed more than three times in a row the game cuts out and starts all over again.

According to Microcom this shouldn't happen and it is currently working on an improved bug free version!

When the game is first loaded a screen full of instructions appears, but nowhere does it tell you that to play using the keyboard the letter K has to be pressed. This we found acutely annoying. Until we made a quick telephone call to Microcom we were convinced that the game could only be played with joysticks.

Another phone call to Microcom revealed that it had received a lot of feed back on *Nug-It*. Most of it was negative and criticised the speed of the miner and that it was too difficult to grab the gold. Microcom is planning to slow down the improved version of *Nug-It* which should solve the problem, and in our opinion make it less fun to play.

The graphics are exceptionally good and although the scenario stays the same, after all one gold mine's much the same as another, there's so much action that it's difficult to get bored.

This is just the sort of game that addictive arcade players will revel in.

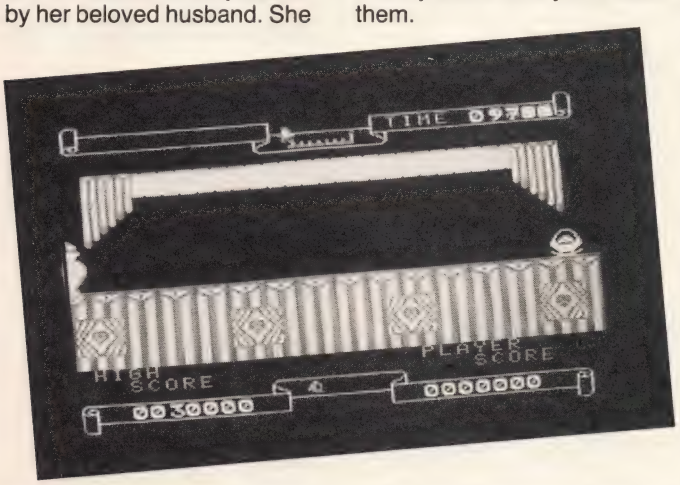
Graphics: *Very sharp*
Sound: *You can actually hear the hob-nail boots*
Conclusion: *Well worth digging into your pockets for!*

PUNCHY

Supplier: Mr Micro 061-728 2282
Type: Arcade
Format: Cassette
Price: £7.95

As the title suggests this is about the traditional victorian theatre puppets Punch and Judy.

Judy has been locked away in the Punch and Judy booth by her beloved husband. She has called upon the services of the Bobby to come to her aid.



Cast as the Bobby you have the not so easy task of attempting to find a way through a whole host of obstacles to try and rescue her.

Dodging the rotten tomatoes and custard pies is the least of your problems — it's the alligators you really need to look out for.

To help you dice with death and not come a cropper too early, Judy manages to throw some sausages in your direction. If you manage to catch three of them, you can then be magically transported to the next screen.

But, take a tip from us: Only use them if you are really having problems.

Each time you manage to get across to the other side of the screen the baby needs to be rocked, and throughout the game you get constant voice synthesis reminders to 'Rock the baby'.

After a while this can get very annoying and unless you turn the sound down it may even put you off the game.

The graphics are suprisingly good and the vivid colours add to its attractiveness.

It's the sort of game that requires more initiative than skill. For instance most of the bombs can be avoided by jumping across the screen and then ducking, this not only speeds up your time but gains lots of extra points.

Our only real complaint is that after manoeuvering our way through five screens, no sausages were thrown. They start appearing after screen five, by which time you'll need them.

The idea behind Punchy is very reminiscent of Konami's *Athletic Land*. In both games you have to pass a series of objects.

The big difference between the two is that in Athletic Land it is possible to go backwards and get past many of the obstacles with relative ease. However, Punchy doesn't allow you to do this, which makes it all the more difficult.

But Mr Micro has allowed for that and puts an incentive in at the end of screen five or when you get more than thirty thousand points. A chart comes up on the screen and you can enter your name as a high scorer.

Determined not to succumb to defeat we soldiered on and managed to get onto stage nine.

The magic sausages were flying thick and fast yet we were unable to catch any. So, either the game is a lot tougher than we originally thought or there's a gremlin in the software!

Graphics: *Appropriately punchy*
Sound: *Aural assault*
Conclusion: *Addictively compelling*

CUBIT

Supplier: Mr Micro 061-728 2282
Type: Strategy
Format: Cassette
Price: £7.95

Fed up with zapping the endless hordes of mutated zombie aliens? If your answer is yes, have a go at *Cubit*, a three dimensional noughts and crosses game from softwarehouse Mr Micro.

Four coloured grids, each divided into 16 squares appears on screen and the idea is to place a row of four pink counters before your opponent does.

The three-dimensional aspect of the grids can cause some confusion and it is important to remember that the row of four can stretch across the planes, not only horizontally and vertically, but diagonally as well. This is where it becomes a little difficult.

It is possible to play against the computer, but it may be more enjoyable to pit your wits against a fellow human, because the computer seems to be endowed with such incredible foresight and logical abilities that it is almost impossible to beat. At least that's our excuse — and we're sticking to it!

But it can be beaten with a little luck and cunning strategy. While the game was in the development stages, it *was* impossible to beat, Mr Micro told us. The programmers had to tone down the computer's fast logic search slightly to give us mortals an outside chance at least!

The diagonal lines of counters running between the planes are the hardest to spot and the computer takes advantage of these 'concealed' lines with uncanny regularity!

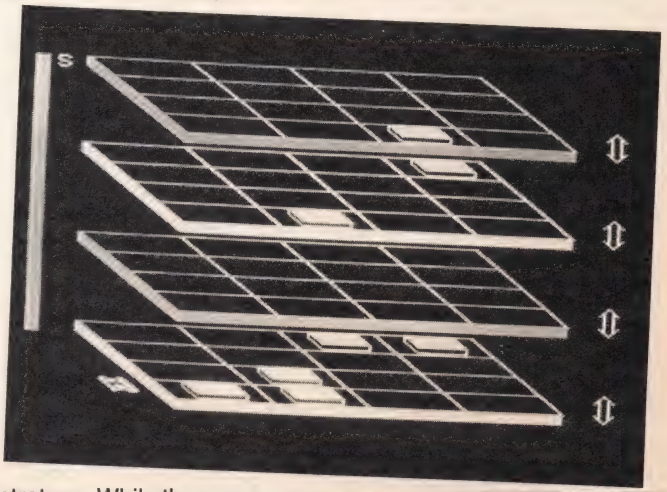
Manipulating the counters over the squares and placing them can prove difficult at first, but we found that a little practise soon irons out any problems.

Either a keyboard or joystick can be used and a high pitched bleeping sound accompanies the counter as it moves up, down and round the boards.

Arrows on the screen's right hand side indicate what direction of movement your counter can move around in. Play is against the clock and a seconds timer lines the left hand side of the TV screen.

Once someone has won, white counter covers zoom in from the side of the screen and cover the four winning ones. A 'you' or 'I won' sign announces the victor's success.

Cubit does require a certain amount of careful thought and beating the computer is such a rare and satisfying feeling that you will find yourself playing again and again — until finally you've discovered the winning formula which is when, as in all games, it loses its attraction.



Graphics: *Clever three-dimensional effect*
Sound: *Adequate, a bit repetitive*
User Appeal: *Fun at first*
Conclusion: *Provokes the winning instinct*

HUMPHREY

Supplier: Mr Micro 061-728 2282
Type: Arcade
Format: Cassette
Price: £7.95

Humphrey is not happy. The poor boy is being pursued by bouncing bombs, (they looked more like blue rabbits to us).

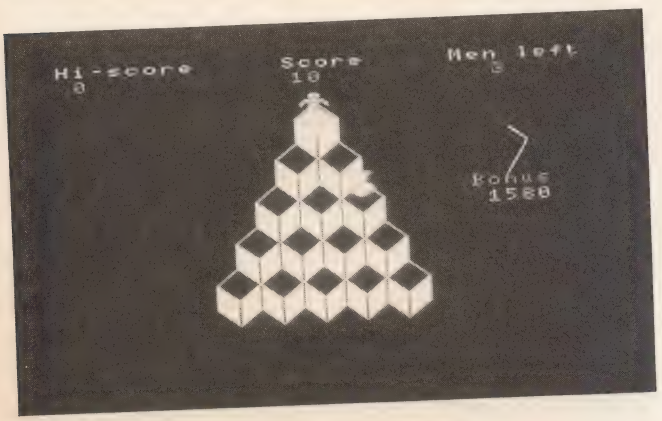
It's up to you to make sure he keeps one step ahead of the bombs and jumps onto all the blocks on the screen.

Once he has jumped onto all the blocks — and it's not easy — they change colour. And guess what, you are then transported onto the next level.

To make the game as tough as possible, Humphrey can only be moved by pressing two keys at once, and he can only move diagonally, which can be extremely inconvenient.

The cassette cover claims *Humphrey* is 'cunning with tremendous addictive properties', but we found it so unimaginative that boredom set in after only a couple of minutes.

The background music is by no stretch of the imagination soothing, and began to get on our nerves so much that we turned it off.



Strategy and co-ordination are definitely required in order to get anywhere and actually score any points.

Although the blocks do change, and form different arrangements on each level, whichever way you look at them they still look like a honeycomb.

Only one person in the office could whip up the enthusiasm to get onto the fifth level.

The game has four different play designs. The first one is the easiest and the fourth is downright diabolical.

However, there is a way of beating the bombs. Instead of moving straight away, sit tight and wait until the bomb has passed through Humphrey. Only then is it possible to fill in all the squares and score any points.

Should you decide not to wait, making the first move is quite a gamble. You can only move in two directions on the first level, down-and-right or down-and-left and there's a fifty-fifty chance that the bomb will land on you.

The graphics are much better than the actual game, but having said that Mr Micro could have made better use of the colours. Sometimes it can be really difficult to actually read the score and note how many lives are left.

Despite the graphics, this probably isn't the game to buy for the under-10s.

It is more likely to appeal to those who revel in strategic planning and are good at manoeuvering themselves out of awkward situations in a matter of seconds.

We found *Humphrey* a little disappointing compared with the other games Mr Micro has launched for MSX. And as there are a lot of games packed with more action on the market, it may well be passed over.

Graphics: *Not bad but . . .*
Sound: *Hmm . . .*
Conclusion: *It could give you the hump!*

3-D GOLF SIMULATION

Supplier: Toshiba (0276) 62222
Type: Sports simulation
Format: Cassette
Price: £7.95

The local golf course can be a pretty grim place in the depths of winter — blizzards, snow drifts, howling winds, bad light — unpleasant! Toshiba's *3-D Golf Simulation* brings some of the excitement of the game to the player in the comfort of an armchair by the fire!

Two different views of each hole are displayed on screen. One shows the player what can be seen from the tee looking towards the hole and the other displays a bird's eye view of the course.

In the bottom left hand side of the screen, a box provides information on the hole he or she is playing — its par, the number of shots that have been taken, the distance between the tee and the hole, what club is being used and where the ball has landed — fairway, bunker, rough, green or out of bounds (O of B).

Each hole is different so a new challenge is presented to the player on every one of the nine holes. Some of the holes are extremely difficult as the ball has to pass across wide stretches of water or large tracts of O of B areas. The bird's eye view is especially useful as the player can aim the ball towards the hole avoiding obstacles like the sand bunkers and lakes.

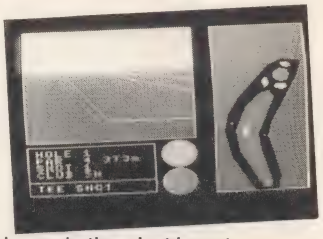
Before the player can make a shot, he or she must take note of the course conditions, where the ball is situated and the distance the ball has to go. It's not much good hitting the ball with a putting club very weakly when the ball is still on the tee with 250 yards to go into the wind!

All the controls and parts of the course are colour-coded. The fairway and green are green, the Out of Bounds areas are red, the rough is black, lakes are blue, trees are purple and the bunkers are white.

At the beginning of each hole, the ball flashes on the tee and at the same time the club flashes in the control box. Woods, irons, wedges and putters — they're all there.

Once the club has been selected with the cursor keys, a white hand on a red circle starts to flash — this represents the shot direction.

The wind direction, the sand bunkers and the out of bounds areas have to be considered before choosing the shot direction. If the ball goes out of



bounds the shot is not counted, but two points are added onto your par.

Once the direction of the shot has been chosen, a power gauge appears. The shot is taken by pressing the space bar when the power indicator is at the strength desired.

On both of the course views the path of the ball is shown, but the effect is rather boring after a while because it's so slow. After you've taken your ninth shot just to get onto the green, waiting for the ball to land can get extremely tiresome.

The out of bounds areas are far too large and although they are intended to make the game more difficult they in fact make it incredibly annoying. Setting up the shot could be completed fairly quickly using space bar and cursor keys, but there is still a lot of waiting around.

Playing golf by yourself is alright, but it is much more fun with two — a two player option would have given the game a bit more interest. It is extremely colourful and visually interesting, but it is not the most professional golf game we have seen for the MSX.

Graphics: *Colourful*
Sound: *Poor*
User Appeal: *On a cold wet day, indoor golf may be preferable*
Conclusion: *The outdoor version is more fun*

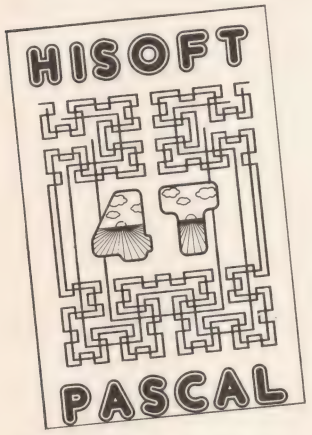
HISOFT PASCAL

Supplier: Hisoft (0582) 696421
Type: Language compiler
Format: Cassette
Price: £29.95

Pascal is a very popular and highly structured programming language, which is taught in numerous universities and colleges.

Its applications range from learning about programming through to complex database management systems and even systems programming.

Hisoft Pascal is an MSX version of the company's



earlier compiler for the Spectrum, Amstrad and most other Z80 based machines. It therefore has a good pedigree and has certainly been very well received on other machines.

Pascal programs are produced in source form using the integral editor, which is an extension of the normal screen editing capability of an MSX machine and is fairly powerful.

One option available from the editor is the compilation of your Pascal program. This compilation is very fast and produces pure Z80 machine code which may optionally be saved to cassette and run as a normal machine code program later on.

Being in machine code, the programs produced by this compiler themselves execute very fast, often more than 10 times faster than an equivalent BASIC program, and almost everything that can be done from BASIC can be done from Pascal.

Pascal is, of course, one of the most strongly-typed languages which means that each of the variables in a program is declared able to hold a certain type of value such as an integer, a character or a floating point number. This makes it ideal for education but it can be a little too restrictive for systems programmers.

To partially overcome this, *Hisoft Pascal* incorporates various procedures to interface directly with the system.

INLINE allows you to include your machine code routines as part of the compiled code and USER allows you to call MSX ROM routines, passing parameters back and forth as appropriate. This gives the Pascal programmer some degree of systems capability.

The compiler takes full advantage of the memory in a 64K machine, storing your source text (the program) directly underneath the BASIC ROM.

It is also extremely compact, which coupled with the ability to compile the bulk of a program from tape, makes it possible to produce a program of far greater extent than could be done with BASIC.

The present version of the compiler does not support FILE types or variant record fields but the company is working on a new compiler which will incorparate all these facilities.

