# MSX and SPECTRAVIDEO

# COMPUTER FORUM

## Magazine

**SANYO MSX EXCLUSIVE**

⊕ **SANYO**

PHC-33

# 4 Page REVIEW

# MSX and SPECTRAVIDEO
# COMPUTER FORUM
Magazine

## Contents

## EDITORIAL

This month we have our first big exclusive. We review the new Sanyo MSX computers which have just been released in Australia. Sanyo have been extremely helpful to Computer Forum in placing this equipment at our disposal and we would like to welcome them to the world of MSX computing.

Computer Forum is only in the third month of publication and is already being well received in all corners of Australia and New Zealand where it was available from one of the stands at the Auckland PC Show.

We have also had comment from a couple of readers (and only a couple — thank goodness) concerning our program listings. It seems that they are having difficulty getting the programs to run. Enquiries revealed that the problems were caused by typing errors — mainly one or two items of data missing.

In an attempt to overcome this, all listings will now be printed in 40 column format. If you set your screen width to forty then it should be a simple matter to line up the text of the listing with that on your screen.

Happy computing ...

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# We review ...



# SANYO MSX

*Sanyo have just released their MSX range in Australia. The computers, the PHC-27 and PHC-33, replace the MPC100 MSX computer that was available overseas. We were supplied with one of each, as well as some other goodies which are reviewed here and in next month's issue.*

The obvious differences between the two computers are the built-in data recorder and two cartridge slots on the top of the PHC-33. The PHC-27 has one slot on the top, one at the back and uses an external data recorder.

Both models are MSX1 standard which means they both have 64K RAM, 32K ROM and 16K of Video RAM. The keyboards on both models are identical except that the PHC-33 has the cassette controls positioned above the function keys.

These computers look very purposeful in all black. The power supply is internal, having only the power lead coming from the back left corner of the computer. The keyboard is sculptured and is a full stroke qwerty keyboard with caps lock indicator light.

The keyboards are light and responsive and we found them to be comfortable to use for both "hunt-and-peck"

and touch-typing methods. The cursor control arrows on the right side of the keyboard are sufficiently sensitive for most purposes but, like all keypads, not really a substitute for a joystick when the game playing gets heavy.

The Sanyo computers are a full implementation of 64K MSX basic with the standard qwerty keyboard layout with the addition of MSX cursor control keys and function keys. There is also the SELECT key which is only used by software written to recognise it, and a DEAD key for inserting accents above the letters a,e,i,o,u,y.

Being a 64K MSX computer, it has the normal 32K ROM which occupies the bottom half of the memory map, leaving 32K of the 64K in the top half. Take off a bit for operating system storage area and the screen signs on with 28815 bytes free.

The assembly work is very neat and survived our
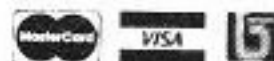
crunch test with ease. Our crunch test is (don't tell the manufacturers, otherwise they may not loan us any more equipment) to load a program and, while this is running, lift one end of the computer a few centimetres from the desk and — let go. The program didn't even hiccup. We do not suggest you try this with your computer even under warranty, as it is classed as abuse and not normal wear and tear.

## THE SANYO PHC-33

This version has a large footprint (desk or tabletop area) measuring 390 x 305mm (15 x 12 inches). This may seem a problem, except that considering it doesn't

need an external cassette recorder and leads, this model begins to appear very compact.

The upper rear section of the unit contains the data cassette on the left and two cartridge slots on the right. On the right-hand side of the computer are a reset button and two joystick ports. Across the back are the power on/off switch, TV, Video and Audio sockets, phase switch, printer socket. The Reset button is a full reset. The button itself is marked Reset/Re-initialisation.

**Back view of the PHC-33 showing output ports.**

Inside, the keyboard is metal-backed which assists keyboard response. On the left side is the power supply which has a heavy heatsink which helps carry the heat away from the power regulators. There are also some

# SANYO MSX REVIEW

fairly large capacitors in this area. In computers, these are designed to filter out unwanted interference from the power and the larger the better.

The rest of the interior of the case bottom is taken up with the main printed circuit board which contains the memory chips and other main processor chips. The two cartridge sockets occupy the rear right corner of the board. These have a light beam to sense whether a cartridge is inserted. A large area of the board is blank except for wire links. We think that the board was designed to take standard chips in these positions and that these were then replaced in the final design by the large custom chips which do the same job.

## INBUILT DATA RECORDER

What really impresses about the PHC33 with in-built cassette, is just that — the in-built cassette. Ordinary tape recorders and even some dedicated data cassettes must have a power lead as well as the lead to connect to the computer. Add these to the power lead for the computer and the cable from the computer to the TV, and you have four cables to connect, get in the way, and generally spoil the look of the area. With the cassette in-built, the PHC-33 only requires the power cable and TV cable — so you don't have to buy a multi-outlet power board in addition to the computer.

The recorder section itself is very well designed and incorporates a damped-opening lid — the lid opens slowly when you release it, instead of crashing open and throwing your precious tapes across the room. It also has a PHASE switch which is helpful if you are having trouble loading tapes produced on another cassette recorder. Using this recorder, we were able to load a very dodgy recording that we have been trying to load for months.

MSX computers have two baud rates (data transfer speed), 1200 and 2400, for cassette saving and loading. The problem is that although tapes recorded at the slower speed are more reliable, they take twice as long to load — up to nine minutes for some. The PHC-33 also has a high speed switch which allows the slower tapes to be loaded at twice the speed. Very handy for some of the larger games which normally take seven or eight minutes to load.

Another interesting point is being able to hear the tape through the TV speaker as it is loading. This can be useful where you are not sure of the counter reading for the start of a program on tape.

## THE SANYO PHC-27

This model is functionally the same as the PHC-33 with the exception of not having a built-in data recorder. The

PHC-27 comes with a cassette cable for plugging into the back of the keyboard.

We used the PHC-27 with an old portable mono tape recorder which has been around the office for six or seven years. Connecting it to the computer according to the instruction manual, we were able to load tapes without even touching the volume control. This turned out to be set about 50% and did not need changing.
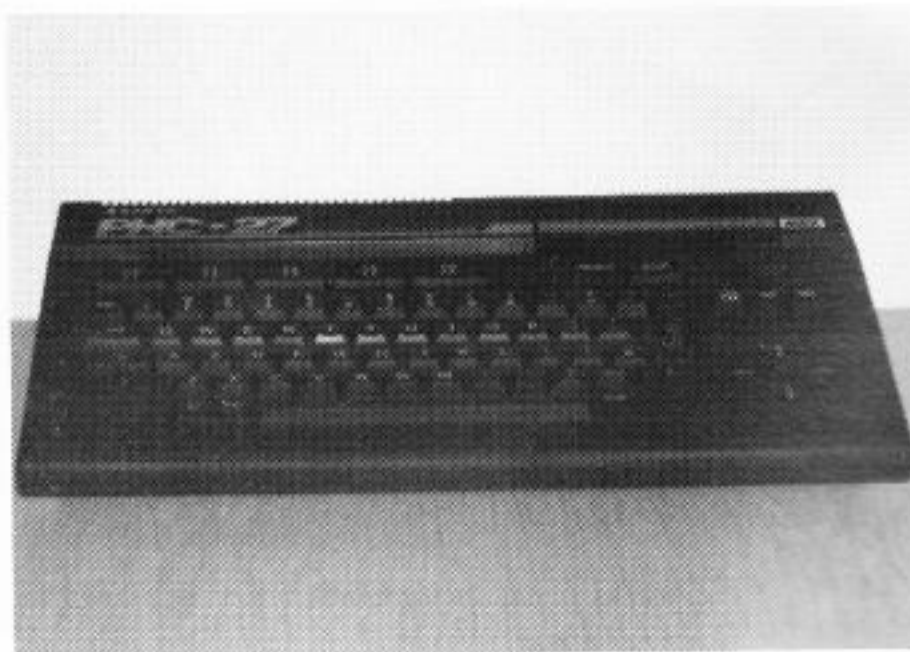


What this means is that the Sanyo must have quite a good cassette interface circuit, as we have tried using the same recorder with other computers with varying degrees of success.

Apart from the advantages afforded by the built-in recorder of the PHC-33, the performance of both computers was identical.