Hisoft Pascal is close to the standard defined by the language's author, and the product is, in common with all Hisoft's products, constantly being improved. As it stands, it is a versatile and apparently bug-free implementation of the language which should augment any serious MSX owner's collection of programs.

Documentation: *Copious and straightforward*
Features: *True compiler, able to use all 64K RAM available to it*
Getting started: *You'll need a book on Pascal!*
Conclusion: *If you like the language, an excellent compiler*

SWAMP

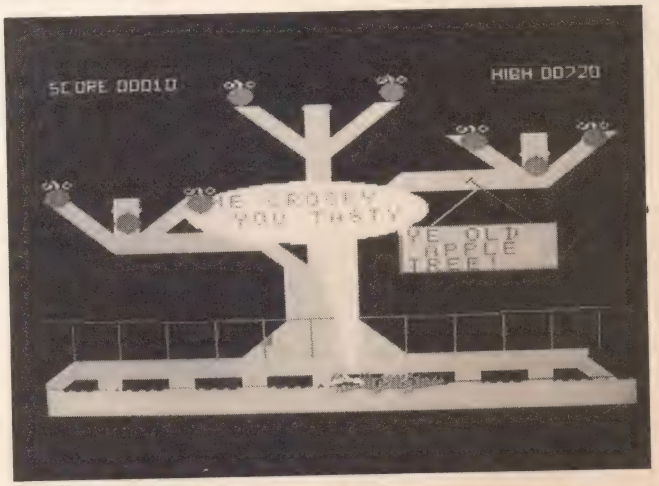
Supplier: Microcom Software (0626) 4583
Type: Arcade
Format: Cassette
Price: £3.95

Picture the scene if you can; a fruit laden tree, a rickety pink bridge, a crocodile infested lake, a little round Martian with little legs and antennae and you've got a pretty accurate picture of *Swamp*.

The banana yellow coloured tree dominating the screen is not the most tree-like tree we have ever seen, but it does have three main branches with twigs sprouting from each one. The roots pass into the water below and a bridge spans the screen. Nine fruits hang from the twigs.

On the first screen, the player is confronted with 'Ye Olde Apple Tree'. The nappy-clad Martian appears in the middle of the screen and starts to jump up and down. As he jumps from the bridge up to the tree top and down again with the help of a parachute, the Martian is meant to grab some fruit.

Both the ascent and descent is controlled by the player with either the keyboard or joystick. The controls are not the most sensitive and accurate we have experienced but it's OK after a bit of practise.



On the first level, collecting apples is a fairly simple process, hampered only by the bridge's propensity to collapse whenever the Martian landed. If he accidently touches down on a gap in the bridge, he immediately falls straight through into the water below. A crocodile then darts up and utters the immortal words 'Me Crocky you tasty!'

If this level is successfully negotiated and all the fruit collected, the next scene unfolds — a cherry tree. This time snakes wander along the bridge and they topple anyone who lands on them into the crock infested waters below.

In the next level you come across 'Bright Green Nanas'. I suspect they're intended to be bananas. This time the crocodile swims to and fro eating the bridge so it is important to collect the fruit as quickly as possible.

There are five more levels. Although the game appears to be rather boring at first, it is actually quite a challenge, especially considering you've only got one life. If the crocodile manages to devour the Martian — which is extremely frustrating if you've managed to get some way — back you go to the beginning.

The sound effects are good, particularly the level where the bee buzzes across the screen on the orange tree level. The graphics are not particularly stunning, in fact they're awful, but the game does have some appeal.

Swamp's theme is suprisingly simple but getting through each level is quite difficult. The challenge is its main attraction.

Graphics: *Colourful but crude*
Sound: *Better than the graphics*
User Appeal: *A difficult challenge*
Conclusion: *I like it, but I don't know why*

NUMBER PAINTER

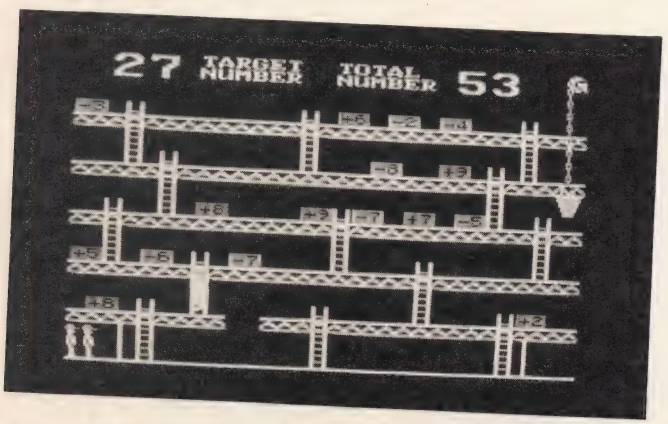
Supplier: ASK 01-874 6046
Type: Educational
Format: Cassette
Price: £8.95

This educational package from ASK is a cross between a mathematics tutor and a game.

It encourages players to practise the number skills of addition, subtraction, multiplication and division on 12 different levels.

A test option is included so that players can monitor their improvements, if any!

A painter is directed around a building site, painting



numbers that will make up a target number.

All this has to be done before the time runs out when a bucket of bright green paint totally floods the screen.

When the painter reaches the target number successfully, you will automatically go up to a higher level — which is of course a little more difficult.

Unless you read the instruction booklet (and we didn't to start off with) it's possible to have an accident. At the higher levels we were caught totally unaware and fell through holes that mysteriously appeared in the girders!

Such accidents add to the fun (?) and as the program is aimed at the five to 14 age group, will no doubt keep them amused.

A choice of speed is also offered so your painter can be a Mr Plod, Mr Walker, Mr Swift or, if you're really on the ball, Mr Speedy . . . he really moves fast!

The graphics used are extremely good — a lot of thought has gone into the structure and how to keep the player's attention. *Number Painter* is useful in encouraging young children with simple mental arithmetic skills to build on their knowledge, and become more confident in dealing with numbers.

Throughout the program mathematical concepts are constantly reinforced. For example, although repeated addition is a good way of solving a multiplication sum it isn't exactly efficient.

It is not only mental agility that is required to get through all the tests successfully but also planning skills.

Before any of the tests are undertaken it is wise to plan a course of action and make best use of the numbers and their operators on the screen.

The self test helps you assess your progress. A set of 10 questions are shown on the screen and you have to answer them as quickly as possible.

The higher the level the more difficult the questions. If the answer is correct the painter nods his head, if it's wrong the painter shakes his head in despair.

Of the few educational games to arrive in our office so far, this is probably the best. ASK is planning to bring out more games of this nature — let's hope they're appealing.

Graphics: *Appealing*
User appeal: *Keeps the grey matter ticking over*
Conclusion: *A good educational arcade type game*

SUPERCHESS

Supplier: Kuma (07357) 4335
Type: Traditional game
Format: Cassette
Price: £8.95

If you seriously believe that you are a champion chess player, try pitting your skills against Kuma's *Superchess*.

This implementation of chess has seven levels of play ranging from easy to downright difficult.

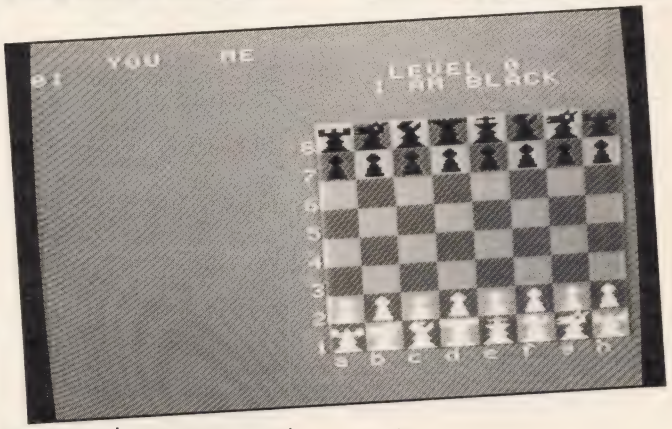
The first four levels play within tournament time limits, and level zero responds to immediate graphic screen display of board and pieces.

If you get really stuck and just can't seem to figure out where to move to next, simply press the 'S' key and the computer will move for you.

Alternatively you can press the 'R' key and the computer will recommend which one of the pieces to move next.

We tried the computer's recommendations and the cheeky hunk of plastic put us into a very dodgy position . . . 'check'.

If you pick level 6 you'll have a long wait, this is meant for



correspondence games and can take up to twelve hours according to the instructions!

Having initially loaded the game there are two options offered. Either the play mode or the analyse mode.

If you go for the analyse mode you can automatically change the level of play, positions and get technical information.

Having played numerous games against the computer we are quite convinced that it cheats!

For example, its Queen was drawn out into the open and could be taken either by our King or by one of our Pawns. When we tried moving the computer kept flashing up the message 'illegal move'.

Later on in the game we decided it was high time to bring our Bishops into the game. When we tried moving them the computer again would not accept it.

By this time patience was wearing very thin and in sheer desperation we switched the machine off and started again.

Again the computer refused to allow us to move Bishops backwards and forwards, Knights horizontally and vertically and Pawns forward.

Whenever we were winning the computer seemed to play up, and forced us to make moves that we wouldn't normally have considered.

So, we've come to the conclusion that either the computer is a far superior chess player, or there's a gremlin in the works!

Quite probably the program has been written by some computer chess whizz kid who knows more about chess than we do.

Having moaned and groaned about the game we can truthfully say that it is very addictive. And we were determined that the computer wasn't going to have the last move. But we do think that it is a little over priced.

Graphics: *Just like a real chessboard*
User appeal: *Ideal for those with vast reserves of patience*
Conclusion: *Worth pondering over*

WHO STOCKS THE SANYO MPC 100? . . . WE DO

ANDYS ELECTRONICS
150-152 FORTIS GREEN ROAD
MUSWELL HILL
LONDON N10
TEL: 01-883 8969

BORO ELECTRONICS
UNIT 1, FORBES BUILDING
LINTHORPE ROAD
MIDDLESBROUGH
TEL: 0642 217166

WARD & WILLIAMS
34 STOCKPORT ROAD
ROMILEY
STOCKPORT
CHESHIRE
TEL: 061 430 2934

BENNETT & BROWN
181-183 WINDMILL STREET
GRAVESEND
KENT
TEL: 0474 533060

CRESCENT VIDEO
1818 CRESCENT WAY
FARNBOROUGH
KENT
TEL: 0689 61400

BORO ELECTRONICS
26-30 CLAYTON STREET
WEST
NEWCASTLE-ON-TYNE
TEL: 0632 615796

KAC ELECTRONIC LTD
53-57 CAMDEN ROAD
TUNBRIDGE WELLS
TEL: 0892 23242

S. LAWS LTD
524/526 HOLLOWAY ROAD
LONDON N7 6JD
TEL: 01-272 3780

SOUND VIDEO CENTRE
132 BALHAM HIGH ROAD
LONDON SW12 9AA
TEL: 01-673 3398

DEANS GENERAL SUPPLIERS
29 MARKET SQUARE
EDMONTON GREEN
LONDON N9
TEL: 01-807 5058
For all MSX computers, accessories and programmes

JOPLINGS LTD COMPUTER CENTRE
JOHN STREET
SUNDERLAND
TEL: 0783 657601

STAR TELEVISIONS
1 MARKET PLACE
BIDEFORD
NORTH DEVON
TEL: 02372 4312

K. K. STATIONERS
187 EDGWARE ROAD
MARBLE ARCH
LONDON W2 1ET
TEL: 01-723 1436

HODGES & JOHNSON LTD
96-98 HAMLET COURT ROAD
WESTCLIFF-ON-SEA, ESSEX
TEL: 0702 334488

PHOTOSTEREO LTD
109 QUEENSWAY
LONDON W2
TEL: 01-221 3227

THE SOUND OF MUSIC COMPUTER VISION
147 CHISWICK HIGH ROAD
LONDON W4
TEL: 01-994 6563

ROY POLLARD LTD
379 WARWICK ROAD
SOLIHULL
W. MIDLANDS
TEL: 021 705 8662

JATALA ELECTRONICS
488-490 CHISWICK HIGH ROAD, LONDON W4
TEL: 01-995 8535
Range of MSX hardware and software available

TELERENTS (NORTHERN) LTD
31 NEWGATE ST.
MORPETH
TEL: 0670 573537

TOMORROWS WORLD TODAY
27 OXFORD STREET
LONDON W1
TEL: 01-439 7799

ROY POLLARD LTD
1756 COVENTRY ROAD
BIRMINGHAM 26
TEL: 021 742 3489

S.U.D.A.
80-84 FLIXTON ROAD
URMSTON
MANCHESTER
TEL: 061 748 1132

R. D. ELECTRONICS
507 HALE END RD,
LONDON E4
TEL: 01-527 5736

W. ROURKE LTD
290 KILN ROAD
BENFLEET
ESSEX SS7 1QT
TEL: 0702 558525

THE LEISURE SHOP
65 BLABY ROAD
SOUTH WIGSTON
LEICESTER
TEL: 0533 786394

SKELTONS (SOUND & VISION) LTD
32 HIGH STREET
LEOMINSTER
HEREFORDSHIRE
TEL: 0568 2638

TELEFRINGE
2-3 KING STREET
FROME
SOMERSET
TEL: 0373 62598

D. J. COMPUTERS
40 FRETHERNE ROAD
WELWYN GARDEN CITY
TEL: 07073 28444

11 TOWN SQUARE
STEVENAGE
TEL: 0438 65501

A. N. AUDIO
46 MARKET SQUARE
ST. NEOTS
CAMBS
TEL: 0480 72071

SOLON ELECTRONICS
198 EAST FINCHLEY HIGH ROAD
LONDON N2
TEL: 01-883 7827

RADIO & TELEVISION SERVICES
FOR **SIGHT & SOUND**
10 CLEVELAND STREET
DONCASTER
TEL: 0302 20771/20364

G. A. COMPUTERS LTD
22 HIGH STREET
RUDDINGTON
NOTTINGHAM
TEL: 0602 211225

PINBALL

Supplier: Toshiba (0276) 62222
Type: Arcade
Format: Cassette
Price: £7.95

Thanks to Toshiba you no longer have to trundle down to the pub for a game of *Pinball*.

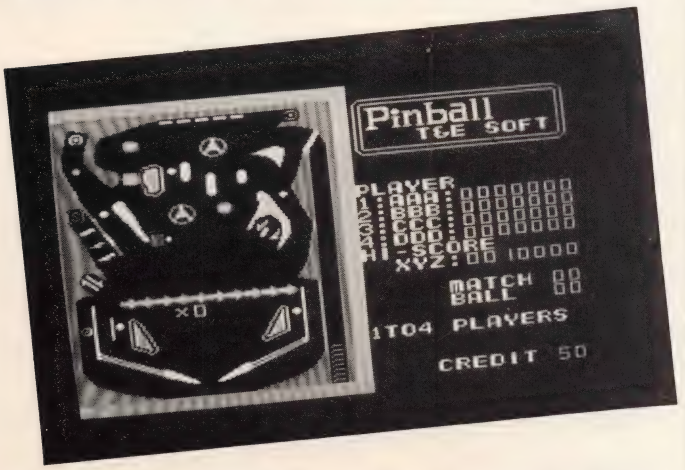
The famous pub game is now computerised and just as good as the real McCoy.

A choice of beginner or professional level is offered. If you've never played the game before we recommend that you don't start with the latter.

Before starting the game the computer has to be told how many people are playing.

Once that's sorted out the names of each player are entered. The game will then be set and ready to play.