**Back view of the PHC-27
showing output ports.**
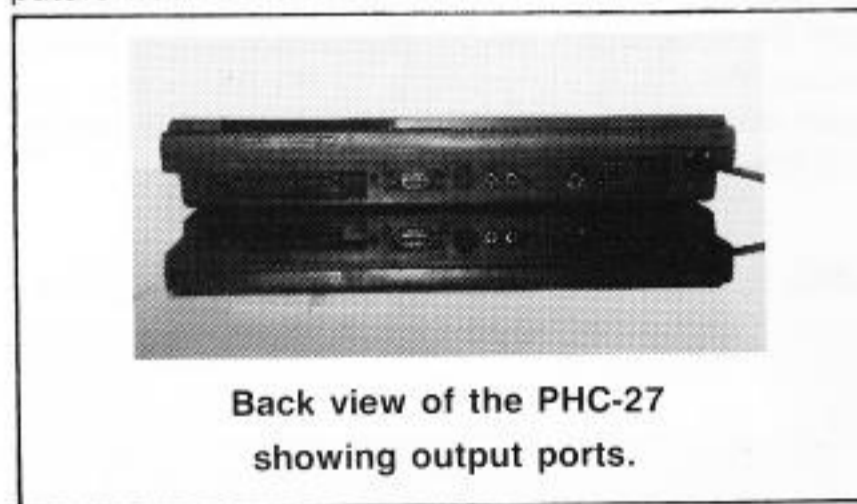
## TV OUTPUT

The picture output of both machines gives very sharp definition and colour on a standard colour TV. The Sanyo outputs its picture to UHF channel 36. This means that you will need a TV with a UHF tuner. For those who get confused between UHF and VHF, like me, VHF channels are the same as those you could get on your old black and white sets. Remember them?

Should your TV not have a UHF tuner, there are two possible solutions. If you have a video cassette

# SANYO MSX REVIEW

recorder, chances are that it is capable of receiving UHF signals. In that case, plug the computer TV output into the Video Cassette and tune in channel 36. You may need an adaptor lead, depending on your recorder type. The second alternative is to duck off to Dick's (Dick Smith) and grab a VHF TV modulator and find a friend with enough knowledge to make an adaptor which will let you connect the Video and Audio outlets of the computer to the VHF modulator. Then you have VHF output.

At time of going to press, Sanyo were considering packaging the PHC-27 with their colour TV/Monitor at a very attractive price. We will review the TV/Monitor unit next month.

## DOCUMENTATION

The owner's manual contains 19 pages covering setting up the computer and controlling the data recorder etc. It is pretty simple and, once read, can probably be put aside.

An MSX-BASIC Programming Manual supplied with the computer is a very good implementation of a reference manual with each command being covered and worked examples included in most cases. Containing 173 pages, this manual is comparable with some books for which you would pay about $30.

There are two demonstration programs in the back of this manual and a five-page index. We typed in both demo programs and they worked without a hitch. Looks like someone did their homework.

## TO SUM UP ...

These two computers are 64K MSX standard. Not much we can add to that. They appear to be well constructed and neatly presented.

When considering a new home computer, consider this. Unless you intend moving into disk drives fairly quickly, you will spend a lot of your computing time saving and loading programs on cassette. If this function creates problems then more of your time will be spent in frustration.

The PHC-27, although not having a data recorder of its own, seems to have the ability to work reliably with external data cassettes. If you intend spending a lot of time loading long programs, and believe me there are plenty of them around, then the PHC-33 should be considered for its built-in recorder and high speed loading facility.

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We did not perform any bench mark (speed performance) tests on this computer because we consider these sort of tests to be little more than meaningless. To use one magazine's tests as an example, the routines that are used for these tests make no allowance for the fact that some computers perform counting and maths functions in single or double precision or integer mode by default.

Unless the benchmark program contains commands to adjust for these differences, then the computer will not perform to its optimum and, conversely, if the test program is modified to suit the machine then all comparison standards are lost. We hear a lot about clock speed from people who are not sure how else to judge a computer. The speed of a computer has no meaning when used with badly written software or is connected to a slow printer etc.

Recommended retail prices are $359 for the PHC-27 and $429 for the PHC-33. When we reviewed the Sanyo, selected dealers were being appointed around Australia and we hope to keep you informed about them. The first of these dealers, Computer Oasis of 324 Stirling Highway in Claremont who assisted with review equipment and information, are offering very attractive introductory prices.

☼     ☼     ☼     ☼     ☼

# PRODUCT NEWS ...

## MSX LIGHT PEN

The MLP-001 Light Pen from Sanyo is a cartridge-based light pen for use on MSX computers. It plugs into the cartridge slot and has a switch on the side for selecting the in-built ROM based graphics routine or for use with your own programs.

Selecting the in-built ROM displays a panel of graphics on the screen. This looked similar to the MAC DRAW panels for the Macintosh. Pressing the light pen on these panels allows selection of wide or narrow pen, colour, circle, line, box, paint, scroll, save, load etc.

To demonstrate how this works, we pressed onto the circle block. The screen cleared and displayed a small circle on the bottom of the screen. Moving the pen to the left of the screen, we pressed to place a cross on the screen where we wanted the centre of the circle. Moving the pen up, we pressed for the radius of the circle and immediately a circle was drawn at that location. Pressing on a blank part of the screen returned us to the selection block.

Pressing onto the square block we were able to move the pen to where we wanted the top left corner of the box, press to record that, move to where the bottom right corner should be and pressed. A box was drawn on the screen. Going back to the selection block and pressing onto the paint brush we moved the light pen to the box just "drawn", pressed onto it and it was painted in.

Now for the selling feature of this product. Moving the pen to the selection block, we pressed onto what looks like a TV with a B displayed. The screen cleared and displayed a program listing of graphics commands for drawing a circle, box and painting in the box. That's right, while we were having fun, the computer was writing the program that would regenerate what had been done on the screen.

At this point we could return to the selection box and select the save block and the program would be saved to tape for future use or modification.

The Light Pen comes with its own 33-page instruction manual which also contains information about Expander Basic that adds four extra commands to MSX Basic.

The Sanyo Light Pen retails for $129 and was supplied courtesy of Computer Oasis and Sanyo.

# Software NEWS & REVIEWS

## RIVER RAID
### MSX cassette

Your mission is to fly your attack aircraft deep into enemy territory. The enemy are concentrated near the river and you must follow this river to destroy the bridges held by them.

You must fly low and follow the river otherwise you will crash into the land on either side. All along the river are enemy helicopters, gun boats and other nasties which decide to move just as you are about to fly 'round them. So shoot 'em up.

The easiest way to shoot them is as soon as they come into view at the top of the screen. To complicate matters, there are also fuel dumps along the way. You will need these to proceed further, so watch out you don't

destroy too many of these. The further up river you go, the less fuel dumps there are and much more of the enemy.

A very addictive game, River Raid is an Activision product distributed in Australia by Imagineering. Our copy was supplied by Peter J. Fox Computers and sells for $19.95.

# *Software* NEWS & REVIEWS

## ANTARCTIC ADVENTURE
**MSX cartridge**



One of the famous Konami cartridge range of software, Antarctic Adventure lives up to their reputation for excellent software.

You are a Penguin. You must make it around the Antarctic continent calling on each of the bases located there. Along the way you will encounter several obstacles such as crevasses and ice holes which can be jumped except when a seal pokes his head up from one. Touching any of these will slow you down.

Extra points can be gained by catching fish that jump from the holes in the ice and by touching green flags positioned along your path. You are only allowed a certain amount of time to complete each leg of your journey, so don't waste any time.

The graphics are excellent, with the clouds in the sky and the ground moving toward you to create an almost 3D impression. This is also a very addictive game.

Our copy of Antarctic Adventure was supplied by Peter J. Fox Computers and sells for $29.00.

(The picture quality reproduced here is not a true indication of the image, as we were unable to 'freeze' the action for our camera.)

## RIVER RAID
**MSX cassette**

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The easiest way to shoot them is as soon as they come into view at the top of the screen. To complicate matters, there are also fuel dumps along the way. You will need these to proceed further, so watch out you don't

demonstrate data storage in Bank 21. Sufficient documentation is provided to show how to implement these programs.

## 55K CAPACITY

To test the full 55K capacity, a memory based data retrieval program was loaded into the first bank along with the extra Basic statements for MEMORY SHIFT and statements for displaying current bank condition and loops back to the program menu. This program was then copied to the second bank using the copy option of MEMORY SHIFT. The data arrays were then loaded into each bank giving a total data storage of 40 + K. The system treated this as two separate programs with access to 20K of data. This makes a large data area available without loading and discarding data from tape.

MEMORY SHIFT Ver 1.0 for SV328 is being made available on a custom basis for $20 including postage within Australia. Back-up copies will be available at extra cost. No guarantees are given other than that the routine will run the two part Demo program. Orders and enquiries should be directed to TIL, P.O. Box 138, Gnowangerup, WA 6335.