This is where the problems start. According to the instructions the flippers can be controlled with the Z and £ keys. If you are the owner of a Canon V-20, however, the



flippers cannot be controlled with both of these keys.

Instead you have to use the Z key and the bottom right punctuation key (the one that is not normally used). This we discovered by working our way through the entire keyboard until we found a key that operated the right flipper.

The other snag we discovered is that should the wrong keys be pressed continuously during the game the message 'Tilt' will appear on the screen, the game finishes and you find yourself back at square one.

Should you be skilled enough to make it through to the high scoring level and acquire 100,000 points, you can then enter the challenge stage. But just getting there is a challenge in itself — we just could not get that high a score.

But we can reveal that the challenge stage really is challenging!

Apparently all the images except the tricks fade from the screen — ie, the flippers and ball — and you become a 'blind' player. How you are supposed to score is anybody's guess.

The graphics are great. When the ball bounces round the board all the obstacles it hits actually move just as they do on original pinball tables.

The only feature that lets the game down is the noise. Until the ball is actually hit all that can be heard is a dull low pitched thudding noise.

However, once the ball starts rolling it gets a lot better — very realistic 'pinging' and 'ringing' noises can then be heard.

Pinball is the sort of game that will appeal to those who really relish pitting their wits against a machine. It is totally addictive and brought out the competitive spirit in quite a few people in the office.

This is one of those games that is suitable for all ages. No detailed knowledge of the game is required because all that's needed is the ability to press a couple of keys.

Pinball will undoubtedly keep even the most boisterous child out of mischief, and for this reason alone is well worth adding to your collection.

User appeal: *Loved it*
Graphics: *Mechanically good*
Conclusion: *An all round entertainer*

BACKGAMMON

Supplier: Electric Software (0954) 81991
Type: Traditional
Format: Cassette
Price: £9.95

Lonely *Backgammon* addicts will welcome the chance to play a competent version of the game without having to hunt around for a partner.

Of the joystick/keyboard options we preferred the joystick — its controls seemed to be much smoother and quicker. A demo mode is available and it is a good idea to watch it before starting a game — it clearly illustrates how the game should be played.

Backgammon instructions do accompany the game, but they are probably better used to refresh the memory on the rules of backgammon rather than as a basis from which to learn the game.

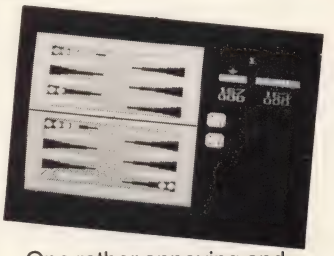
Once the controls have been chosen the backgammon board appears on screen — a very lifelike representation of the traditional board. The two inner compartments where the player moves all the pieces are situated at the bottom and the two upper tables are above them. Even the triangular bits holding the counters are present.

Two coloured labels — red and blue — by the side of the board represent you and the computer. The computer plays with the blue counters, you with the red. Underneath the labels are two three-digit numbers, the upper number being the total that the player needs to throw before all the counters can be moved off. The player's name can be typed into the red label and he or she has a choice of playing up to 64 games! Once the number has been chosen the game starts.

The red and blue dice are rolled across the screen; if the red number is higher, the player starts first. The dice rolling action is extremely lifelike as if someone is actually throwing them across the screen. The numbers on the dice are of course selected at random and didn't seem to be loaded in anyone's favour (although when the computer had received its sixth double six in a row I wondered).

Moving the counters is a bit tricky at first, but after a while it becomes easier.

If the player tries to move the counter the wrong way or tries to move it to a location more or less moves than the dice has given, the program will refuse to place the counter at all — no cheating allowed.



One rather annoying and time consuming characteristic of the game is that every move has to be placed — if you want a counter to move using both dice scores, each one has to be placed before moving on.

All the rules of backgammon have been included into the game. For instance if one player receives a hit — the opponent lands on his or her counter — the counter is placed on the middle partition as in the real game. Once one of the players has got all the pieces into the inner board he can start to take them off.

Once someone has won, the screen flashes in the winner's colour.

A doubling cube at the top of the board shows the value of the current game and is set at one at the beginning of each game. Either the player or the computer can double it, although if the player doesn't want to accept the doubling bid, he can concede the game at the original value.

If you enjoy backgammon, Electric Software's version of the game should provide you with a few hours of amusement.

Graphics: *Accurate and colourful*
Sound: *Minimised to bleeps*
User Appeal: *If you like backgammon, you'll like this*
Conclusion: *Well documented*

HUSTLER

Supplier: Bubble Bus
(0732) 355962
Type: Traditional
Format: Cassette
Price: £6.99

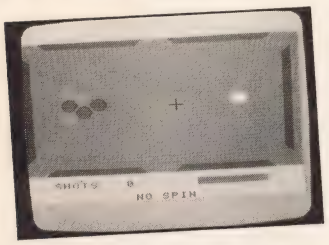
While the pubs are closed confirmed pool addicts may find some solace in *Hustler*, a computerised version of the pub game. But not for long! As soon as the pubs re-open, *Hustler* will probably be cruelly abandoned in favour of the real thing.

Bubble Bus has packed six different games into this program. Three are one player games and the remaining three are for two players.

A full size snooker table complete with vividly coloured green baize and six pockets, four in the corners and two in the sides appears on screen.

Each game starts with the white cue ball at one end of the table and six balls set in the familiar triangle formation at the other end. The cue is represented by a little cross.

To hit one of the red or yellow pool balls, this cross has to be placed either behind or in front of a ball, so that



when either the fire button or space bar is pressed, the cue ball rolls towards the cross and hopefully knocks the ball into a pocket. A red power gauge is used to influence the power of your shot.

To help the player obtain a more accurate hit, Bubble Bus has included a spin option. By pressing the appropriate keys, left, right, bottom and top spins can be obtained. These do make quite a difference to your game. If you choose a left spin, 'Left Spin' appears on screen together with a purple gauge which controls the amount of spin on the ball.

In the one player games, every shot you take is indicated on the screen, if you accidentally knock the cue ball into a pocket about five penalty points are added onto your score.

In the two player games we were surprised to learn that the joysticks could control both players' cues regardless of whose turn it was. Unscrupulous pool players could use this property to play havoc with their opponent's game, moving his cue just as he was taking his shot, causing the ball to move in the wrong direction for instance!

If Player one makes a mistake, the screen indicates that Player two is allowed two shots instead of the normal one.

In the first of the six games, the player has to knock all six balls into the pockets in any order. At the end of each game, your score goes onto a high score table. In game two, the balls are all numbered and have to be pocketed in the correct order starting with one. Knocking the wrong one in incurs penalty points.

All the table pockets are numbered in the third game. The idea is to knock a ball into a pocket with a number corresponding to its own number — for instance ball one has to go into pocket one. The fourth game is the same except that two players are involved.

The fifth game is a mini version of pool. One player is yellow and the other red. Who is what colour depends on who was the first player to pocket a ball. The final game involves one player potting the ball in order one to six while the other player pots them in the reverse order.

The balls were a curious spherical shape with jagged edges although they seemed to roll across the table quite smoothly! We found that the ball control was quite accurate and a fairly satisfactory game could be played. The music at the beginning of the game was fun, although the sounds of the balls hitting each other became a bit monotonous.

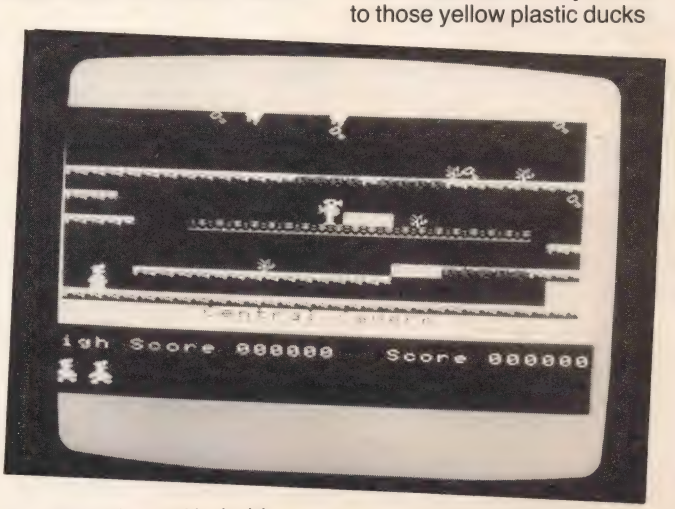
Graphics: *Balls were fuzzy*
Sound: *Jolly tune in the beginning, but dull in the rest of the game*
User Appeal: *It is more fun with two players*
Conclusion: *OK for computerised pool*

MANIC MINER

Supplier: Software Projects
051-428 9393
Type: Arcade
Format: Cassette
Price: £7.95

This game is all about a day in the life of a miner called Willy. While prospecting in an obscure out of the way town called Surbiton, Willy stumbles upon an old and disused mine shaft.

Naturally curiosity overcomes him and he starts to explore. Lo and behold, Willy uncovers evidence of a lost civilisation far superior to our own.



Further explorations reveal that they used automatons to dig deep into the earth's core to supply raw materials for their industries.

After centuries of peace and prosperity, the civilization was torn apart by war and lapsed into a long dark age, abandoning their industry and machines.

But guess what? Nobody bothered to tell the mine robots to stop working. And so, through countless aeons they have steadily accumulated a stockpile of very valuable and highly desirable metals and minerals.

Miner Willy does some quick thinking and realises that he can get rich quick by uncovering the underground store.

In order to get at the treasures you have to manoeuvre Willy through ten chambers. And along the way he has to pick up all the flashing keys.

Like most good games there are a few obstacles along the route just to make it all the more fun.

In Willy's case he has to avoid poisonous pansies, spiders, slime and, worst of all, the manic mining robots.

We found this game to be a little confusing despite the detailed instructions on the cassette cover.

The graphics are also not as clear as they could have been. For instance, Willy looks nothing like a miner but more like the Elephant Man. And the manic robot looks very similar to those yellow plastic ducks young children often have in the bath with them!

The second level consists of penguins but unfortunately we were not able to get that far.

Manic Miner definitely requires a lot of skill and requires advanced planning, as it is easy to get caught by the robots, or fall off a platform and find yourself back at square one.

Getting used to the keyboard is another glitch in the program. To move to the left, instead of using the cursor keys you have to press either S,F,H or K, and to move to the right D,G,J or L. The SHIFT key is for jumping and W is for freezing the entire screen, so that you can have a quick look around and plan your next move.

The actual concept of the game is relatively novel.

Graphics: *Feeble*
User appeal: *Extremely addictive*
Conclusion: *A mine-ful of surprises*

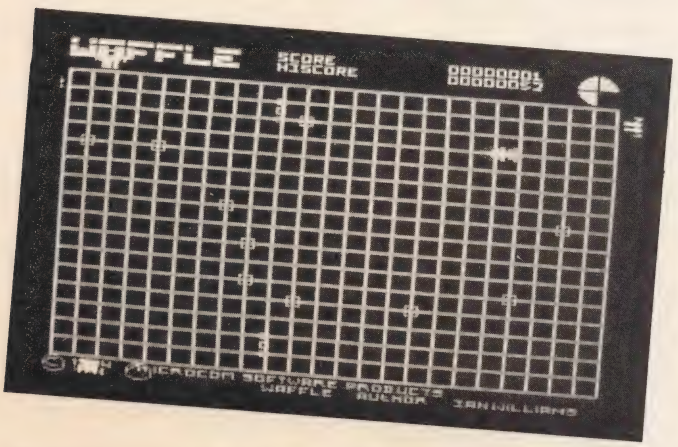
WAFFLE

Supplier: Microcom (0626) 4583
Type: Arcade
Format: Cassette
Price: £3.95

Mould, cheese and a giant red waffle may sound rather unlikely subjects for a computer game, but Microcom has managed to put these items together to create *Waffle*.

You play the leading role in this mouldy food drama as a yellow triangular wedge of cheese. The giant waffle has been left in the kitchen too long and is covered in green mould. Your task is to clear this mould, but as usual life is made difficult by four white zappers.

The waffle covers the whole screen and resembles a grid with 236 squares. At the beginning of the game your cheese starts in the top right hand corner. By using either the joystick or the cursor keys you guide it round the grid lines clearing up the 10 or so green bits of mould which appear at random around the waffle. You are treated to a resounding pinging noise when a mould has been cleared.



Four zappers surround the grid, one on each side. The two facing each other operate together, moving along opposite sides of the waffle shooting blue squares towards each other and towards your cheese. Any contact results in instant death and an explosion.

There are only two ways to survive these square death traps. One is to avoid them — quite an easy task as they move slowly — or to consume one of the blue moulds which appear in ones and twos with the green moulds on the waffle. These are super blue moulds and endow you with a super-duper cheese power enabling you to survive the onslaught of one zapper-fired square. After that your cheese loses its power.

You can tell when you've eaten one of these super blue moulds because your cheese turns blue and starts to make metallic-sounding throbbing noises (!).

Once the waffle has been cleared of the green fungal growth, the level of difficulty does not increase. The screen clears, a new waffle appears and the mould patches appear in different locations.

As playing the game is so incredibly easy we wondered what the point of the game was, after all, the challenge of any game is to improve your technique and get through increasingly difficult levels.

Waffle provides no such excitement — no fast levels, not even a greater amount of mould to clear. The reason for this deficiency lies in the fact that the program is written in BASIC which means it just can't support many more features.

As a company spokesman told us; 'Waffle is not intended to be for real games players but is aimed at the younger age range.' Five-to-eight year olds would probably find it more of a challenge.

Graphics: *Fairly simple*
Sound: *Metallic*
User Appeal: *Some addictive properties*
Conclusion: *Youngsters might like it*

HOMEWRITER

Supplier: Sony (0784) 61688
Type: Word Processor
Format: Cartridge
Price: £39.95

As *Homewriter* is available on cartridge, the program loads extremely quickly and the display that appears on screen is divided into four sections.

Unfortunately the most important section — the text display — has been allotted only six lines at the top of the screen. Everytime anything has to be checked, the text has to be scrolled up and then down again — very time consuming.

The menu and format areas occupy most of the middle of the screen. The menu holds some of the commands, for instance 'create or load file' or 'save file'.

The format area can be used to create up to eight files. Once you have chosen the size of the paper you intend to use from the menu — A4, B5, A5, postcard or roll, the format area changes to the corresponding size.

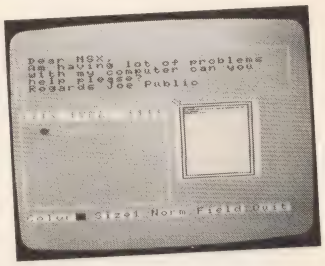
Most word processors use written commands to format text for the printer, but *Homewriter* approaches text format in a slightly different way.

To create a heading or a space for the address at one side of the paper, a field or box has to be created. These fields are labelled by numbers so if you use field one for the date, you create a space big enough for the date anywhere on the A4 size format area, usually in the right hand corner.

Then, after choosing field one in the menu area you go to the text space and type in the date. Miniaturised characters appear in the appropriate field in the format areas giving the user a rough idea what the text will look like on paper when it is printed.

The fourth section on the screen is the command line which runs along the bottom of the screen. These commands are used in conjunction with the menu to control text, format (fields), printing, plotting, rotating, saving and loading saved text.

All the usual word processing commands are available — deleting and inserting text can be easily controlled using the cursor, INS and DEL keys. In theory typing text should present no problems, but in practise *Homewriter* has a few irritating characteristics.



If you make a field 23 characters wide, every time 23 characters are typed into the text area, the sentence stops immediately even in mid-word and starts on the next line.

For £39.95, the least a customer could expect is a justifying function (where the words spread out to prevent a sentence ever ending mid-word).

The manual on the other hand, is a delight to behold! Clearly written and very informative, it takes the user step by step through *Homewriter*.

All formatted text on the files can be saved on cassette and reloaded at a later date.

Make sure that you have an MSX printer if you invest in *Homewriter* because it won't print on any other. If you own a Sony colour printer plotter all text can be printed in black, blue, green and red. In addition seven character sizes can be plotted — 90 degrees to the left if desired!

Good MSX word processors are a bit thin on the ground at the moment, so *Homewriter* doesn't have much competition, but we can't help feeling that £40 is too much to pay for this program.

Overall Impression: *Novel approach to word processing*
Documentation: *Excellent, well illustrated*
Conclusion: *Too highly priced*

POLAR STAR

Supplier: Toshiba (0276) 62222
Type: Arcade
Format: Cassette
Price: £7.95

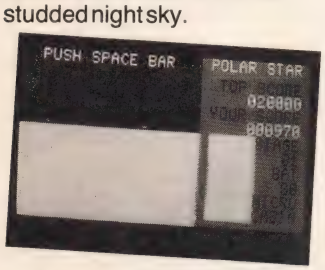
Enter a pitch black world of death, the dark nebula of the Little Bear and battle for your life on Polar Star, the last settlement of mankind . . . so goes the blurb!

Actually the game is not quite as exciting as Toshiba has made it sound, but as far as the space arcade/zap'em type games go it is a passable effort.

The aim is to save your world (isn't it always?!), the northern most planet Polar Star, from destruction at the hands of the evil alien enemies. As you'll have guessed, this is all achieved by zapping as many of them as you can.

Aliens arrive in vast revolving colourful fortresses and lurk about on the screen horizon. From these giant structures emerge aggressive pink pellet-shooting alien spaceships.

The screen is divided into two halves, all the action taking place on the left side. Your ship finds itself in a blue mountainous landscape which scrolls downwards as your ship moves towards the horizon. Above the horizon is the star studded night sky.



Your ship is based at the bottom of the planet landscape and its movement is limited to that area.

On the first level your ship starts 1000 miles away from the enemy fortress and as it flies towards the horizon, the distance is lowered on the distance indicator at the top of the screen. From the horizon the enemy ships fly and the best course of action is to eliminate them with your lazer.

They can be avoided, but if they pass you, they tend to turn round and start shooting at you from behind.

On the right hand side of the screen is a magnification of this scene which shows all the enemy positions as well as your own—especially useful for spotting those coming up behind you! Two white lines can be used for lining up your own ship with the aliens, making them easier to shoot.

Other information displayed on this side are the top score, your score, the stage you've reached and the number of lives left.

If you manage to locate the red fortress without being eliminated don't become complacent, because then the *really* hard part starts! The fortress's only weak spot is a white energy loading bay which moves from side to side along the middle. The only way to destroy it is to annihilate it with a plasma missile (what else?).

Unfortunately, while you are waiting for the missile energy loading to be completed, your ship is left totally defenceless and it has to dodge the oncoming alien space ships.

The indicator at the top of the panel counts to 100 very quickly. Once the missile is ready to be fired the panel turns blue and says 'Missile Ready'. While dodging the oncoming UFOs you somehow have to hit the moving white loading bay—it's not easy!

If you fail, the missile has to load up again and again continuously. We eventually succeeded. The screen flashes red, green and orange, the fortress disappears and your ship speeds off into the distance.

Green landscape covers the next level, the fortress is yellow, your ship starts 1,500 miles away and white capsules frequently appear from behind. Apart from these additional difficulties the action is virtually the same.

If you have nerves of steel, a steady hand, super fast reflexes and like using them, you will probably enjoy *Polar Star.*

Graphics: *Not good, not bad*
Sound: *Fairly uninspiring*
User Appeal: *Space game addicts may like it*
Conclusion: *Entertaining for a while*

BATTLE SHIP CLAPTON II

Supplier: Toshiba (0276) 62222
Type: Arcade
Format: Cassette
Price: £7.95

Trigger happy alien zappers will be in their element with this little number from Toshiba.

Like most of the other battle type games, you are in charge of a space ship and your task is to save the universe. (Sound familiar?).

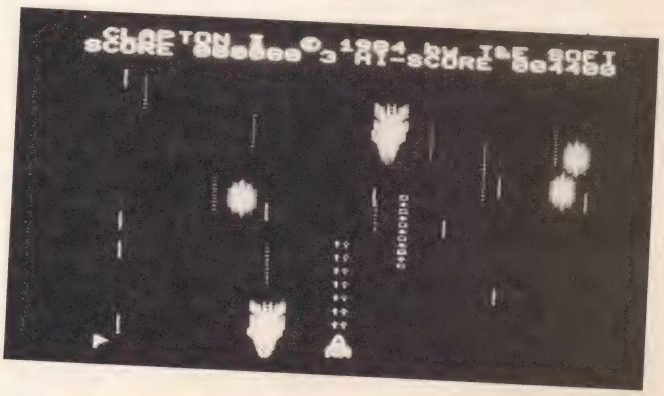
The spaceship moves very rapidly and leaves you little time to contemplate a plan of action before you're zapped out of existence.

Knocking this off the screen posed no great problems as it seemed to be moving incredibly slowly.

By the time the next attack got on the way our fingers ached, our eyes were sick of looking at the same screen and our enthusiasm was sapped.

Needless to say we half heartedly attempted to go on. But when you know that the game isn't going to get any more difficult and the screens aren't going to change there's really not much incentive to accumulate more points.

When we first loaded



Exploding stars are the first objects to track you down. If you get past those you then have to battle your way through a storm of tiny space ships. These also come thick and fast.

Zapping stars and space ships becomes such an intense task that it is difficult to keep track of the score and see exactly how far you've managed to get.

And after a few minutes we found that our thumb joints ached terribly and the index fingers developed cramp!

Using a joystick with a rapid or continuous fire button may well alleviate this problem though.

The next bombardment comes in the form of larger space ships coloured a hideous blue with all their laser beams firing.

Should you manage to get through this attack (we did and managed to score over three thousand points in the process) a slow moving space ship the size of half a golf ball appears on the screen.

Clapton II most people passing through our offices muttered 'Oh no not another space invader type game' and didn't even give it a second glance.

The whole concept is old hat. So many manufacturers have brought out very similar games, and although they may well have completely different titles the game is still the same.

Obviously there is a market for this type of game as many people enjoy whiling away the day killing aliens and spaceships.

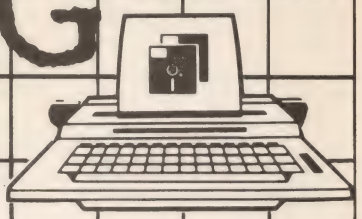
But there's also plenty more who would rather play a more sophisticated game for the money.

Young children will probably enjoy playing *Clapton* in the initial stages but after a time the novelty is bound to wear a little thin.

Graphics: *Too fast for most of us*
Sound: *Very explosive*
Conclusion: *Only if you haven't anything similar*

GET TYPING

Feel like doing it yourself? Get your teeth into our readers' programs



MSX GRAPHICS by Graham Bland

This is another impressive program from Graham Bland. It's a simple graphics system which allows you to draw pictures on the screen and SAVE them to tape.

The program is ikon driven — that is, you point a cursor to the feature you want and press the SPACE bar to select it. The ikons are in a panel on the left side of the screen. The main drawing area is to the right of this, occupying about three-quarters of the screen.

The cursor keys are used to move the cross-hair cursor. To draw lines you simply select the line symbol, move the cursor to where you want to start drawing, press SPACE again, start drawing and then press SPACE to stop.

Other features work in a similar way. Circles and rectangles are drawn by marking two points on the screen, ellipses are drawn by marking three.

Filled versions are also available. There is a paintbrush option for broad lines, and you can add a gridded background.

In its present state the program only draws in two colours. It shouldn't take too much effort to add more. But for starters there is a feature included which swops the foreground and background colours.

But as it does this byte-by-byte it's INCREDIBLY slow. So, for that matter, are the cassette LOAD and SAVE routines (which use a filename called "CAS:PIC"). This is an area where machine code would come in very handy.

The other main feature worth noting is the mirror option which you can use to create kaleidoscopic effects. And finally, although the program contains a basic printer dump routine this part will need to be configured properly for the particular printer you're using.

```
10 '************************
20 '*                      *
30 '*    MSX Computing     *
40 '*                      *
50 '* Graphics System III  *
60 '*                      *
70 '*   By Graham Bland    *
80 '*                      *
90 '************************
100 '*
110 GOTO 2150
120 '*
130 '* Paint with the Brush
140 '*
150 PS=5
160 IF X+PS >255 THEN PS=PS-1
170 LINE(X+4,Y+3)-STEP(PS,0):RETURN
180 '*
190 '* Mirror about x & y axes
200 '*
210 PSET(X+3,Y+4):PSET(X+3,195-Y):PSE
T(256-(X-44),Y+4):PSET(256-(X-44),195
-Y):RETURN
220 '*
230 '* Determine action to be
240 '* taken on trig. button press
250 '*
260 PLAY "L2405CO6C"
270 IF X+3>47 THEN GOTO 510
280 IF Y>112 THEN RETURN
290 '*
300 '* Menu selection process
310 '*
320 V=INT((X+3)/16):W=INT((Y+4)/16)
330 H=TBL(V,W)
340 '*
350 '* Imperative processing
360 '*
370 IF H=6 THEN GOSUB 1720 : RETURN
380 IF H=7 THEN RETURN
390 IF H=11 THEN GOSUB 1250 : RETURN
400 IF H=12 THEN GOSUB 1350 : RETURN
410 IF H=13 THEN GOSUB 1830 : RETURN
420 IF H=14 THEN GOSUB 2080 : RETURN
430 IF H=18 THEN GOSUB 1940 : RETURN
440 IF H=19 THEN GOSUB 1670 : RETURN
450 '*
460 '* Set option indicator
470 '* and update screen image
480 '*
490 F=H
500 GOSUB 3230: RETURN
510 '*
520 '* Set or carry out specific
530 '* action (non-imperative)
540 '*
550 ON F GOSUB 630,630,1050,1130,1530
,,,830,830,1170,,,,,1580,1580,1650,,,
1200
560 RETURN
570 '*
580 '* END of selection processing
590 '*
600 '*
610 '* DRAWING ROUTINES:
620 '*
630 '*
640 '* Draw Circles
650 '*
660 '* Define circle centre and
670 '* lock the Y co-ords
680 '*
```

```
690 IF CF=0 THEN CF=1:C1=X+3:C2=Y+4:P
UT SPRITE 1,(C1-1,C2-2),1:FOR I=1 TO
8 :CSR(I,2)=0:NEXT:RETURN
700 FOR I = 1 TO 8: CSR(I,2)=YG(I):NE
XT
710 CF=0:PUT SPRITE 1,(0,209),1
720 IF C1-ABS(X+3-C1)<48 THEN PLAY "L
2402CE":RETURN
730 CIRCLE(C1,C2),ABS(X+3-C1),,,,8/7
740 IF F<2 THEN RETURN
750 '*
760 '* See if the circle is to be
770 '* filled
780 '*
790 IF POINT(C1,C2)=15 THEN PLAY "124
o3ce": RETURN
800 PAINT (C1,C2):RETURN
810 RETURN
820 '*
830 '* Draw Ovals
840 '*
850 '* The Y co-ord is locked first,
860 '* then the X. The aspect ratio
870 '* is determined and the oval
880 '* is drawn
890 '*
900 IF OV=0 THEN OV=1:O1=X+3:O2=Y+4:P
UT SPRITE 1,(O1-1,O2-2),1:FOR I=1 TO
8 :CSR(I,2)=0:NEXT:RETURN
910 '*
920 IF OV=1 THEN OV=2:R1=ABS(O1-X+3):
PUT SPRITE 2,(X+2,Y+2),1,1:X=O1-3:Y=O
2-4:FOR I=1 TO 8 : CSR(I,2)=YG(I):CSR
(I,1)=0: NEXT:RETURN
930 R2=ABS(O2-Y+4):RD=R1
940 OV=0
950 IF R1<R2 THEN RD=R2
960 FOR I = 1 TO 8:CSR(I,1)=XG(I):NEX
T
970 PUT SPRITE 1,(0,209):PUT SPRITE 2
,(0,209)
980 IF O1-RD<48 THEN PLAY"124o2ce":RE
TURN
990 CIRCLE(O1,O2),RD,,,,R2/R1
1000 '*
1010 '* Paint in oval if selected
1020 '*
1030 IF F=8 THEN RETURN
1040 PAINT (O1,O2):RETURN
1050 '*
1060 '* Draw Line
1070 '*
1080 IF LF=0 THEN LF=1:L1=X+3:L2=Y+4:
PUT SPRITE 1,(L1-1,L2-2),1:RETURN
1090 LINE (L1,L2)-(X+3,Y+4):LF = 0 :
PUT SPRITE 1,(0,209): RETURN
1100 '*
1110 '* Paint enclosed area
1120 '*
1130 PAINT(X+3,Y+4)
1140 RETURN
1150 '*
1160 '* Pencil
1170 '*
1180 SWAP PU,PD
1190 RETURN
1200 '*
1210 '* Patterns
1220 '*
1230 SWAP MU,MD
1240 RETURN
1250 '*
1260 '* Draw background grid
1270 '*
1280 FOR I=0 TO 192 STEP 8
1290 LINE (48,I)-STEP(255,0)
1300 NEXT I
1310 FOR I=48 TO 256 STEP 8
1320 LINE (I,0)-STEP(0,191)
1330 NEXT I
1340 RETURN
1350 '*
1360 '* Reverse Screen
1370 '*
1380 '* The screen is inverted by
1390 '* altering the color and
1400 '* pattern table on a byte by
1410 '* byte basis.  This takes
1420 '* quite a long while!
1430 '*
1440 VDP(7)=FC
1450 FOR I = 0 TO 6144
1460 IF VPEEK(I)=0 AND VPEEK(BASE(11)
+I)=FC THEN VPOKE BASE(11)+I,BC:GOTO
1490
1470 IF VPEEK(I)=0 AND VPEEK(BASE(11)
+I)=BC THEN VPOKE BASE(11)+I,FC:GOTO
1490
1480 VPOKE I,NOT(VPEEK(I)) AND 255
1490 NEXT
1500 SWAP BC,FC
1510 RETURN
1520 '*
1530 '* Paint Brush
1540 '*
1550 SWAP BU,BD:RETURN
1560 REM *
1570 '*
1580 '* Draw Boxes
1590 '*
1600 IF BF=0 THEN BF=1:B1=X+3:B2=Y+4:
PUT SPRITE 1,(B1-1,B2-2),1,1:RETURN
1610 IF F=15 THEN LINE(B1,B2)-(X+3,Y+
4),,B: BF=0:PUT SPRITE 1,(0,209):RETU
RN
1620 LINE (B1,B2)-(X+3,Y+4),,BF:BF=0:
:PUT SPRITE 1,(0,209): RETURN
1630 '*
1640 '* Set Erase Color
1650 '*
1660 SWAP EU,ED : RETURN
1670 '*
1680 '* Clear Screen
1690 '*
1700 LINE (48,0)-(255,191),4,BF
1710 RETURN
1720 '*
1730 '* Save to tape
1740 '*
1750 OPEN "cas:PIC" FOR OUTPUT AS #2
1760 FOR I = 48 TO 5836 STEP 256
1770 FOR J = I TO I+207
1780 PRINT#2,VPEEK(J);",";VPEEK(8192+
J)
1790 NEXT J,I
1800 CLOSE#2
1810 RETURN
1820 '*
1830 '* Load from Tape
1840 '*
```