The author mentioned that this routine has also shown the ability to run under MSX Basic when modified. Anyone wishing to co-develop MEMORY SHIFT for various MSX machines may contact the above address.

## AEROBAT FLIGHT SIMULATOR
**MSX and SV cassette**
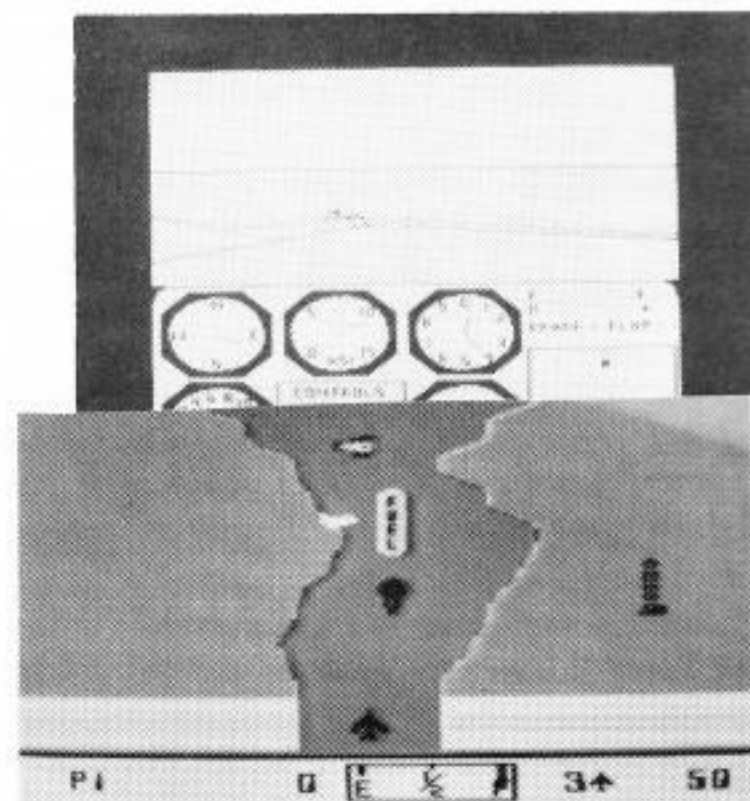


destroy too many of these. The further up river you go, the less fuel dumps there are and much more of the enemy.

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# Software NEWS & REVIEWS

## TEST FLIGHT

Through the windscreen we can see little except for the runway in front of us. Holding down the P key we notice the power indicator move up to maximum. At this point, pressing B releases the brakes. The ASI shows our speed increasing as we move down the runway.

As the speed increases to 50 knots, the border of the screen changes from red to black to indicate that we have reached flying or rotation speed. Ease back on the joystick to pull the nose up and the VSI indicates a climb and the artificial horizon drops slightly away from the little 'plane in the middle of the gauge. While climbing, the ASI will not increase greatly but the Altimeter is still ticking its way upward.

When the altimeter indicates 1000 feet (we can climb to 14,000 feet if we want) we push gently forward on the joystick and level out. The Altimeter remains unchanged, the VSI drops back to zero and the ASI begins to move up. Around 80 knots air speed, we press the O key to throttle back and conserve fuel. After a while of flying due south, it is time to turn around and head north, so we move the stick to the left and do a steep banking turn.

The nose starts to drop as we side slip during our turn. Pull the stick back. No, too hard and the border of the screen has turned red. We are stalling. Look at the power indicator. Of course — we are still throttled back. Press the P key to increase power and push the stick forward slightly. That's better. The border colour is now black, but we are losing altitude. Now pull back gently on the stick to raise the nose and the Altimeter starts its climb again.

On the map display can be seen mountains and buildings together with a lake over which there is a bridge. We could fly over the lake, under the bridge,

do aerobatics such as loops and rolls. Such is the realism of Aerobat.

It was intended that this review should be rounded off with a description of a perfect landing. That would, however, be a fairy-tale because that little exercise has not been achieved — yet!

Aerobat was recently named as a finalist in the New Zealand software awards. For more information about this product, see the advertisement elsewhere in this issue.

# MAILBOX

*This page is for your comments and queries. If you have a specific problem or have solved one, we would like to hear about it.*

*If you require an answer before we publish it, please enclose a stamped self-addressed envelope.*

## GETTING RID OF MSX SPRITES

I must congratulate you on your magazine, it is great. In regard to the CLS function to remove sprites on the SV (the bottom of page 4 Vol. 1 No. 1). To get rid of the sprites quicker on MSX, just type Screen0: Screen 2 (or whatever screen you were on).

I have started a CP/M Public Domain Library down in my area, which may be of interest to your CP/M readers. At the moment I have only 2 Meg but, the library is constantly growing.

I am looking into finding a program that runs a menu on the screen, under CP/M for Ron Gray (Vol. 1 No. 1 page 8). If I can't find one I will probably start to write one, if I get the chance.

Keep up the good job, the magazine is what Spectravideo owners need.

Todd Davies
Donnybrook, W.A.

*Thanks for the Sprites hint and kind words Todd.*

## CONVERTING TO MSX

I have just bought the first issue of your magazine and must say I'm very pleased to read a magazine that I can relate directly to my SV328, instead of 'MSX only' magazines.

I am though, still interested in MSX, and wonder if SV728 ROMs would work in my machine, assuming the port addresses and allocations are the same, and where I could get these ROMs from. Being that you have both machines, could you give me a definite answer (even by trying it yourself), and if the answer is no, please list the reasons technically enough so as I can decide on the magnitude of mods necessary.

Also, as well as printing memory maps of SV328 & MSX, more importantly could you print MSX VDP memory maps so I can 'fix' MSX programs that mysteriously VPOKE into the darkness.

One more thing, what happens on an MSX when you 'CALL' to addresses 41H, 44H and 156H. As I have a few MSX programs that do this, and it's very likely that they don't have the same effect on SV328s

Martin Everitt
Eagleby. QLD

*Last things first, 41H disables the screen, 44H enables it, and 156H clears the keyboard buffer. The memory map for MSX VRAM should be the same as the SV, however we hope to include a memory map comparison in next month's issue.*

*With regards fitting MSX ROMs in the SV328, would not achieve the desired result because the I/O ports are different (see chart). To correct this situation, would mean a very extensive rewire of the main board to decode the new ports. Even reading the ROM, rewriting the port I/O calls, and burning a new chip would not help as the new ports would not be recognisable by MSX software.*

I/O PORT MAP (NA = Not Assigned)

| PORT FUNCTION | SV318/328 | MSX |
|---|---|---|
| Printer | 10H-12H | 90H-91H |
| Modem | 20H-26H | NA |
| RS-232 | 28H-2EH | 80H-87H |
| Floppy Disk | 30H-38H | DOH-D7H |
| 80 Column Card | 50H-58H | NA |
| Video Display Processor | 80H-84H | 98H-99H |
| Programmable Sound Generator | 88H-90H | AOH-A2H |
| Programmable Peripheral Interface | 96H-99H | A8H-ABH |
| External Memory (Sony) | NA | BOH-B3H |
| Light Pen (Sanyo) | NA | B8H-BBH |
| Audio/Video Control | NA | F7H |

## EXTRA MEMORY CONFUSION

It seems that we opened a bag of snakes with our article on the usage of the Spectravideo 64K RAM card. One reader phoned to say that he followed the instructions in the article to no avail. Another has sent in a three page article concerning the use of this card.

The article was written whilst using the card with an SV602 Mini Expander and with that in mind, the card performed as per the text and sample programs. It is possible that the card will perform differently when used with disk drives and full expander. As this subject is only of interest to those with the card or contemplating purchasing one, we will not publish the three page article submitted. If you are interested, send two 33 cent stamps and we will send you a copy of that article.

# BASIC TUTORIAL — Part 3

The BASIC TUTORIAL now has a new style. Starting this month it will continue the in-depth explanation of the commands. To keep your interest it will also contain sections relating specifically to graphics and sound commands.

## MANIPULATING STRING VARIABLES

### The LEFT$ command

This command allows you to 'peel-off' the left part of a string variable. For example, if we had five names in data statements and wanted to find a TOM someone. Using the IF-THEN command we could use something like this

```
100 FOR I=1 TO 5
110 READ A$
120 IF LEFT$(A$,3)="TOM" THEN GOSUB 200
130 NEXT I
140 DATA DAVE JONES,ALAN SMITH,TOM DAVIS,FRED BLOGGS,JIM WILSON
200 PRINT "TOM IS AT POSITION";I;" IN THE DATA"
210 RETURN
```

This program will read the data statements one at a time and check if the first three letters, LEFT$(A$,3), are equal to TOM. If they are, execution will branch to the subroutine at line 200 and print the information. Execution will then return to line 130. After running, type NEW and press ENTER to remove this program from memory.