LISTINGS

```
1850 GOSUB 1700
1855 SOUND 8,0
1860 OPEN "cas:PIC" FOR INPUT AS #2
1870 FOR I = 48 TO 5836 STEP 256
1880 FOR J=I TO I+207
1890 INPUT #2,VP,VC
1900 VPOKE J,VP:VPOKE 8192+J,VC
1910 NEXT J,I
1920 CLOSE#2
1930 RETURN
1940 '*
1950 '* Print Routine
1960 '*
1970 LPRINT CHR$(27);"L";CHR$(208);CH
R$(0)
1980 FOR I = 0 TO 183 STEP 8
1990 FOR J = 48 TO 255
2000 B$=""
2010 FOR K = 0 TO 7
2020 IF POINT(J,J+K)=FC THEN B$=B$+"1
" ELSE B$=B$+"0"
2030 NEXT K
2040 NEXT J,I
2050 LPRINT CHR$(VAL("&B"+B$))
2060 '*
2070 RETURN
2080 '* Quit the program
2090 '*
2100 COLOR 15,4,4 : SCREEN 0,0
2110 END
2120 '*
2130 '* Start of the main program
2140 '*
2150 DEFINT A-Z : MAXFILES=2
2160 GOSUB 2840
2170 GOSUB 3350
2180 BC=4:FC=15
2190 COLOR FC,BC,BC
2200 SCREEN 2,0,0
2210 OPEN "grp:" AS #1
2220 GOSUB 3010
2230 '*
2240 '* Main Screen Drawing
2250 '*
2260 LINE(0,0)-(47,111),,B
2270 FOR I = 15 TO 31 STEP 16
2280 LINE(I,0)-(I,111)
2290 NEXT I
2300 FOR I = 15 TO 120 STEP 16
2310 LINE(0,I)-(47,I)
2320 NEXT I
2330 CIRCLE(8,8),4:CIRCLE STEP(15,0),
5,,,,1/2:LINE STEP(12,-4)-STEP(7,7),,
B
2340 CIRCLE(8,23),BC:PAINT(8,23):CIRC
LE STEP(15,0),5,,,,1/2:LINE STEP(12,-
4)-STEP(7,7),,BF:PAINT STEP (-15,-2)
2350 LINE (7,36)-STEP(0,8)
2360 LINE (4,35)-STEP(6,1),,BF
2370 LINE (21,36)-STEP(5,5)
2380 LINE (35,35)-STEP(8,8),,B
2390 LINE (35,35)-STEP(8,8)
2400 LINE (35,43)-STEP(8,-8)
2410 LINE (4,51)-STEP(7,4),,B
2420 LINE -STEP(-7,3),,BF
2430 FOR I = 15 TO 31 STEP 4
2440 LINE(I,47)-STEP(0,15)
2450 LINE(15,32+I)-STEP(15,0)
2460 NEXT
2470 DRAW "bm35,50r6d616u6r6d3r3d616u
3"
2480 LINE(4,66)-STEP(6,3),,BF
2490 LINE(4,71)-STEP(6,0)
2500 LINE(6,73)-STEP(2,3),,BF
2510 LINE (19,67)-STEP(8,8),,B
2520 LINE (19,67)-STEP(8,8):PAINT STE
P(-3,-1)
2530 LINE (32,64)-STEP(15,15)
2540 LINE (47,63)-STEP(-15,15)
2550 LINE (32,95)-STEP(15,15),,BF
2560 PSET(6,84):PRINT#1,"S"
2570 LINE(35,83)-STEP(8,8),,B
2580 LINE(39,83)-STEP(0,8)
2590 LINE(35,87)-STEP(8,0)
2600 PAINT(6,100)
2610 PSET(21,100):PRINT#1,"Q"
2620 PSET(21,84):PRINT#1,"L"
2630 REM *
2640 X=48:Y=96 : PU=-1:PD=0 : EU=-1:E
D =0 : BU=-1:BD=0 : MU=-1:MD=0
2650 STRIG(0) ON : ON STRIG GOSUB 220
2660 '*
2670 '* Polling loop for the j-stick
2680 '* and paint brush, pencil and
2690 '* eraser routine
2700 '*
2710 PUT SPRITE 0,(X,Y),1,0
2720 IF PD AND X>47 THEN PSET(X+3,Y+4
)
2730 IF ED AND X>47 THEN PRESET(X+3,Y
+4)
2740 IF BD AND X>47 THEN GOSUB 150
2750 IF MD AND X>47 THEN GOSUB 210
2760 IF STICK(0)=0 THEN 2760
2770 PUT SPRITE 0,(X,Y),1,0
2780 X=X+CSR(STICK(0),1):Y=Y+CSR(STIC
K(0),2)
2790 IF X<-3 THEN X=-3
2800 IF X>252THEN X=252
2810 IF Y>187 THEN Y=187
2820 IF Y<-3 THEN Y=-3
2830 GOTO 2710
2840 '*
2850 '* INITOFF:
2860 '* Initialise Tables
2870 '*
2880 RESTORE 3170
2890 DIM CSR(8,2)
2900 DIM TBL(3,7)
2910 DIM ER(8,8)
2920 DIM YG(8),XG(8)
2930 FOR I=1 TO 8
2940 FOR J=1 TO 2
2950 READ A:CSR(I,J)=A:IF JMOD2=0 THE
N YG(I)=A  ELSE XG(I)=A
2960 NEXT J,I
2970 FOR I=0 TO 2
2980 FOR J=0 TO 6
2990 READ TBL(I,J):NEXT J,I
3000 RETURN
3010 REM *
3020 REM * SPINIT:
3030 REM * Initlise Sprites
3040 REM *
3050 RESTORE 3200
3060 FOR K=0 TO 1
3070 S$=""
3080 FOR I = 0 TO 7
```

```
3090 READ A:S$=S$+CHR$(A)
3100 NEXT
3110 SPRITE$(K)=S$
3120 NEXT K
3130 RETURN
3140 '*
3150 '* Data Section
3160 '*
3170 DATA 0,-1,1,-1,1,0,1,1,0,1,-1,1,
-1,0,-1,-1
3180 DATA 1,2,3,4,5,6,7,8,9,10,11,12,
13,14,15,16,17,18,19,20,21
3190 '*
3200 DATA 16,16,16,238,16,16,16,0
3210 DATA 64,224,64,0,0,0,0,0
3220 '*
3230 '* Update function image
3240 '*
3250 IF F=21 THEN RETURN
3260 BF=0:CF=0:OV=0:LF=0
3270 PUT SPRITE 1,(0,209):PUT SPRITE
2,(0,209)
3280 V1=V*16:W1=W*16
3290 FOR I = 1 TO 14
3300 FOR J = 1 TO 14
3310 IF POINT(V1+I,W1+J)=BC THEN C=FC
 ELSE C=BC
3320 PSET(32+I,96+J),C
3330 NEXT J,I
3340 RETURN
3350 '*
3360 '* Title Screen
3370 '*
3380 SCREEN 0,0:KEY OFF
3390 PRINT "Drawing System"
3400 PRINT:PRINT "Select all the opti
ons on the screen"
3410 PRINT"by positioning the cursor
over the"
3420 PRINT"menu option and pressing t
he spacebar"
```

```
3450 PRINT "1. CIRCLE : Press space t
o define":PRINT"centre, press again t
o define radius and draw"
3460 PRINT"2. FILLED Circle : As abov
e"
3470 PRINT"3. LINE : Press once for t
he start ofthe line":PRINT"Press agai
n to draw it"
3480 PRINT"4. PAINT : Press space to
paint area"
3490 PRINT"5. BRUSH : Press to lower
or raise
3500 PRINT"6. SAVE (S) : Save to Tape
3510 PRINT TAB(3);"THIS IS VERY S-L-O
-W"
3520 PRINT "7. OVAL : as CIRCLE, but
also define aspect ratio"
3530 PRINT "8. FILLED Oval : As above
"
3540 PRINT "9. PENCIL : as BRUSH
3550 PRINT:PRINT "More..."
3560 R$=INKEY$:IF R$="" THEN 3560
3570 CLS
3580 PRINT "10. GRID : Draw Grid"
3590 PRINT "11. REVERSE : reverse for
eground and":PRINT"background - SLOW!
"
3600 PRINT "12. LOAD : recall picture
. Again.. V. Slow"
3610 PRINT "13. BOX : As for line
3620 PRINT "14. FILLED BOX : As above
3630 PRINT "15. ERASE : As for PENCIL
"
3640 PRINT "16. PRINT : Screen Dump"
3650 PRINT "17. CLEAR screen"
3660 PRINT "18. MIRROR - As for PENCI
L"
7000 PRINT:PRINT "Run Me..."
8000 R$=INKEY$:IF R$="" THEN 8000
8010 RETURN
```

CHARACTER SET
by Chris Burkinshaw

In the last issue we gave you a sprite designer. This time it's the turn of the character set to get the re-design treatment. You can call up and re-shape any of the existing characters by entering the appropriate ASCII number (see your machine's manual for the numbers).

The program contains a machine code routine for saving and loading the characters. Putting the appropriate sections into your own programs will allow you to use your newly created characters.

Chris Burkinshaw will soon have a book out, written with R Goodley. It's called *The Programmer's Guide to the MSX System*, and is to be published by Sigma.

```
10 '*****************************
20 '** (C) 1984 C.I.BURKINSHAW **
30 '**                          **
40 '**  CHARACTER SET UTILITY   **
50 '*****************************
60 '
70 ' SETUP MACHINE CODE
80 '
90 FOR X=0TO12:READA$,B$:POKE38000!+X
,VAL("&H"+A$):POKE38200!+X,VAL("&H"+B
$):NEXT
100 DEFUSR=38000!:DEFUSR2=38200!
110 DATA 21,21,00,40,00,9C,11,11,40,0
0,9C,00,01,01,00,00,08,08,CD,CD,59,5C
,00,00,C9,C9
```

```
120 '
130 ' SET INTERRUPTS
140 '
150 ON KEY GOSUB 310,370,420,560:KEY(
1) ON:KEY(2) ON:KEY(3) ON:KEY(4) ON
160 ON STRIG GOSUB 530:STRIG(0) ON
170 KEY OFF:COLOR 14,1,1:SCREEN 1,0:
CLS
180 LOCATE2,1:PRINT"F1..SAVE  F3..CHA
NGE CHR$":LOCATE2,3:PRINT"F2..LOAD  F
4..COPY CHR$"
190 FORX=0TO7:VPOKE14336+X,VPEEK(224+
X):NEXT:PUT SPRITE 0,(144,47),8,0
200 FORX=373TO375:VPOKEX,0:NEXT:VPOKE
371,24:VPOKE372,24
```

LISTINGS

```
210 A$=STRING$(8,46):FORX=0TO7:LOCATE
16,X+6:PRINTA$:NEXT
220 GOSUB 420:X1=1:Y1=1
230 '
240 ' MOVE CURSOR CHARACTER
250 '
260 X2=STICK(0):IF X2=0 THEN 260
270 ON X2 GOTO 480,260,490,260,500,26
0,510
280 '
290 ' SAVE ROUTINE
300 '
310 Z=USR(2):LOCATE2,20:PRINT"RECORD
THEN RETURN"
320 A$=INPUT$(1):IF ASC(A$)<>13 THEN
320 ELSE BSAVE"CAS:",40000!,42047!
330 LOCATE 2,20:PRINT STRING$(28,32):
RETURN
340 '
350 'LOAD ROUTINE
360 '
370 LOCATE 2,20:PRINT"LOADING..":BLOA
D"CAS:":Z=USR2(2)
380 LOCATE 2,20:PRINT STRING$(28,32):
RETURN
390 '
400 ' CHANGE CHARACTER SUBROUTINE
410 '
420 LOCATE0,20:PRINT"ENTER # OF CHR$
<RET>":GOSUB 600:CN=XX
430 FOR X=0TO7:A$(X)=BIN$(VPEEK(CN*8+
X)):NEXT
440 FORX=0TO7:IF LEN(A$(X))<8 THEN A$
(X)=STRING$(8-LEN(A$(X)),79)+A$(X)
450 FOR BT=1 TO 8:LOCATE15+BT,X+6:IF
MID$(A$(X),BT,1)="1"THEN PRINTCHR$(21
9) ELSE PRINTCHR$(46)
460 NEXT:NEXT:LOCATE 2,11:PRINT"CHARA
CTER";CN:LOCATE 7,13:PRINT CHR$(CN)
470 RETURN
480 IF Y1=1 THEN 260 ELSE Y1=Y1-1:GOT
O520
490 IF X1=8 THEN 260 ELSE X1=X1+1:GOT
O520
500 IF Y1=8 THEN 260 ELSE Y1=Y1+1:GOT
O 520
510 IF X1=1 THEN 260 ELSE X1=X1-1:GOT
O 520
520 PUT SPRITE 0,(136+X1*8,39+Y1*8),8
,0:FORX=1TO80:NEXT:GOTO260
530 LOCATE 15+X1,5+Y1:IF MID$(A$(Y1-1
),X1,1)="1" THEN MID$(A$(Y1-1),X1,1)=
"0":PRINTCHR$(46) ELSE MID$(A$(Y1-1),
X1,1)="1":PRINTCHR$(219)
540 NN=CN*8+Y1-1:IF MID$(A$(Y1-1),X1,
1)="1" THEN VPOKENN,VPEEK(NN)OR(2^(8-
X1)) ELSE VPOKENN,VPEEK(NN)AND(255-(2
^(8-X1)))
550 RETURN
560 LOCATE0,20:PRINT"CHR$ TO COPY <RE
T>":GOSUB 600:C1=XX
570 LOCATE0,20:PRINT"CHR$ TO BE REPLA
CED":GOSUB 600:C2=XX
580 FORX=0TO7:VPOKEC2*8+X,VPEEK(C1*8+
X):NEXT
590 LOCATE0,20:PRINTSTRING$(28,32):RE
TURN
600 C1$=""
610 X$=INKEY$:IF X$="" THEN610
620 IF ASC(X$)<32 AND ASC(X$)>27 THEN
 610
630 IF ASC(X$)<>13 THEN C1$=C1$+X$:GO
TO 610ELSE XX=VAL(C1$)
640 IF XX>255 OR XX<0 THEN 600
650 LOCATE0,20:PRINT STRING$(28,32):
RETURN
```

QUIRK
by Chris Burkinshaw

This program just goes to show that artificial intelligence needn't be too sensible. The computer takes the part of your friendly neighbourhood psychoanalyst. You have to tell it what your problem is and it tries to help with suitable responses.

In its current form the program isn't the solution to schizophrenia we've all been waiting for (in this office at least). But it is a lot of fun, and could easily be added to.

Any expansion to the program would involve making the various string arrays holding the machine's questions and replies bigger.

As the program works largely by triggering responses with certain keywords, you'd probably need to expand these too — in the DATA statements at the end of the program. You'll also have to think of some more comments — the wittier the better.

```
10 ' ****************************
20 ' ****                    ****
30 ' ****      QUIRK         ****
40 ' ****                    ****
50 ' **** (C) C.I.BURKINSHAW ****
60 ' ****                    ****
70 ' ****************************
80 '
90 DIM Z$(200):COLOR 10,1,1:SCREEN0:
KEY OFF:CLS
100 LOCATE 2,2:PRINT"TELL ME A LITTLE
 ABOUT THE PROBLEM"
110 '
120 ' GET REPLY & ALLOCATE EACH WORD
     TO AN ELEMENT IN THE Z$ ARRAY
130 '
140 ERASE Z$:DIM Z$(200):PRINT:INPUT"
....";A$:IF A$="" OR LEN(A$)=1 THEN 1
40 ELSE B=0:C=0
150 A$=A$+" ":A=LEN(A$):FOR X=1TOA:IF
 X=A THEN 170
160 B=B+1:IF MID$(A$,B,1)<>" " THEN Z
$(C)=Z$(C)+MID$(A$,B,1) ELSE C=C+1
170 NEXT:A=C:ZZ=0:FOR X=0TOA
180 '
190 ' SWAP IDENTIFIERS
200 '
210 IF Z$(X)="I" THEN Z$(X)="+YOU":ZZ
=1
220 IF Z$(X)="YOU" THEN Z$(X)="+I":ZZ
=1
230 IF Z$(X)="ME" THEN Z$(X)="*YOU":Z
Z=1
240 '
250 ' CHECK FOR KEYWORD
260 '
```

```
262 NEXT:C=0:B=0:FOR X=0 TO A:RESTORE
270 READ R$:READ RP$
280 IF Z$(X)=R$ THEN B=1:C=1:X=A
290 IF C=0 AND R$<>"X" THEN 270
300 NEXT:IF B=1 THEN 500
310 IF ZZ=1 THEN 390
320 IF MID$(A$,LEN(A$)-1,1)="?" THEN
 470
330 '
340 ' SELECT RANDOM REPLY
350 '
360 Y$(1)="TELL ME A LITTLE MORE" : Y
$(2)="CARRY ON" : Y$(3)="COULD YOU GI
VE ME A LITTLE MORE" : Y$(4)="REALLY,
 GO ON"
370 Y$(5)="INTERESTING, JUST A LITTLE
 MORE      PLEASE":Y$(6)="I SEE, NOT
UNUSUAL":Y$(7)="UMM, QUITE A COMPLEX
AREA":Y$(8)="ANY OTHER ASSOCIATED PRO
BLEM?":Y$(9)="MODERN OPINON IS DIVIDE
D ON THE      CORRECT APPROACH TO THI
S GENERAL AREA"
380 X=INT(RND(-TIME)*9):AN$=Y$(X+1):
GOTO 510
390 C=0:FOR X=0 TO A:IF LEFT$(Z$(X),1
)="+"  OR LEFT$(Z$(X),1)="*" THEN C=X
:X=A
400 NEXT
410 X1$="":X2$="":FOR Y=0TOC-1:X1$=X1
$+" "+Z$(Y):NEXT:FORY=C+2TOA:X2$=X2$+
" "+Z$(Y):NEXT
420 IF Z$(C)<>"+YOU" THEN 450
430 IF Z$(C+1)<>"DONT" AND Z$(C+1)<>"
DON'T" THEN AN$="WHY HAVE YOU"+X2$:GO
TO 510
440 AN$="WHY DON'T YOU"+X2$:GOTO 510
450 IF Z$(C)="+I" THEN AN$="WHY SHOUL
D I"+X2$:GOTO 510
460 IF Z$(C)="*YOU" THEN AN$="WHY DOE
S"+X1$+" YOU":GOTO 510
470 QM$(2)="IS THIS IMPORTANT TO YOU?
":QM$(3)="I THINK WE OUGHT TO RETURN
TO THE    MAIN PROBLEM"
480 QM$(0)="PERHAPS WE OUGHT TO DISCU
SS ANOTHER  AREA":QM$(1)="I THINK I O
UGHT TO ASK THE QUESTIONS"
490 X=INT(4*RND(-TIME)):AN$=QM$(X):GO
TO 510
500 AN$=RP$:GOTO 510
510 PRINT:PRINTAN$:GOTO 140
520 DATA YES,CARRY ON,NO,GO ON,HATE,C
AN YOU JUSTIFY THIS HATE,DEPRESSED,DO
 YOU HAVE CORRESPONDING 'HAPPY'    PE
RIODS?,LOVE,LOVE IS JUST A LABEL FOR
A SET OF    NEEDS,WHY,WHY NOT?
530 DATA MEANING,DO YOU BELIEVE IN FR
EE WILL?,LIFE,SUICIDE ACHIEVES NOTHIN
G,TIRED,TAKE MORE EXERCISE!,FREE,WHO
IS?,MONEY,WEALTH & POVERTY BOTH EQUAT
E TO      FREEDOM,X,X
```

MONGOOSE MONITOR
by Gareth Jefferson

Mongoose is a straightforward machine code monitor. It has been written in a highly modular style, with virtually all operations handled as separate subroutines.

Readers intending to use the program need not bother to type in the REM statements (these begin with a single apostrophe, as in the first line). Variables do not need to be declared or initialised in BASIC, so lines 270 to 510 are more for the sake of style and documentation.

The main program is from line 140 to line 220 and consists of an endless loop that is terminated only by making CD$ = "Q" (CD$ is the main command variable). The REPEAT UNTIL control statement has been emulated by using the old FOR X = 0 TO 1 trick. X is reset to 0 every time the loop is encountered, so the loop repeats endlessly.

It is worth noting that there is very little error checking built into the program, so use with caution or write in some error checking routines. The D command allows any block of 32 addresses to be examined, with the date displayed in hexadecimal. Sub-commands allow the block to be automatically incremented or printed out without incrementing. Alternatively any locations on the display can have its data modified. If the address in question is in RAM, the new data will be displayed. If the address is in ROM, naturally, the data will remain the same.

The L, R, S, and W commands will load, read, save and write files respectively. Use the X command (execute a file) with care.

Apart from leaving out REMs, the other thing you could do to save memory is to use integer variables instead of reals; integer variables are affixed by a % (as in LET X% = 6) and take up less space in memory than reals. Since speed of execution is not at all critical, it would not be worth rewriting the program to avoid GOSUBs; its speed is perfectly adequate as it is.

```
10 '  MONGOOSE
20 '  MSX MACHINE CODE MONITOR
30 '
40 '  INITIALISE SCREEN & DATA ARRAY
50 SCREEN0:KEY OFF : WIDTH 36 : COLOR
 4,15
60 DIM DA(32)
70 FOR ML = 0 TO 1
80 GOSUB 160:' MAIN MENU LOOP
90 GOSUB 650:' EXECUTE MAIN COMMAND
100 LET ML=0:LET FR=0
110 NEXT ML
120 ' END OF PROGRAM
130 CLS:KEY ON:COLOR 15,4,4:END
140 '
150 '
160 ' INIT. VARIABLES AND MAIN MENU
170 '
180 FR=0   :' FIRST RUN FLAG
190 SA$="":' START ADDR IN HEX
200 SA=0   :' START ADDR IN DEC
210 TB=0   :' TOP-OF-BLOCK
220 PM=0   :' PRINT MENU FLAG
230 CD$="":' MAIN COMMAND
240 OD$="":' OLD DATA
250 ND$="":' NEW DATA
260 LA$="":' LINE ADDRESS
270 CA$="":' CHANGE ADDR IN HEX
280 CA=0   :' CHANGE ADDR IN DEC
290 DV$="":' DEVICE
300 DD=0   :' DATA IN DEC
310 HX$="":' DATA AS HEX STRING
320 CO=0   :' CHANGE ADDRESS OFFSET
330 AS=0   :' ARRAY SUBSCRIPT
```

LISTINGS

```
340 FI$="":' FILE NAME
350 FA$="":' 1ST FILE ADDR IN HEX
360 FA=0  :' 1ST FILE ADDR IN DEC
370 LD$="":' LAST FILE ADDR IN HEX
380 LD=0  :' LAST FILE ADDR IN HEX
390 XA$="":' XECUT START ADDR IN HX
400 XA=0  :' XECUT START ADDR IN DC
410 DC$="":' DATA MENU COMMAND
420 PD$="":' PRINT DATA
430 '
440 ' MAIN MENU DISPLAY
450 CLS
460 PRINT
470 PRINT TAB(12);"*MONGOOSE*"
480 PRINT
490 PRINT TAB(5);"-MSX MACHINE CODE M
ONITOR-"
500 PRINT
510 PRINT
520 PRINT TAB(12);"OPTIONS"
530 PRINT
540 PRINT
550 PRINT "  (D)isplay memory
560 PRINT "  (C)hange memory"
570 PRINT "  (L)oad cassette file"
580 PRINT "  (R)ead file"
590 PRINT "  (S)ave cassette file"
600 PRINT "  (W)rite file"
610 PRINT "  (X)ecute file"
620 PRINT "  (Q)uit"
630 CD$=INPUT$(1)
640 RETURN
650 ' EXECUTE MAIN COMAND
660 IF CD$ = "D" THEN GOSUB 750:' DUM
P MEMORY
670 IF CD$ = "C" THEN GOSUB 2170:' CH
ANGE MEMORY MESSAGE
680 IF CD$ = "L" THEN GOSUB 2280:' LO
AD FILE
690 IF CD$ = "R" THEN GOSUB 2370:' RE
AD FILE
700 IF CD$ = "S" THEN GOSUB 2460:' SA
VE FILE
710 IF CD$ = "W" THEN GOSUB 2640:' WR
ITE FILE
720 IF CD$ = "X" THEN GOSUB 2820:' EX
ECUTE FILE
730 IF CD$ = "Q" THEN GOTO 120:' END
OF PROGRAM
740 RETURN
750 '  DUMP MEMORY SUBROUTINE
760 FOR DM=0 TO 1:' DUMP MEMORY LOOP
770 LET DM=0
780 IF FR=0 THEN GOSUB 880:'FR=FIRST
RUN FLAG: GET ADDRESS
790 GOSUB 1010:' LOAD DATA ARRAY
800 GOSUB 1060:' PRINT DATA ARRAY
810 IF PM=1 THEN GOSUB 1250:'  PRINT
DATA MENU
820 IF DC$=CHR$(32) THEN GOSUB 1530:'
 UPDATE ARRAY
830 IF DC$=CHR$(13) THEN DM=1:' RETUR
N TO MENU
840 IF DC$="C" THEN GOSUB 1770:' CHAN
GE MEMORY
850 IF DC$="P" THEN GOSUB 1590:' LPRI
NT BLOCK SUBROUTINE
860 NEXT DM
870 RETURN
880 '  GET START ADDR SUBROUTINE
890 '
900 CLS
910 PRINT
920 PRINT TAB(13);"DISPLAY MEMORY"
930 PRINT
940 INPUT "ENTER HEX START ADDRESS";S
A$
950 LET SA$="&H"+SA$
960 LET SA=VAL(SA$)
970 LET FR=1:' FR = FIRST RUN FLAG
980 LET PM=1:' PM = PRINT MENU FLAG
990 '
1000 RETURN
1010 '  LOAD DATA ARRAY
1020 FOR LL = 0 TO 31
1030 LET DA(LL)=PEEK(SA+LL)
1040 NEXT LL
1050 RETURN
1060 '  PRINT DATA ARRAY
1070 '
1080 LET AS=0
1090 CLS:PRINT
1100 PRINT TAB(10);"DISPLAY MEMORY"
1110 PRINT
1120 FOR OL = 1 TO 4
1130 GOSUB 1360:' LINE ADDR. SUBRT.
1140 PRINT LA$;": ";:' LINE ADDR.
1150 FOR IL = 1 TO 8
1160 LET PD$=HEX$(DA(AS)):' PRINT DAT
A AS 2 DIGIT HEX STRING
1170 IF LEN(PD$)=1 THEN PD$="0"+PD$
1180 PRINT PD$;"  ";
1190 LET AS=AS+1
1200 NEXT IL
1210 PRINT CHR$(13)
1220 NEXT OL
1230 '
1240 RETURN
1250 ' DISPLAY DATA MENU SUBROUTINE
1260 LOCATE 0,12
1270 '
1280 PRINT "VIEW NEXT BLOCK? HIT <SPA
CE-BAR>"
1290 PRINT"PRINT THIS BLOCK? HIT <P>"
1300 PRINT "CHANGE MEMORY? HIT <C>"
1310 PRINT "RETURN TO MENU? HIT <RETU
RN>"
1330 RETURN
1340 '
1350 RETURN
1360 ' LINE ADDRESS SUBROUTINE
1370 '
1380 ON OL GOSUB 1470,1480,1490,1500
1390 LET LA$=HEX$(LA)
1400 ON LEN(LA$) GOSUB 1420,1430,1440
,1450
1410 RETURN
1420 LET LA$="000"+LA$:RETURN
1430 LET LA$="00"+LA$:RETURN
1440 LET LA$="0"+LA$:RETURN
1450 RETURN
1460 '
1470 LET LA=SA:RETURN
1480 LET LA=SA+8:RETURN
1490 LET LA=SA+16:RETURN
```

```
1500 LET LA=SA+24:RETURN
1510 '
1520 '
1530 ' UPDATE BLOCK SUBROUTINE
1540 LET PM = 1
1550 LET SA=SA+32
1560 '
1570 '
1580 RETURN
1590 ' LPRINT BLOCK SUBROUTINE
1600 LET PM = 1
1610 LET AS=0
1620 LPRINT
1630 LPRINT TAB(10);"MEMORY DUMP"
1640 LPRINT
1650 FOR OL = 1 TO 4
1660 GOSUB 1360:' LINE ADDR. SUBRT.
1670 LPRINT LA$;": ";
1680 FOR IL = 1 TO 8
1690 LET PD$=HEX$(DA(AS))
1700 IF LEN(PD$)=1 THEN PD$="0"+PD$
1710 LPRINT PD$;"  ";
1720 LET AS = AS + 1
1730 NEXT IL
1740 LPRINT CHR$(13)
1750 NEXT OL
1760 RETURN
1770 ' CHANGE MEMEORY SUBROUTINE
1780 '
1790 LOCATE 0,12:PRINT SPC(144)
1800 '
1810 LOCATE 0,14
1820 INPUT "ENTER ADDRESS TO CHANGE";
CA$
1830 IF CA$=CHR$(13) THEN PM=1
1840 IF CA$=CHR$(13) THEN RETURN 770
1850 LET PA$=CA$:LET CA$="&H"+CA$
1860 LET CA=VAL(CA$):LET CO=CA-SA
1870 LET TB=SA+32
1880 IF CA<SA THEN RETURN
1890 IF CA>TB THEN RETURN
1900 ON LEN(PA$) GOSUB 1920,1930,1940
,1950
1910 GOTO 1960
1920 LET PA$="000"+PA$:RETURN
1930 LET PA$="00"+PA$:RETURN
1940 LET PA$="0"+PA$:RETURN
1950 RETURN
1960 ' PRINT CHANGE ADDRESS AND OLD
DATA
1970 LET OD=PEEK(SA+CO)
1980 LET OD$=HEX$(OD)
1990 IF LEN(OD$)=1 THEN OD$="0"+OD$
2000 LOCATE 0,14:PRINT SPC(40):LOCATE
 0,14
2010 PRINT PA$;": ";OD$;">";
2020 '
2030 ' GET NEW DATA
2040 INPUT ND$
2050 '
2060 LET PM=1
2070 IF ND$=CHR$(13) THEN DC$=""
2080 IF ND$=CHR$(13) THEN RETURN 770
2090 LET ND$="&H"+ND$
2100 LET ND=VAL(ND$)
2110 '
2120 ' UPDATE MEMORY SUBROUTINE
2130 '
2140 POKE SA+CO,ND
2150 '
2160 RETURN 770
2170 ' CHANGE MEMORY OPTION MESSAGE
2180 '
2190 CLS:LOCATE 0,6
2200 PRINT "THE CHANGE MEMORY FUNCTIO
N"
2210 PRINT "IS PART OF THE DISPLAY ME
MORY"
2220 PRINT "OPTION":PRINT
2230 PRINT  "HIT <RETURN> TO RETURN T
O"
2240 PRINT "MENU AND THEN SELECT <D>"
2250 CD$=INPUT$(1)
2260 IF CD$<>CHR$(13) THEN GOTO 2250
2270 RETURN
2280 ' LOAD CASSETTE FILE SUBROUTINE
2290 '
2300 DV$="CAS:":CLS
2310 LOCATE 4,4
2320 INPUT "ENTER CASSETTE FILENAME";
FL$
2330 BLOAD DV$+FL$
2340 RETURN
2350 '
2360 '
2370 ' READ FILE SUBROUTINE
2380 '
2390 DV$="A:":CLS
2400 LOCATE 4,4
2410 INPUT "ENTER FILENAME";FL$
2420 BLOAD DV$+FL$
2430 RETURN
```