### THE RIGHT$ command

This command lets you get the right hand part of a string variable.

Using the previous example if we had five names in data statements and wanted to find someone with the surname of BLOGGS, the IF-THEN command could be used something like this -

```
100 FOR I=1 TO 5
110 READ A$
120 IF RIGHT$(A$,6)="BLOGGS" THEN GOSUB 200
130 NEXT I
140 DATA DAVE JONES,ALAN SMITH,TOM DAVIS,FRED BLOGGS,JIM WILSON
200 PRINT "BLOGGS IS AT POSITION";I;" IN THE DATA"
210 RETURN
```

This program will read the data statements one at a time and check if the last six letters, RIGHT$(A$,6), are equal to BLOGGS. If they are, execution will branch to the subroutine at line 200 and print the information. Execution will then return to line 130. After running, type NEW and press ENTER to remove this program from memory.

## The LEN command

This command gets the length of a string variable.

```
100 A$="ELEPHANT"
110 A=LEN(A$)
120 PRINT "THERE ARE";A;" LETTERS IN THE WORD ";A$
```

After running, type NEW and press ENTER to remove this program from memory.

## The MID$ command

MID$ allows checking for one string contained within another. Values within brackets are the name of the string to be examined, the point in the string to commence examination and the number of characters to look for.

```
100 A$="THE FOX IS RUNNING"
110 S$="FOX"
120 FOR I=1 TO LEN(A$)
130 IF MID$(A$,I,3)="FOX" THEN GOSUB 200
140 NEXT I:END
200 PRINT"THE WORD FOX STARTS AT POSITION";I;" IN THE LINE"
210 RETURN
```

After running, type NEW and press ENTER to remove this program from memory.

The MID$ command can also be used to replace or modify part of a string variable. For example

```
100 A$="THE FOX IS YOUNG"
110 PRINT A$
120 MID$(A$,5,3)="DOG"
130 PRINT A$
```

Running this program will display
THE FOX IS YOUNG
THE DOG IS YOUNG

After running, type NEW and press ENTER to remove this program from memory.

## The STRING$ command

With this command we can produce a string of characters. Perhaps we want to print a string of underline characters across the screen –

```
100 PRINT STRING$(38,"_")
```

if we know the ASCII code for the underline character then we can use

```
100 PRINT STRING$(38,95)
```

To print a string of spaces we could use

```
PRINT STRING$(20," ") or PRINT STRING$(20,32)
```

## The SPACE$ command

If you want to print a string of spaces, instead of using the STRING$ command, we can use SPACE$. Type

```
PRINT "X"+SPACE$(10)+"X"
```

Two Xs will be displayed separated by ten spaces.

## Demonstration of String Manipulation

The following program example uses LEN, LEFT$, MID$, RIGHT$ and SPACE$ to re-assemble names stored with surname first and print them out with initials first.

```
100 S$=SPACE$(1)
110 FOR I=1 TO 5
120 READ A$ : L=LEN(A$)
130 FOR P=1 TO L
140 IF MID$(A$,P,1)=S$ THEN GOSUB 200
150 NEXT P
160 PRINT A$
170 NEXT I
180 END
200 SN$=LEFT$(A$,P-1) :  REM GET THE SURNAME AND REMOVE THE SPACE
210 CN$=RIGHT$(A$,L-P) : REM WHAT IS LEFT IS THE INITIAL
220 A$=CN$+S$+SN$
230 RETURN
300 DATA JONES B,SMITH A,GREEN F,WILSON E,DAVIS G
```

When this program is run, the names will be displayed as -

```
B JONES
A SMITH
F GREEN
E WILSON
G DAVIS
```

After running, type NEW and press ENTER to remove this program from memory.

## ARRAYS

An ARRAY is a grid of one, two or three dimensions. A list is a one dimensional array (one column of several rows). A bookcase is an example of a two

dimensional array (third book from the left on the second shelf). An example
of a three dimensional array would be several bookcases one behind the other
(third book from the left, on the second shelf of the third bookcase).

## The DIM command

An array is set-up or DIMensioned using the DIM command. An array cannot be
used without it having been dimensioned previously. If you use something like
A(20)=10 and you have only used DIM A(15) or not DIMensioned the array A at
all, then a 'subscript out of range' error will result.

DIM A(10) is a one dimensional, ten element array of ten rows in one column.
Actually eleven elements if A(0) is used.

```
A(1)
A(2)
 .
 .
A(9)
A(10)
```

DIM A(10,20) is a two dimensional, 200 element array of ten rows in twenty
columns

```
A(1,1)    A(1,2)    A(1,3) . . . . A(1,19)   A(1,20)
A(2,1)    A(2,2)    A(2,3) . . . . A(2,19)   A(2,20)
 .         .         .              .         .
 .         .         .              .         .
A(9,1)    A(9,2)    A(9,3) . . . . A(9,19)   A(9,20)
A(10,1)   A(10,2)   A(10,3). . . . A(10,19)  A(10,20)
```

DIM A(10,20,30) is a three dimensional, six thousand element array of ten
rows, twenty columns and thirty layers. This would appear the same as the
above example except there would be thirty layers with the same grid.

NOTE:

a. All array dimensions will contain one more than the number specified
because zero is a valid element. Therefore, an array which is dimensioned as
DIM A(10) will actually hold 11 elements, DIM A(10,10) will hold 121 (11 x 11)
and so on.

b. You do not need to dimension an array of less than 10 elements. This is
automatically handled by the computer -

```
10 FOR I=1 TO 10
20 READ A(I)
30 NEXT
40 DATA 1,2,3,4,5,6,7,8,9,10
50 PRINT A(10)
```

After running, type NEW and press ENTER to remove this program from memory.

# THE NEED FOR ARRAYS

Without the use of arrays, the following example

```
100 DIM A(10)
110 FOR I=1 TO 10
120 A(I)=1
130 NEXT
```

would have to be something like this -

```
100 A=1
110 B=1
120 C=1
and so on up to
190 J=1
```

Examples of different types of arrays -

```
10 REM ONE DIMENSIONAL ARRAY
15 REM HOLDS NAMES OF TEN CHILDREN IN ONE CLASS
20 DIM N$(10)
30 FOR I=1 TO 10
40 INPUT "ENTER NAME";N$(I)
50 NEXT I
60 FOR P=1 TO 10
70 PRINT N$(P)
90 NEXT P
```

After running, type NEW and press ENTER to remove this program from memory.

```
10 REM TWO DIMENSIONAL ARRAY
15 REM HOLDS TEN STUDENTS NAMES AND TEN MARKS
20 DIM R$(10,2)
30 FOR I=1 TO 10
40 INPUT "ENTER NAME";R$(I,1)
50 INPUT "ENTER MARK";R$(I,2)
60 NEXT I
70 FOR P=1 TO 10
90 PRINT R$(P,1),R$(P,2)
90 NEXT P
```

After running, type NEW and press ENTER to remove this program from memory.

```
10 REM THREE DIMENSIONAL ARRAY
15 REM HOLDS 2 CLASSES OF STUDENTS NAMES AND MARKS
20 DIM R$(10,2,2)
30 FOR C=1 TO 2
40 FOR I=1 TO 10
45 PRINT "ENTER NAMES AND MARKS FOR CLASS NUMBER";C
50 INPUT "ENTER NAME";R$(I,1,C)
60 INPUT "ENTER MARK";R$(I,2,C)
70 NEXT I
80 NEXT C
```

```
90 FOR C=1 TO 2
100 PRINT "NAMES AND MARKS FOR CLASS NUMBER";C
110 FOR P=1 TO 10
120 PRINT R$(P,1,C),R$(P,2,C)
130 NEXT P
140 NEXT C
```

After running, type NEW and press ENTER to remove this program from memory.

## Sorting ARRAYS

The following program will ask for ten names to be entered one at a time.  The
program  will then sort those names into alphabetical order and print them  on
the screen.

Type in the following, pressing ENTER after each line

```
100 CLEAR 1000 : DIM A$(10)
110 FOR I=1 TO 10
120 INPUT"ENTER NAME";N$(I)
130 NEXT I
140 FOR J=1 TO 10
150 FOR K=1 TO 10
160 IF N$(J)<N$(K)THEN T$=N$(J):N$(J)=N$(K):N$(K)=T$
170 NEXT K
180 NEXT J
190 FOR P=1 TO 10
200 PRINT N$(P)
210 NEXT P
220 END
```

After running, type NEW and press ENTER to remove this program from memory.

Continued next month ...

## MSX and SPECTRAVIDEO
## GRAPHICS COMMANDS

The  following  commands are used to generate and control graphics in the  MSX
and Spectravideo computers.

CIRCLE, COLOR, DRAW, LINE, ON SPRITE, PAINT, PRESET, PSET, PUT SPRITE, SCREEN,
SPRITE$, STICK, STRIG, VPEEK, VPOKE.

We will discuss each of these commands as they relate to each other.  There is
one command that must be used whenever you want to use graphics - SCREEN.  The
SCREEN  command  places the computer into either Text or  Graphics  mode.  The
SV318/328 has only one text mode (SCREEN 0 - 40 character width) therefore the
Graphics screens are SCREEN 1 and SCREEN 2.  MSX computers have two text modes
(SCREEN  0  - 40 characters,  SCREEN 1 - 32 characters) and  consequently  the
Graphics screens are SCREEN 2 and SCREEN 3.

## Format for the SCREEN command

### SV318/328

```
SCREEN 1,0 Gives high resolution graphics with 8x8 unmagnified sprites.
SCREEN 1,1 Gives high resolution graphics with 8x8 magnified sprites.
SCREEN 1,2 Gives high resolution graphics with 16x16 unmagnified sprites.
SCREEN 1,3 Gives high resolution graphics with 16x16 magnified sprites.
SCREEN 2,0 Gives low resolution graphics with 8x8 unmagnified sprites.
SCREEN 2,1 Gives low resolution graphics with 8x8 magnified sprites.
SCREEN 2,2 Gives low resolution graphics with 16x16 unmagnified sprites.
SCREEN 2,3 Gives low resolution graphics with 16x16 magnified sprites.
```

### MSX

```
SCREEN 2,0 Gives high resolution graphics with 8x8 unmagnified sprites.
SCREEN 2,1 Gives high resolution graphics with 8x8 magnified sprites.
SCREEN 2,2 Gives high resolution graphics with 16x16 unmagnified sprites.
SCREEN 2,3 Gives high resolution graphics with 16x16 magnified sprites.
SCREEN 3,0 Gives low resolution graphics with 8x8 unmagnified sprites.
SCREEN 3,1 Gives low resolution graphics with 8x8 magnified sprites.
SCREEN 3,2 Gives low resolution graphics with 16x16 unmagnified sprites.
SCREEN 3,3 Gives low resolution graphics with 16x16 magnified sprites.
```

## MSX EXTENDED SCREEN COMMAND

There are three more options to the SCREEN command in MSX computers -

M
S   Key Click On/Off (0 = off, 1 = on)
X   Cassette Baud Rate (0 = 1200, 1 = 2400)
    Printer Type (0 = Printer with MSX graphics, 1 = non-MSX printer)
O
N   Example:  SCREEN  3,3,1,1,0  would indicate low res graphics  with  16x16
L   magnified sprites, Key Click On, Cassette Baud rate 1200, non-MSX printer
Y

The Baud rate of the cassette can also be changed using CSAVE.


Sprite  sizes 0 or 1 will allow up to 256 sprites to be  defined,  and  sprite
sizes 2 or 3 will allow up to 64 sprites. Remember that only 32 sprites can be
displayed on the screen.

High resolution graphics screens divide the screen into a grid of dots 256 (0-
255)  horizontally by 192 (0-191) vertically.  Low resolution graphics screens
have 64 blocks across and 48 blocks down - each block being 4 dots by 4 dots.

YOU  MUST  specify one of these screen modes before using any of the  graphics
commands CIRCLE,  DRAW,  LINE,  PAINT,  PRESET,  PSET,  PUTSPRITE otherwise an
"Illegal function call" will result.

The  following program demonstrates the different screen modes.  This  program
makes  use  of commands that have not been dealt with yet,  but don't worry  -
they will be explained later.  Type NEW and press ENTER to clear any  existing
program.

NOTE: For MSX add 1 to the number immediately following the screen command (eg SCREEN 1,0 should read SCREEN 2,0)

```
10 REM SCREEN DEMO
20 SCREEN 1,0 : GOSUB 120
30 SCREEN 1,1 : GOSUB 120
40 SCREEN 1,2 : GOSUB 120
50 SCREEN 1,3 : GOSUB 120
60 SCREEN 2,0 : GOSUB 120
70 SCREEN 2,1 : GOSUB 120
80 SCREEN 2,2 : GOSUB 120
90 SCREEN 2,3 : GOSUB 120
100 GOTO 10
120 SPRITE$(1)=STRING$(16,255)
130 PUT SPRITE 1,(128,96),15,1
140 LINE(10,10)-(100,20),15,B
150 CIRCLE(50,150),20
160 DRAW"BM150,10D10R10U10L10"
170 FOR T=1 TO 200 : NEXT T
180 RETURN
```

After running, type NEW and press ENTER to remove this program from memory.

## The HIGH RESOLUTION screen

Before moving into the area of programming in the high-resolution or hi-res mode, it should be remembered that although you can draw lines starting and ending at any dot location, each of the 192 horizontal screen lines is divided into 32 segments for the purpose of displaying colours. Try the following demonstration.

```
10 SCREEN 1,1 : REM SCREEN 2,1 FOR MSX
20 COLOR 15,1,1 : C=2
30 FOR I=0 TO 255 STEP 8
40 LINE(I,10)-(I+7,17),C,BF
50 C=C+1
60 IF C>15 THEN C=2
70 NEXT I
80 GOTO 80
```

After running, type NEW and press ENTER to remove the program from memory.

Let us draw a line divided into three colours of red, white and blue. Horizontal positions 11 - 20 red, 21 - 30 are white and 31 - 40 are blue. The following program will draw a dot at the 11,21,31,and 40 positions as a guide, then attempt to colour in the line as described.

```
5 COLOR 15,1,1
6 A=11:B=40:C=41:D=70:E=71:F=100
10 SCREEN 1,1 : REM SCREEN 2,1 FOR MSX
20 PRESET(A,20),15:PRESET(C,20),15:PRESET(E,20),15:PRESET(F,20),15
30 LINE(A,22)-(B,22),6
35 FOR T=1 TO 500 : NEXT T
40 LINE(C,22)-(D,22),15
```

```
45 FOR T=1 TO 500 : NEXT T
50 LINE(E,22)-(F,22),4
60 GOTO 60
```

Notice that when this program is run the three different coloured segments  do
not  line  up with the dots above the line.  This is due to the fact that  the
start  and finish points for each segment are not positioned at the  beginning
or end of an 8 dot position on the screen line.  Make the following changes to
line 6 and run the program again.

```
6 A=11:B=39:C=40:D=72:E=73:F=100
```

After running, type NEW and press ENTER to remove this program from memory.

Continued next month ...

# SOUND COMMANDS

There  are only three commands for generating sound on these  computers.  They
are BEEP,  SOUND and PLAY. This may appear simple at first and fairly limited.
However there are a great many variations for using two of these commands.

## The BEEP command

This command sounds a beep for .04 seconds. One of its uses could be to signal
incorrect input -

```
100 PRINT "ENTER LEVEL 1 TO 4"
110 I$=INKEY$
120 IF I$<"1" OR I$>"4" THEN BEEP : GOTO 110
130 PRINT I$
```

After running, type NEW and press ENTER to remove this program from memory.

## The SOUND command

MSX  and  Spectravideo computers have a separate processor chip  for  handling
sound.  This processor,  called the Programmable Sound Generator or PSG,  con-
tains 14 control registers (0-13).  Don't let the term "register" throw you. A
register  can be thought of as a program containing one  instruction.  As  the
sound  generator  chip has 14 registers,  then it has a program with up to  14
instructions which it checks each time it is called upon to produce sound.

The  PSG  has three sound channels - A,B and C.  Registers 0,1 and  8  control
channel  A.  2,3  and 9 control channel B and 4,5 and 10  control  channel  C.
Registers  0 - 5 control the frequency of the sound produced by each  channel.
For  those who are not sound engineers - all sounds have a frequency.  A rumb-
ling  sound is very low frequency and a police siren is in the high  frequency
range. Registers 8,9 and 10 control the volume of each of the three channels.

Registers  6,7,11,12  and 13 have effect on all three  channels.  Let  us  now
examine each register, or pair of registers, in detail.