GRAPHIC DEMOS by Davie Conway

These simple programs are by our most prolific contributor. Davie Conway has sent in a dozen or so programs — all short and written, as he says, 'for fun'. That's the sort of attitude that makes computing enjoyable. You can't run a business with this software, and there are no aliens to zap. All the programs do is draw pretty patterns. But you can learn a lot about BASIC commands by playing around with them.

```
5 REM**POMPOM**D.CONWAY*GLASGOW*1984*
10 SCREEN 2:COLOR 15,1,1
20 X=128:Y=96:R=45:C=15:SA=0:EA=6.2:A
R=1.4
30 PI=4*ATN(1):R1=R
40 FOR T=0 TO 360 STEP 13
50 TH=2*PI*T/360
60 X=130+R1*SIN(TH):Y=95+R1*COS(TH)
70 GOSUB 100
80  NEXT T
90  GOTO 90
100 CIRCLE(X,Y),R,C,SA,EA,AR:RETURN
```

LISTINGS

```
3 REM CIRCLES & ELLIPSES DEMO
4 REM DAVIE CONWAY*GLASGOW*1984
5 CLEAR 400,55296! : SCREEN 2 : COLOR
 15,1
10 X=120:Y=96:S=60
15 FOR Z=1 TO 15 STEP 2
20 FOR B=1 TO S STEP 5
30 CIRCLE(X,Y),B,Z,,,1.4
40 NEXT:NEXT
50 CLS:GOTO 60
60 X=120:Y=96:S=50
70 FOR Z=1 TO 15 STEP 2
80 FOR B=S TO 1 STEP -2
90 CIRCLE(X,Y),B,Z,,,1.4
100 NEXT:NEXT
110 CLS:GOTO 120
120 X=120:Y=96:S=75
130 FOR Z =1 TO 15 STEP 2
140 FOR B=1 TO S STEP 2
150 CIRCLE(X,Y),B,Z,,,2.4
160 NEXT:NEXT
170 CLS:GOTO 180
180 X=120:Y=96:S=100
190 FOR Z=1 TO 15 STEP 2
200 FOR B=1 TO S STEP 4
210 CIRCLE(X,Y),B,Z,,,,.25
220 NEXT:NEXT
230 CLS:GOTO 240
240 X=120:Y=96:S=75
250 FOR Z=1 TO 15 STEP 2
260 FOR B=S TO 1 STEP -3
270 CIRCLE(X,Y),B,Z,,,2.8
280 NEXT:NEXT
290 CLS:GOTO 300
300 X=120:Y=96:S=100
310 FOR Z=1 TO 15 STEP 2
320 FOR B=S TO 1 STEP -2
330 CIRCLE(X,Y),B,Z,,,,.75
340 NEXT:NEXT
350 CLS:GOTO 360
360 X=120:Y=96:S=75
370 FOR START=0 TO 1 STEP .01
400 FOR B=1 TO S STEP 2
410 PI=4*ATN(1)
420 CIRCLE(X,Y),B,11,ST,PI,1.4
430 NEXT:NEXT
450 GOTO 450
```

```
5 REM "RUNNING ROUND IN CIRCLES"
10 SCREEN 2:COLOR 6,15,6:CLS
20 X=50:Y=145:S=40
30 FOR R=0 TO S STEP 2:GOSUB 70:GOSUB
 90:GOSUB 110:GOSUB 130:GOSUB 150
40 CIRCLE(X,Y),R,RND(1)*15+1
50 NEXT
60 GOTO 60
70 CIRCLE(X,Y-99),R,RND(1)*15+1
80 RETURN
90 CIRCLE(X+83,Y),R,RND(1)*15+1
100 RETURN
110 CIRCLE(X+83,Y-99),R,RND(1)*15+1
120 RETURN
130 CIRCLE(X+166,Y),R,RND(1)*15+1
140 RETURN
150 CIRCLE(X+166,Y-99),R,RND(1)*15+1
160 RETURN
```

```
5 REM "RUNNING ROUND IN CIRCLES"
10 SCREEN 2:COLOR 6,15,6:CLS
20 S=50
30 FOR R=0 TO S STEP 2:GOSUB 70:GOSUB
 90:GOSUB 110
40 CIRCLE(RND(1)*250,RND(1)*190),R,RN
D(1)*15,.3,3.1,1.4
50 NEXT
60 GOTO 60
70 CIRCLE(RND(1)*250,RND(1)*190),R,RN
D(1)*15,,,1.4
80 RETURN
90 CIRCLE(RND(1)*250,RND(1)*190),R,RN
D(1)*15,,,2.8
100 RETURN
110 CIRCLE(RND(1)*250,RND(1)*190),R,R
ND(1)*15,,,,2
120 RETURN
```

LETTERS
by Paul Webster

Paul Webster originally wrote this routine as a teaching aid for his children. You are asked to enter a string (such as a name) and the computer then prints it in large letters on the screen. A dark yellow background is chosen, the colours for the letters being selected at random. You could change this with a little judicious reprogramming.

If you want to make the letter colours fixed, then just choose the value you want for variable CL in line 350. The background colour is selected in line 260. But if you change this, remember to alter the exclusion colours in line 350, or you'll start getting invisible letters!

You are given a choice of three letter sizes, which also affects the number of letters you're allowed. When the computer has finished printing, the SELECT key returns you to the menu.

Variables used in *LETTERS*:

A$	User inputed character
A$()	Character patterns
C	Counter for W$() for split
CH	Print size
CH$	Print size inputed
CL	Colour control variable
L	Counter for W$() for print
LC	Maximum number of characters allowed per line
N	ASCII value of characters allowed per line
NC	Maximum number of characters in total
P	Points to character to be printed
S	Scale value for DRAW
T$()	Menu titles
W$()	Holds one line of characters
X%	X co-ordinate
XX	Horizontal scaling
XY$	DRAW scale, colour and co-ordinates
Y%	Y co-ordinate
YY	Vertical scaling

```
10 REM **************************
20 REM *        LETTERS         *
30 REM *   By Paul A. Webster   *
60 REM **************************
70 REM
80 CLS:KEYOFF:CLEAR1000:DIMA$(95),W$(
15):GOSUB430
90 ON STOP GOSUB 1090
100 STOP ON
110 T$(1)=" Small  (12 lines x15)":T$
(2)=" Medium ( 6 lines x10)":T$(3)="
Large  ( 3 lines x 5)"
120 COLOR1,3,3:SCREEN0
130 LOCATE2,5:PRINT"Please choose:-"
140 LOCATE12,8:PRINT"<1>";T$(1):' Siz
e 1/4
150 LOCATE12,10:PRINT"<2>";T$(2):'Siz
e 1/2
160 LOCATE12,12:PRINT"<3>";T$(3):'Siz
e 1/1
170 CH$=INKEY$:IFCH$=""THEN170ELSECH=
VAL(CH$)
180 IFCH<1ORCH>3THEN170
190 REM     Set up variables to suit
scale
200 IFCH=1THENY%=-16:YY=16:XX=16:S=1:
NC=180:LC=15ELSEIFCH=2THENY%=-32:YY=3
2:XX=24:S=2:NC=60:LC=10ELSEY%=-64:YY=
64:XX=48:S=4:NC=15:LC=5
210 COLOR1,9,9:CLS:LOCATE2,5:PRINT"Pl
ease enter your characters"
220 LOCATE2,7:PRINT"Maximum (";NC;" )
characters"
230 LOCATE2,9:PRINT"[";SPACE$(NC);"]"
240 LOCATE 10,20 : PRINT"UPPER-CASE O
NLY"
250 LOCATE3,9:LINE INPUTA$:A$=LEFT$(A
$,NC)
260 COLOR8,10,10:CLS:SCREEN2:C=1
270 REM Split input string into lines
280 W$(C)=MID$(A$,C*LC-(LC-1),LC)
290 IFLEN(W$(C))=LCTHENC=C+1:GOTO280
300 REM Begin printing characters
310 FORL=1TOC-1
320 Y%=Y%+YY:P=0
330 IFW$(L)=SPACE$(LC)THEN410
340 FORX%=0TO(LEN(W$(L))-1)*XX STEPXX
350 CL=INT(RND(1)*15):IFCL=10ORCL=0TH
EN350:'Choose colour
360 XY$="S"+RIGHT$(STR$(S),LEN(STR$(S
))-1)+"C"+RIGHT$(STR$(CL),LEN(STR$(CL
))-1)+"BM"+RIGHT$(STR$(X%),LEN(STR$(X
%))-1)+","+RIGHT$(STR$(Y%),LEN(STR$(Y
%))-1)
370 P=P+1:N=ASC(MID$(W$(L),P,1))
380 IFN<32ORN>95THEN400:'Undefined ch
aracters
390 DRAWXY$+A$(N):IFN<>32ANDS>1THENPA
INTSTEP(0,0),CL
400 NEXTX%:'Next character
410 NEXTL:'Next line
420 A$=INKEY$:IFA$=CHR$(24)THEN120ELS
E420:'Look for SELECT key
430 A$(32)="":'SPACE
440 A$(33)="BR16R8D40L8U40BD48R8D8L8U
8BU20BR4":' !
450 A$(34)="BR8R8D24L8U24BR16R8D24L8U
24":' "
460 A$(35)="BR8R8D16R8U16R8D16R8D8L8D
8R8D8L8D16L8U16L8D16L8U16L8U8R8U8L8U8
R8U16BD24BR8R8D8L8U8BU4":' #
470 A$(36)="BR16R8D8R16D8L16D8R8F8D8G
8L8D8L8U8L16U8R16U8L8H8U8E8R8U8BD16D8
H4E4BD16BR8F4G4U8BU2":' $
480 A$(37)="R16D16L16U16BD4BR40G40D8E
40U8BD36BL16R16D16L16U16BU16":' %
490 A$(38)="BR8R8F8D16G4F8E4R8D8G4F4D
8L8H4G4L16H8U16E4H4U16E8BD8BR4F4D8G4H
4U8E4BD24F12G4L8H4U8E4BU4":' &
500 A$(39)="BR16R8D24L8U24BF2":' '
510 A$(40)="BR16R8G16D24F16L8H16U24E1
6BD2":' (
520 A$(41)="BR16R8F16D24G16L8E16U24H1
6BR4BD2":' )
530 A$(42)="BR16R8D16E8R8D8G12F12D8L8
H8D16L8U16G8L8U8E12H12U8R8F8U16BF4":'
 *
540 A$(43)="BD24R16U16R8D16R16D8L16D1
6L8U16L16U8BF4":' +
550 A$(44)="BD32BR16R8D16G8L8E8U16BF4
":' ,
560 A$(45)="BD24R40D8L40U8BF4":' -
570 A$(46)="BD48BR16R8D8L8U8BF2":' .
580 A$(47)="BD4BR40D8G40U8E40BD4BL2":
' /
590 A$(48)="BR8R24F8D40G8L24H8U40E8BD
8BR4R16F4G24U24E4BD12BR20D24G4L16H4E2
4BR4":' 0
600 A$(49)="BR16R8D48R8D8L24U8R8U32L8
U8E8BD4":' 1
610 A$(50)="BR8R24F8D8G32R32D8L40U8E3
2U4H4L16G4D4L8U8E8BD4":' 2
620 A$(51)="BR8R24F8D16G4F4D16G8L24H8
U8R8D4F4R16E4U8H4L8U8R8E4U8H4L16G4D4L
8U8E8BD4":' 3
630 A$(52)="BR24R8D32R8D8L8D16L8U16L2
4U16E24BD8D24L16U8E16BU4":' 4
640 A$(53)="R40D8L32D8R24F8D24G8L24H8
U8R8D4F4R16E4U16H4L28U24BF4":' 5
650 A$(54)="BR8R24F8D8L8U4H4L16G4D12R
24F8D16G8L24H8U40E8BD32R20F4D8G4L16H4
U12BU4":' 6
660 A$(55)="R40D8G32D16L8U16E32L32U8B
F4":' 7
670 A$(56)="BR8R24F8D16G4F4D16G8L24H8
U16E4H4U16E8BD8BR4R16F4D8G4L16H4U8E4B
D24R16F4D8G4L16H4U8E4BU4":' 8
680 A$(57)="BR8R24F8D40G8L24H8U8R8D4F
4R16E4U12L24H8U16E8BD8BR4R16F4D12L20H
4U8E4BU4":' 9
```

```
690 A$(58)="BD16BR16R8D8L8U8BD16R8D8L
8U8":' :
700 A$(59)="BD16BR16R8D8L8U8BD16R8D16
G8L8E8U16BF4":' ;
710 A$(60)="BR34D8G20F20D8H28E28BD4BL
2":' <
720 A$(61)="BD16R40D8L40U8BD16R40D8L4
0U8":' =
730 A$(62)="BR6F28G28U8E20H20U8BD4BR2
":' >
740 A$(63)="BR8R24F8D8G16D8L8U8E16U4H
4L16G4D4L8U8E8BD48BR8R8D8L8U8BU46":'
?
750 A$(64)="BR8R24F8D24G8L16U24R8D8R8
U12H4L16G4D32F4R28D8L32H8U40E8BD4":'
@
760 A$(65)="BR16R8F16D40L8U24L24D24L8
U40E16BD8BR4F12D4L24U4E12BU4":' A
770 A$(66)="R32F8D16G4F4D16G8L32U56BF
8R20F4D8G4L20U16BD24R20F4D8G4L20U16BU
4":' B
780 A$(67)="BR8R24F8D8L8U4H4L16G4D32F
4R16E4U4R8D8G8L24H8U40E8BD4":' C
790 A$(68)="R32F8D40G8L32U56BF8R20F4D
32G4L20U40BU4":' D
800 A$(69)="R40D8L32D16R24D8L24D16R32
D8L40U56BF4":' E
810 A$(70)="R40D8L32D16R24D8L24D24L8U
56BF4":' F
820 A$(71)="BR8R24F8D8L8U4H4L16G4D32F
4R16E4U4L8U8R16D16G8L24H8U40E8BD4":'
G
830 A$(72)="R8D24R24U24R8D56L8U24L24D
24L8U56BF4":' H
840 A$(73)="BR8R24D8L8D40R8D8L24U8R8U
40L8U8BF4":' I
850 A$(74)="BR32R8D48G8L24H8U8R8D4F4R
16E4U44BF4":' J
860 A$(75)="R8D24E24R8G28F28L8H24D24L
8U56BF4":' K
870 A$(76)="R8D48R32D8L40U56BF4":' L
880 A$(77)="R8D12F12E12U12R8D56L8U36G
12H12D36L8U56BF4":' M
890 A$(78)="R8D12F24U36R8D56L8U12H24D
36L8U56BF4":' N
900 A$(79)="BR8R24F8D40G8L24H8U40E8BD
8BR4R16F4D32G4L16H4U32E4BU4":' O
910 A$(80)="R32F8D16G8L24D24L8U56BF8R
20F4D8G4L20U16BU4":' P
920 A$(81)="BR8R24F8D36G4F4G4H4G4L20H
8U40E8BD8BR4R16F4D32H4G4F4L16H4U32E4B
U4":' Q
930 A$(82)="R32F8D16G8L16F24L8H24D24L
8U56BF8R20F4D8G4L20U16BU4":' R
940 A$(83)="BR8R24F8D8L8U4H4L16G4D8F4
R20F8D16G8L24H8U8R8D4F4R16E4U8H4L20H8
U16E8BD4":' S
950 A$(84)="R40D8L16D48L8U48L16U8BF4"
:' T
960 A$(85)="R8D44F4R16E4U44R8D48G8L24
H8U48BF4":' U
970 A$(86)="R8D36F12E12U36R8D40G16L8H
16U40BF4":' V
980 A$(87)="R8D36E12F12U36R8D56L8U12H
12G12D12L8U56BF4":' W
990 A$(88)="R8D12F12E12U12R8D16G12F12
D16L8U12H12G12D12L8U16E12H12U16BF4":'
 X
1000 A$(89)="R8D12F12E12U12R8D16G16D2
4L8U24H16U16BF4":' Y
1010 A$(90)="R40D12G32D4R32D8L40U12E3
2U4L32U8BF4":' Z
1020 A$(91)="R40D8L24D40R24D8L40U56BF
4":' [
1030 A$(92)="BD4F40D8H40U8BD4BR2":' \
1040 A$(93)="R40D56L40U8R24U40L24U8BF
4":' ]
1050 A$(94)="BD34E20F20D8H20G20U8BF2"
:' ^
1060 A$(95)="BD48R40D8L40U8BF4":' _
1070 RETURN
1080 REM Restore colour to normal
1090 COLOR15,4,4:CLS:END
```