REGISTERS 0 AND 1

These registers control the FREQUENCY for channel A. Register 0 fine-tunes the frequency and can contain a value between 0 and 255. Register 1 coarse-tunes the channel A frequency with a value between 0 and 15. To illustrate this, changing the value in register 0 will give a barely noticeable change in the sound, whereas changes to register 1 are much more obvious. The HIGHER the value in the register, the LOWER the sound frequency. This can be heard when the following program is run.

```
100 CLS:V0=0:V1=1
110 SOUND 7,62:SOUND 0,V0:SOUND 1,V1:SOUND 8,6
120 GOSUB 180:GOSUB 200
130 V1=V1+1:SOUND 1,V1:GOSUB 200
140 IF V1<>15 THEN 130
150 V0=V0+10:SOUND 0,V0:GOSUB 180
160 IF V0<250 THEN 150
170 END
180 LOCATE 0,0:PRINT "REGISTER 0 =";V0
190 FOR T=1 TO 100:NEXT:RETURN
200 LOCATE 0,2:PRINT "REGISTER 1 =";V1
210 FOR T=1 TO 100:NEXT:RETURN
```

After running, type NEW and press ENTER to remove this program from memory.


REGISTERS 2 AND 3

These function the same as registers 0 and 1 except that the result is produced through channel B.


REGISTERS 4 AND 5

These function the same as registers 0 and 1 except that the result is produced through channel C.


REGISTERS 8, 9 AND 10

These registers control the VOLUME of channels A, B and C respectively. Try changing the 6 in the command SOUND 8,6 in line 110 of the last program to another value between 1 and 15. Do not exceed 15 because a value of 16 in this register causes the PSG to look for a value in register 13, which we have not done yet.


REGISTER 13

This is the ENVELOPE register. The ENVELOPE controls the shape of the sound for each channel which has 16 in its volume register. The values that can be stored in this register are from 0 to 15.


Values 0,1,2,3,9 -

a sound which begins with maximum intensity diminishing to minimum and staying there.

Values 4,5,6,7,15 -

a sound which increases in intensity from minimum to maximum, then drops off to minumum.

Value 8 -

a sound which begins with maximum intensity , decreases to minimum then sharply rises to maximum then decreases again and will continue this cycle.

Value 10 -

a sound which rises sharply from minimum to maximum intensity then continues decreasing to minimum and increasing to maximum.

Value 11 -

(the reverse of 4,5,6,7,15) a sound which begins with maximum intensity, decreasing to minimum before rising sharply to maximum and staying there.

Value 12 -

(the reverse of 8) a sound which begins with minimum intensity, increases to maximum then drops sharply to minimum then increases again to continue this cycle.

Value 13 -

(the reverse of 0,1,2,3,9) a sound which begins with minimum intensity which increases to maximum and stays there.

Value 14 -

a sound which begins with minimum intensity which increases to maximum before decreasing to minimum and starting again.


The following program demonstrates some of the various shapes of register 13 -

```
100 SOUND7,62:SOUND0,0:SOUND1,8:SOUND8,16
110 SOUND11,0:SOUND12,10
120 FOR S=1 TO 8:READ E
130 SOUND 13,E: GOSUB 150:NEXT S
140 END
150 CLS:PRINT "REGISTER 13 =";E
160 FOR T=1 TO 2000:NEXT T
170 RETURN
180 DATA 0,4,8,10,11,12,13,14
```

After running, type NEW and press ENTER to remove this program from memory.

Continued next month ...

QUESTIONS

1. What will be displayed when the following program is run?

```
100 A$="ABCDEFGHI"
110 PRINT LEFT$(A$,3)
```

2. What will be displayed when the following program is run?

```
100 A$="ABCDEFGHI"
110 PRINT RIGHT$(A$,3)
```

3. What will be displayed when the following program is run?

```
100 A$="COUNT THIS LINE"
110 PRINT LEN(A$)
```

4. What will be displayed when the following program is run?

```
100 A$="IN THE MIDDLE"
110 PRINT MID$(A$,8,6)
```

5. What will be displayed when the following program is run?

```
100 PRINT STRING$(6,65)
```

HINT: Check the ASCII codes in your manual.

6. What will be displayed when the following program is run?

```
100 PRINT "A";SPACE$(5);"B";SPACE$(5);"C"
```

7. What error message will be displayed when this program is run?

```
100 DIM A(20)
110 FOR I=1 TO 25
120 A(I)=100
130 NEXT I
```

9. What error message will be displayed when this program is run?

```
100 CIRCLE(100,90),20
```

# MAILBOX

## SOFTWARE AND CARTRIDGES

Can you please advise how I can obtain software or listing for a screen dump routine to an MSX printer plotter? Is it true that Konami cartridges are not available in Australia and if so, why?

My next question is regarding the copying of pre-recorded tapes. Although I realise unauthorised copying is illegal but how can I make a backup copy of my original tape. I feel the purchaser should be able to do so to safeguard the purchase. I find I have a lot of trouble in loading tapes after using them only a few times.

I have had my data recorder checked out and this is OK apparently. Therefore it seems tapes are rather unreliable and not always returnable to supplier, i.e. overseas. How can I solve this problem as it is most annoying to keep wasting money on tapes that knowingly will quite possibly be unloadable after minimum usage.

Finally, congratulations on your magazine, I hope it is a success.

B. Waller
East Keilor, VIC.


*For information concerning screen dump software, we suggest you contact either Peter Fox of Peter J. Fox Computers, or Peter d'Zwart of Panda Soft International. I am sure they would be able to help.*

*Konami cartridges are available in Australia in limited range. Contact Downs Home Computing, LPG Software, or Peter Fox.*

*With regard backup copies of software, we are in two minds about this. Firstly, it is always tricky with goods obtained overseas. When you think of all the places where the product is exposed to magnetic fields in transit, it makes you cringe. Hopefully, with more dealers stocking software, the need for this course of action will be eliminated. Local dealers are usually very helpful in the area of faulty software.*

*There are ways of making backup copies, but in fairness to the manufacturer (and because of the copyright laws) we cannot advise on this action. Some business software houses have developed a system that allows one or two backups to be taken from the master disk. Any attempt to take further copies will result in the master being corrupted. Maybe other software houses could incorporate a similar system.*

## VIDEO REVERSAL

Is there a way of getting REVERSE VIDEO on the MSX machines on SCREEN0? On the SV318, you could use —

PRINT CHR$ + (27) + "p" to turn on, print what you want, then PRINT CHR$(27) + "q" to turn off.

I have tried the above on the SV728 (MSX) and it seems to ignore it. Is there a way of setting the cursor to blink or any other features?

Incidentally, further to the PAINT problem mentioned in "Hints & Tips", I have found that this is not always a user problem. If you draw a checker board of lines with smallish areas, say 5x5 pixels, the colour may overflow also, even though all lines are joined correctly and the colour scheme is correct.

John Knight
Cranbourne, VIC.


John also sent a few suggestions for the magazine —

1. A high score page for readers to submit their high scores and the best are published.
2. A page where readers can say what *they* think of games. What are their favourites (maybe *why* and who the game would appeal to). Possibly with some form of voting and we might have a Top Twenty.
3. Is there any thought on doing a MACHINE LANGUAGE BEGINNER'S GUIDE in the future?

*Thank you for your queries and constructive comment John and we will tackle your suggestions first. We have already decided on a Hall of Fame section for game players, and we have just received your scores. We think it an excellent idea for readers to provide reviews of games, after all, the reviews appearing in this magazine are only based on our reviewers likes and dislikes — one man's meat. We hope to commence a MACHINE CODE TUTORIAL very shortly in Computer Forum.*

*When we first fired up our MSX computer, the first thing we noticed was the absence of reverse video on the function key display. That should have told us not to waste our time — but off we went, looking for the elusive reverse video characters. They are not there. On the SV, if you used FOR I = 0 TO 190:VPOKEI,I:NEXT you would see a full alphanumeric set in normal video followed by a set in reverse. Try this on your MSX and you will see why there is no reverse video capability. The reverse character set has been replaced by extra graphics characters.*

*Cursor blinking could be handled from Basic, but would be very clumsy. We might be able to talk our hacker into looking at this and other features.*

*The problem with small areas of colour spilling out, is caused by not defining the area to fit within an eight pixel colour block. This is covered on page 20 of our Tutorial.*

# M A I L B O X

## TAPE TRAUMA

We own a Spectravideo SV318 and we are experiencing some difficulty in understanding the section in the manual dealing with "sound". Is there an easy explanation?

Also, another problem we have *sometimes* encountered is a tape can be put away in perfect working order, but when we tried to load the tape into the computer, the error message "Device Error" flashed up and the tape will not continue loading or run, thereby making the tape useless. What are we doing wrong?

Is there a CHESS program, either a listing or pre-recorded, suitable to run on my Spectravideo SV318. If so, could you please forward the cost of same.

Noel Bergman
Bellbird Park

*There is no easy explanation for the Sound commands. If you look in this month's tutorial, you will see that we have commenced coverage of this area of programming.*

*Tape software should always be treated as FRAGILE! You do not say whether the tape stops at the same point each time (tape counter reading). If it does, then the chances are that the tape has been corrupted — see our item last month about cassettes on page 22. If the tape stops at different places each time, then the problem might be dirty heads on the data recorder or a problem with power fluctuation. Also, don't rely on only one copy of your own programs, and don't put your backup copies on the other side of the same tape because if the tape gets damaged — you have lost the lot. Let us say you have two programs — GAME1 and*

*GAME2. Record GAME1 on tape 1 side A and tape 2 side B then record GAME2 on tape 2 side A and tape 1 side B.*

*We are not aware of a CHESS program for the SV, perhaps our readers/dealers can help.*

## COLECO GAMES

I received my copy of COMPUTER FORUM and was greatly impressed. I now know of things that I had not thought even could of possibly existed, e.g. stringy floppy and the flight simulator.

If possible, could you include BASTOW MANOR in a software review because I have heard it is pretty good on the Commodore (they have some good games but otherwise Spectravideo rules!!)

I sent away for a Coleco games catalogue and the one I received had an Atari adaptor and a driving module for some games, e.g. Turbo and Destructor. I want to know if our computer can support these additions?

Also, let us (SV owners) know where Spectravideo is currently ranked in the world's home micros.

Peter Beil
Kumbia. QLD

P.S. Also post some posters of SV318 and SV328 in the magazine.

*We don't think the driving adaptor is usable with your SV. If you can advise the catalogue number, we can certainly check it out. As far as where the SV ranks in home micros, as far as sales figures are concerned, it would have to be fairly low on the list. As for features and value-for-money, it would have to be in the top bracket — we have never heard a complaint about the equipment, only backup and information.*

# HACKERS CORNER

*Hi, and welcome once again to the Hacker's Corner. In this issue I include a section on the sound chip, as the manuals are not very helpful on this aspect of the MSX and Spectravideo computers. I'm sorry if last month's column sounded like a Spectravideo only column but, due to lack of information, I was unable to include such articles on MSX. This will not happen again.*

## A NEW DOS

Here are vague descriptions of the DOS's commands.

APPEND — add on one file to another
ATTRIB — set/get attributes of a file
AUDIO — set the cassette speaker on/off
AUTO — make a disk do commands after BOOT
BASIC2 — go to normal ROM BASIC
BEEP — make a beep sound
BLINK — cursor blink
BOOT — reset and restart disk system
CHAIN — do commands from a file instead of keyboard
CHNON — set the chaining system on/off
CLEAR — erase all unused memory
CLICK — set the keyclick on/off
CLOCK — set time display on/off
CLS — clear the screen
COLOR — set the colour of the screen
COPY — multi-device copy of files
CREATE — create or make a new file
DATE — set the date
DEBUG — enter the debugging tool
DIR — directory of disk(s)
DUMP — dump a file in hex to a device
ERROR — force a specified error
FORMAT — format disk (multi-format)
FREE — display the amount of free space on a disk
GO — jump to a specified memory address
HIMEM — set/display the high memory pointer
JKL — keypress to dump a screen to the printer
KILL — kill file(s)
LIB — display a list of DOS commands
LIST — list a file to the screen
LOAD — load a machine language file
PAUSE — wait for the user to press ENTER
PDRIVE — get/set parameters of mass storage devices
(tape, disk, hard disk)
PRINT — list a file to the printer
PROT — set protection of a file or disk
PURGE — mass deletion of files
R — repeat last command
RENAME — rename a file
ROUTE — setup RS232C card
SAVE — save a block of memory to disk or tape
STMT — display a message to the screen
SYSTEM — get/set system parameters
TIME — set time
VERIFY — make read after write

## THE SOUND CHIP

The PSG or Programmable Sound Generator is a dedicated chip inside the computer that handles all the sound processing. The PSG has three voice channels each with a range of eight octaves. There is also a noise channel that can be mixed with the other channels. It even has two spare ports which can be made to appear as a PIO. Here are details of the internal registers of the sound chip.

| Register | Function |
|---|---|
| 00 | : Channel-A tone low byte |
| 01 | : Channel-A tone high byte |
| 02 | : Channel-B tone low byte |
| 03 | : Channel-B tone high byte |
| 04 | : Channel-C tone low byte |
| 05 | : Channel-C tone high byte |
| 06 | : Noise generator value |
| 07 | : Internal mixer |

| B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 |
|---|---|---|---|---|---|---|---|
| PIO B | PIO B | noise enable C | noise enable B | noise enable A | tone enable C | tone enable B | tone enable A |

PIO port A controls the joystick ports
PIO port B controls memory banking

Note that the mixer is reverse-logic ie. 0=on. For the PIO's 1=write, 0=read

| 08 | : Channel-A volume |
|---|---|
| 09 | : Channel-B volume |
| 10 | : Channel-C volume |
| 11 | : Envelope period low byte |
| 12 | : Envelope period high byte |
| 13 | : Envelope trigger - |

| Value | Attack | Decay | N.B. | Type |
|---|---|---|---|---|
| 00-03 | fast | slow | one-shot | ⅃ |
| 04-07 | slow | fast | one-shot | ⌐ |
| 08 | fast | slow | continuous | ⅃ |
| 09 | fast | slow | one-shot | ⅃ |
| 10 | slow | slow | continuous | ⋀ |
| 11 | ---- | ---- | continuous | -- |
| 12 | slow | fast | continuous | ⌐ |
| 13 | ---- | ---- | continuous | -- |
| 14 | slow | slow | continuous | ⋁ |
| 15 | slow | fast | one-shot | ⌐ |

14 : Spare port-A, used for the joystick (note: B denotes the bit number)

| B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 |
|---|---|---|---|---|---|---|---|
| R I S H T | L E F T | D O W N | U P | r i g h t | l e f t | d o w n | u p |

Joystick-2 / Joystick-1

Note that it uses reverse logic ie 0=on, 1=off

## USING THE SOUND CHIP

Now that you know what the registers do I will show you how to apply them in a program.

```
10 SOUND 8,10   ' set CHNL-A volume
20 SOUND 0,160  ' set CHNL-A tone low
30 SOUND 1,1    ' set CHNL-A tone high
40 END
```

This program sounds a tone. In machine language the program would look like this — (note port locations are for the SV. SV port 88H = MSX port A0H, SV port 8CH = MSX port A1H, SV port 90H = MSX port A2H.)

```
LD   A,8      ; set volume register
OUT  (88H),A  ; send to PSG
LD   A,10     ; set volume to 10
OUT  (8CH),A  ; send to PSG
XOR  A        ; A=0, tone A low
OUT  (88H),A  ; send to PSG
LD   A,160    ; set tone low
OUT  (8CH),A  ; send to PSG
LD   A,1      ; set tone A high
OUT  (88H),A  ; send to PSG
LD   A,1      ; set tone high
OUT  (8CH),A  ; send to PSG
END
```

In the Spectravideo there are three registers for controlling the PSG.

Register:   Function
88H (hex)   Set the PSG register that you want to use
8CH         After you have sent to the PSG which register you want to use, you send your value to this port.
90H         As above, when you have set the PSG register, you may now read what is already stored in this register by a read to this port.

This should make some more sense —

To set a PSG register in Machine Code

```
B=register number, C=value
        LD   A,B
        OUT  (88H),A
        LD   A,C
        OUT  (8CH),A
```

To read a PSG register in Machine Code

```
B=register
        LD   A,B
        OUT  (88H),A
        IN   A,(90H)
```

A, now contains the value already in the specified PSG register.

## THE ROM DECODED

This month I give you the addresses of some keywords (or tokens) for the SV318/SV328.