DISK INITIALISATION
by Phil Rotsky

This program is for those of you lucky enough to have Sony disk drive units — or planning to get them. The idea is to SAVE it under the filename of AUTOEXEC.BAS. Each time you power up your machine this program will automatically RUN. It prints a list of the files on the disk, and makes it easy to DELETE or RENAME them. You can also FORMAT the disk, but make sure you have backup copies of any files you want as everything on the disk will be wiped off.

The colours selected for the screens are green lettering on a black background. This is easy on the eye, but you can select other colours by changing line 50.

The program contains some error trapping. For example, it stops you trying to RENAME a file with an existing name, without crashing the program. Other routines should be easy to add.

The strange symbol in lines 60, 90 and 120 is what our printer produces in place of the GRAPH-U graphics symbol.

```
10 ' DISK INITIALISATION
20 ' by Phil Rotsky
30 KEY OFF
40 ON ERROR GOTO 380
50 COLOR3,1,1:CLS
60 PRINT"@@@@@@@@@@@@@@@@@@@@@@@@@@@@"
70 PRINT
80 PRINT"     DRIVE A : FILES"
90 PRINT"@@@@@@@@@@@@@@@@@@@@@@@@@@@@"
100 PRINT
110 FILES:PRINT
120 PRINT"@@@@@@@@@@@@@@@@@@@@@@@@@@@@"
130 PRINT:PRINT
140 PRINT"<D> Delete a File"
150 PRINT"<F> Format the Disk"
160 PRINT"<R> Rename a File"
170 PRINT"<B> Return to BASIC"
180 Q$=INKEY$
190 IF Q$="" THEN 180
200 IF INSTR("BDFR",Q$)=0 THEN 180
210 IF Q$="D" THEN GOSUB 260
220 IF Q$="F" THEN GOSUB 300
230 IF Q$="R" THEN GOSUB 340
240 IF Q$="B" THEN STOP
250 GOTO 50
260 INPUT"File to Delete";O$
```

```
270 INPUT"ARE YOU SURE";Q$
280 IF Q$="Y" OR Q$="y" THEN KILL O$
290 RETURN
300 PRINT"ARE YOU SURE YOU WISH TO"
310 INPUT"FORMAT THE DISK";Q$
320 IF Q$="Y" OR Q$="y" THEN CALL FOR
MAT
330 RETURN
340 INPUT"File to Change";O$
350 INPUT"New Filename";N$
360 NAME O$ AS N$
370 RETURN
```

```
380 PRINT "ERROR DETECTED AT LINE " ;
 ERL
390 IF ERR=70 THEN PRINT "DISK OFFLIN
E"
400 IF ERR=53 THEN PRINT"FILE NOT FOU
ND"
410 IF ERR=65 THEN PRINT"FILE ALREADY
 EXISTS":PRINT"Please choose another
name"
420 PRINT:PRINT"Press Any Key to Cont
inue"
430 Q$=INKEY$:IF Q$="" THEN 430
440 GOTO 30
```

GEOM
by Chris Ratcliffe

GEOM is a short program which produces the type of 'mathematical' hi-res patterns which computer manufacturers love to show in adverts. GEOM is interesting in that after displaying five standard patterns, it uses its imagination, and produces unique random patterns until the cows come home.

The main pattern drawing routine is only five lines long, starting at line 250, so can easily be incorporated into other programs. For the mathematically minded, the program appears to draw a series af rotating points on a circle, but using a relatively large angular step (r).

The pattern produced depends on the ratio of r to 2π (2π is the radian equivalent of 360°). For instance, the first standard pattern uses a step of 3.1 radians. But $2\pi/3.1 = 2.01 = 2$. So the pattern produced looks like a two-sided polygon (a line) rotating slowly anticlockwise, because 2.03 is just greater than 2.00.

Similarly the second standard pattern uses a step size of 2.11. $2\pi/2.11 = 2.98 = 3$. So the pattern produced looks like a triangle (a three-sided polygon) rotating slowly clockwise (since 2.98 is just less than 3). If none of this makes sense, just run the program and all should become clear!

```
10 REM GEOM
20 REM by Chris Ratcliffe
30 REM
40 REM set up for high-res.
50 SCREEN 2
60 COLOR 11,0,0
70 REM loop to read in the data
80 REM for the first five "standard"
90 REM patterns
100 FOR T=1 TO 5
110 READ R
120 GOSUB 230:REM draw pattern
130 NEXT T
140 REM loop to draw random patterns
150 R=(RND(1)*5)+1.3
160 GOSUB 230:REM do random pattern
170 GOTO 150
180 REM main pattern routine
190 REM clear screen and initialise
```

```
200 REM colour for first line to
210 REM black,and reset scaling
220 REM factor to maximum
230 CLS:I=0:O=1
240 REM main routine loop
250 FOR A=0TO300 STEP R
260 X=130+COS(A)*120*O
270 Y=95+SIN(A)*94*O
280 REM draw line to new coordinates
290 LINE -(X,Y),I
300 REM reduce scaling factor,and
310 REM set plot colour to yellow
320 O=O*.997:I=11:NEXT
330 REM pause loop after drawing
340 FOR A=0 TO2999:NEXT
350 RETURN
360 REM data for the five
370 REM standard patterns
380 DATA 3.1,2.11,1.58,1.24,1.832
```

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. So as long as your typing's OK, everything should work perfectly.

If you have a problem, don't hesitate to *write* to us. Unfortunately, we can't answer telephone queries as we're usually too busy putting together the next issue. In any case, the original programmer is rarely on hand to answer your questions. If you send us a letter, we'll be in a better position to sort out your problem.

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 to us together with a copy on cassette?

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 ace program.

DON'T VAT THE PRESS

There are strong reasons to believe the Chancellor of the Exchequer is planning to impose VAT on your magazine.
Such a move would turn the clock back 130 years — the last tax on newspapers and journals was repealed in 1855. Since then 'No tax on knowledge' has been a principle agreed by all Governments, even in the darkest days of war.
A free Press is a tax-free Press.
No Government should be given the power to impose financial pressure on a Press it may not like.
Tell your MP to say 'NO' to any tax on reading.

Issued by the Periodical Publishers Association, London

ADVERTISERS INDEX

The JUKI 2100 sells itself.

Compare it with any other portable daisywheel typewriter and you'll see why. Its advanced specification includes a typing speed of 10 characters per second, full decimal tabulation, automatic centering and lift-off, 12-character keybuffer memory, automatic carriage return, and correction key. It uses the standard Olivetti PRAXIS 30* cartridge (available just about everywhere), has a full 100-character daisywheel, and, like all Juki products, comes with a comprehensive, easy-to-read User's Manual. Yet complete with compact carrying hood, the Juki 2100 weighs less than 14 lbs.

Your customers will be knocked out. Especially when you hit them with the price. Just £ 249. (The Juki 2200, which doubles as a fully-interfaced personal computer printer, is equally stunning at £ 299).

We may be the latest name in information technology, but our philosophy is as old as the hills. Roughly translated, it means outstanding value for money.

Or, to put it another way, Juki means business.

* Olivetti PRAXIS 30 is a registered trademark of Olivetti SPA.

JUKI

Technology true to type

JUKI (EUROPE) GMBH · Eiffestr. 74 · 2000 Hamburg 26 · F.R. Germany
Tel.: (040) 25 20 76 · Telex: 2 163 061 (JKI D) · Fax.: (040) 25 20 79

Sole distributor:

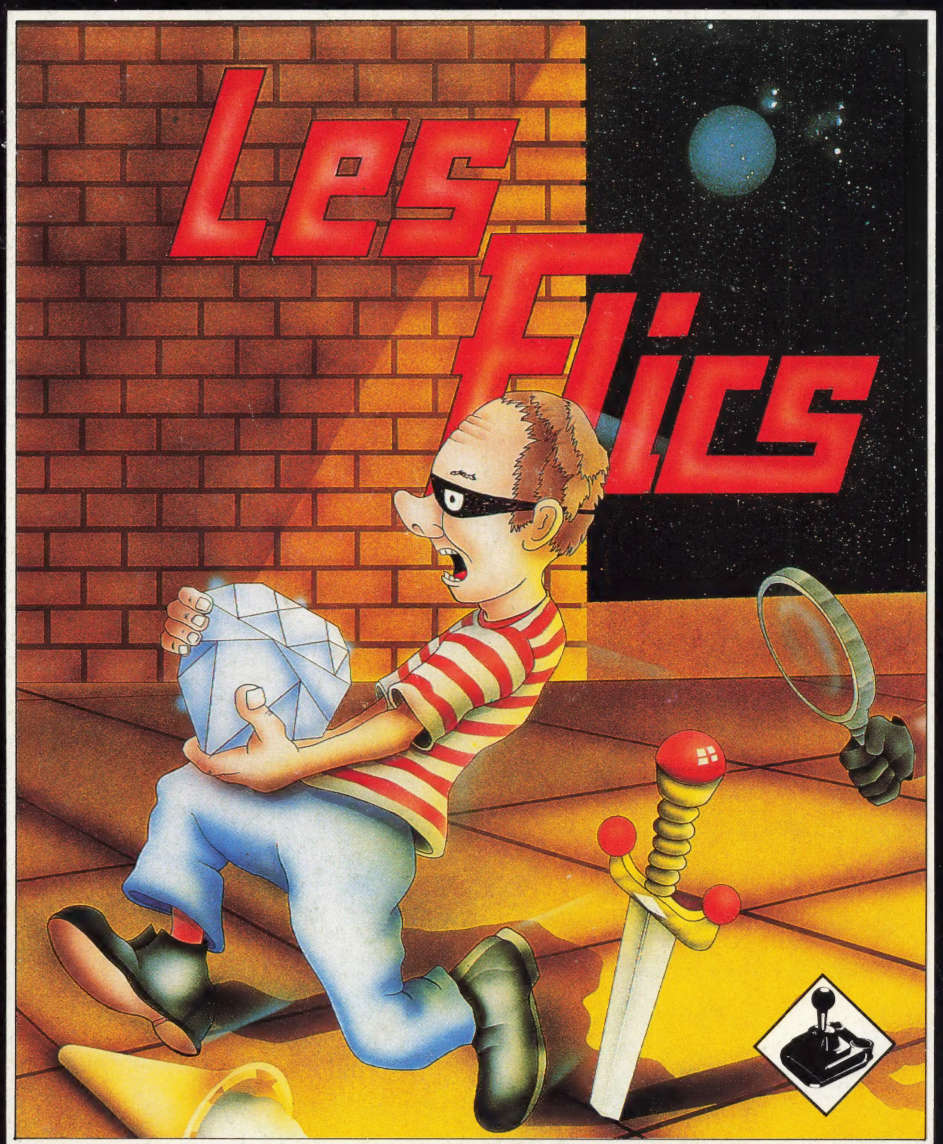
Micro Peripherals ltd
69 The Street, Basing, Basingstoke, Hampshire RG24 OBY
Tel.: Basingstoke (0256) 47-3232 (12 lines)
Telex: 859669 MICROP G,
Facsimile: (0256) 47-61 570

JUKI 2100/2200
(Electronic Portable Typewriter)

MSX Star Games

Software for a new generation

Look for MSX Star Games... A guarantee of quality, programs that only PSS can bring you. These games are available now, if you have difficulty in obtaining any of these titles from your local retailer write or phone PSS direct



Psst! ... Over here! ... Wanna buy a diamond? A great big one, I've just ah, acquired it. Have a look at that! Oh it's a snip at four grand, chief. Where did I get it? Don't ask questions like that but I know that I had to work very hard. Do you know that I've been through Locksmiths, Bakers, Banks and even the sewers to get that sparkler.

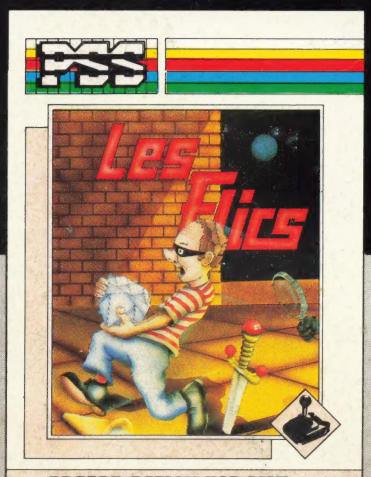
My car's been worn out too, dodging all those Police cars out hunting for me, I'd just like to get this gem off my hands now. What? Not interested in the bargain of a lifetime? Oh well, must be off, is that an officer of the Law I see plodding this way?

Can you make out as master burglar? Have you got what it takes to rip off the biggest diamond ever found? You'll need all your wits (and possessions!) to outwit the gentlemen of the Constabulary ranged against you.

Avoid the Squad cars and enter the buildings, evade the Policemen, detectives and the mad axe wielding chef.

Pick up the items as you find them, we leave you to find out what they do!

Send cheque or P.O. to: PSS, 452 Stoney Stanton Road, Coventry CV6 5DG. Tel: Coventry (0203) 667556



ARCADE ACTION FOR MSX

LES FLICS

MSX 7·95

Assembler/Monitor for MSX

CHAMP

MSX 12·95

ARCADE ACTION FOR MSX

MAXIMA

MSX 7·95

ARCADE ACTION FOR MSX

TIME BANDITS

MSX 7·95