The Keywords and their entry addresses.

| KEYWORD | TOKEN | ADDRESS |  | KEYWORD | TOKEN | ADDRESS |
|---|---|---|---|---|---|---|
| ABS | 255,134 | 55B1 |  | HEX$ | 255,155 | 68FF |
| ASC | 255,149 | 6B10 |  | IF | 139 | 1225 |
| ATN | 255,142 | 5139 |  | INP | 255,144 | 1A37 |
| ATTR$ | 233 | 34D3 |  | INPUT | 133 | 7406 |
| AUTO | 169 | 11F5 |  | INT | 255,133 | 57FB |
| BEEP | 192 | 40BE |  | IPL | 213 | 34BA |
| BIN$ | 255,157 | 6904 |  | KEY | 199 | 3120 |
| BLOAD | 205 | 76B4 |  | KILL | 212 | 34B5 |
| BSAVE | 206 | 7624 |  | LEFT$ | 255,129 | 6B66 |
| CDBL | 255,160 | 5765 |  | LEN | 255,146 | 6B04 |
| CHR$ | 255,150 | 6B20 |  | LET | 136 | 10C0 |
| CINT | 255,158 | 56B5 |  | LFILES | 187 | 73AD |
| CIRCLE | 188 | 2652 |  | LINE | 175 | 1374 |
| CLEAR | 146 | 57A6 |  | LIST | 147 | 1ABB |
| CLICK | 200 | 31AF |  | LLIST | 158 | 1AB3 |
| CLOAD | 155 | 1EAA |  | LOAD | 181 | 7121 |
| CLOSE | 180 | 7375 |  | LOCATE | 216 | 2FD1 |
| CLS | 159 | 3777 |  | LOF | 255,173 | 749A |
| CMD | 215 | 34C4 |  | LOG | 255,138 | 5197 |
| COLOR | 189 | 4552 |  | LPOS | 255,156 | 1B34 |
| CONT | 153 | 671B |  | LPRINT | 157 | 125D |
| COPY | 214 | 34BF |  | LSET | 184 | 7228 |
| COS | 255,140 | 50BB |  | MAXFILES | 202 | 7CBA |
| CSAVE | 154 | 1E15 |  | MDM | 207 | 3036 |
| CSNG | 255,159 | 56DD |  | MERGE | 182 | 7122 |
| CSRLIN | 232 | 31C7 |  | MID$ | 255,131 | 6B9F |
| CVD | 255,170 | 7331 |  | MKD$ | 255,176 | 7318 |
| CVI | 255,168 | 732B |  | MKI$ | 255,174 | 7312 |
| CVS | 255,169 | 732E |  | MKS$ | 255,175 | 7315 |
| DATA | 132 | 109B |  | MON | 203 | 7B44 |
| DEF | 151 | 18BA |  | MOTOR | 204 | 2BE5 |
| DEFDBL | 174 | 0F65 |  | NAME | 211 | 34B0 |
| DEFINT | 172 | 0F5F |  | NEW | 148 | 6556 |
| DEFSNG | 173 | 0F62 |  | NEXT | 131 | 6B21 |
| DEFSTR | 171 | 0F5C |  | OCT$ | 255,154 | 68FA |
| DELETE | 168 | 1C6C |  | OPEN | 176 | 7080 |
| DIAL | 208 | 79C2 |  | OUT | 156 | 1A4C |
| DIM | 134 | 6061 |  | PAD | 255,165 | 32BD |
| DRAW | 190 | 29DA |  | PAINT | 191 | 24FC |
| DSKF | 255,166 | 34C9 |  | PDL | 255,164 | 3280 |
| DSKI$ | 234 | 34CE |  | PEEK | 255,151 | 1CA6 |
| DSKO$ | 209 | 34A6 |  | POKE | 152 | 1CAD |
| ELSE | 161 | 109D |  | POS | 255,145 | 1839 |
| END | 129 | 66CF |  | PRESET | 195 | 2328 |
| EOF | 255,171 | 74B0 |  | PRINT | 145 | 1265 |
| ERASE | 165 | 676E |  | PSET | 194 | 232D |
| ERROR | 166 | 11EA |  | PUT | 179 | 2FB1 |
| EXP | 255,139 | 526B |  | READ | 135 | 1405 |
| FIELD | 177 | 72CD |  | RENUM | 170 | 1CF6 |
| FILES | 183 | 73B2 |  | RESTORE | 140 | 66AE |
| FIX | 255,161 | 57E9 |  | RESUME | 167 | 119D |
| FOR | 130 | 0D65 |  | RETURN | 142 | 1061 |
| FPOS | 255,167 | 74C6 |  | RIGHT$ | 255,130 | 6B96 |
| FRE | 255,143 | 6CF7 |  | RSET | 185 | 7227 |
| SET | 178 | 2FB4 |  | RUN | 138 | 0FE2 |
| GOSUB | 141 | 0FF6 |  | SAVE | 186 | 7167 |
| GOTO | 137 | 1028 |  | SCREEN | 197 | 459A |
|  |  |  |  | SET | 210 | 34AB |

Until next time — HERE LIETH THY ENDE

# COMPUTER KIDS

Hi kids! This is Wendy, here for another issue. What did you do for your mum on Mother's Day? Did you wash the dishes or make her breakfast? Or did you just give her a big hug and say "Happy Mother's Day!"

Whatever you did, spare a thought for all those kids who don't have a mum to care for them.

This issue there is a little program which asks for your name and then prints it in a square. We've also got a new word game for you to play. It's a word search of a different kind. You are given a word in which you have to find other words (e.g. the word HAT from cATcH), but the words have to be three letters or longer and you can jumble the letters to find words.

I'll let you get on with that and will be with you next issue. Bye for now. Wendy.

P.S. You can write and tell me how many words you made if you like.

```
100 CLS:WIDTH 39
110 INPUT"ENTER YOUR NAME";N$
120 L=LEN(N$)
130 B=L:CLS
140 LOCATE 0,2:PRINT N$
150 FOR I=1 TO L
160 LOCATE 0,I+1:PRINT MID$(N$,I,1)
170 LOCATE L-1,I+1:PRINT MID$(N$,B,1)
180 B=B-1
190 NEXT I
200 B=L
210 FOR I=1 TO L:LOCATE I-1,L+1
220 PRINT MID$(N$,B,1):B=B-1:NEXT I
```

## WORDSEARCH

Your word is: **SPECTRAVIDEO**

---

# HINTS & TIPS

## ON-SCREEN EDIT

Make full use of on-screen editing. If you have more than one line with similar content, e.g.

100 X = X + 1: RETURN
110 Y = Y + 1: RETURN

Type in line 100 and press enter. Now move the cursor up to the 1 in 100 and type 110. Move the cursor across and change the two Xs to Ys and press enter.

Now list the program and you will have both lines done.

## SPECTRAVIDEO 80 COLUMN CARD USAGE

When using the 80 column card with a monitor, some people have been wondering why they cannot display graphics. This is because the graphics are a function of the VDP or Video Display Processor chip in association with its Video Ram. All of the characters, both graphics and text, are stored in the Video Ram. When an 80 column card is used and WIDTH 80 is executed, all information displayed is via the 80 column card. The text characters displayed are not those in the Video

Ram but come, instead, from a character generator chip on the 80 column card itself.

Also on the subject of monitors, to display both 40 or 80 columns requires one cable from the 80 column card to the monitor and one from the back of the keyboard to the monitor. This means that the cable will need to be swapped each time a different display format is required.

There are two ways in which this can be overcome. If you are handy with a soldering iron and drill, you can remove the back of the monitor and fit a second socket to accept the other cable. A two-way switch can be fitted next to these.

The cable coming from the monitor circuitry to the original socket should be moved to the centre contact of the two-way switch and the two sockets connected to each end of the switch. It is then a case of plugging the video output cable from the keyboard to one socket and the cable from the 80 column card to the other and simply switching between the two for 40 or 80 column display.

Another method, used by one our readers, makes use of the switch box supplied with earlier MK1 models to allow the computer and the antenna to remain connected to the TV. Changing one plug and one socket on this box provided him with a two-way external changeover switch without having to modify his monitor. By the way, those switch boxes are also available from most Tandy stores.

# CLUB NEWS

## MSX USERS GROUP (W.A.)

New members welcome! A letter from a committee member.

The MSX Users Group has existed in some way since early last year, largely kept alive by Peter Fox of Peter J. Fox Computers, whose wholehearted support provided the venue, publicity and expertise that any club needs as its cornerstone.

The last few months saw an upward trend in attendance and the room at Peter's shop started to become a little cramped. After a best-yet turnout at the April meeting, enthusiasm was running at an all-time high. An ad-hoc committee meeting settled on Leederville Town Hall as the venue for future meets as it is easily accessible from both freeways, and quite centrally located (an important point with members from one end of the metropolitan area to the other).

The club's aims will depend largely on the wishes of its members, but certainly the most immediate goal is to establish an information base. The club can gather information about members' equipment and skills, sources of hardware, software and technical information and provide a place where members can help each other solve problems, share experiences, swap programs and generally associate with others with similar (and different) problems and solutions.

A club library is being established including magazines, public domain software, anything we can lay our hands on. A tape and disk copying service is also available for public domain material, courtesy of our librarian, Max Cowin.

Membership fees are $15 for six months ($30 per year), to cover venue hire etc. — a mere trifle compared to the benefits.

Don't forget, 7.30 p.m. on the second Tuesday of every month at the Leederville Town Hall (Lesser Hall), Cambridge Street, Leederville. So if you live in W.A. and own or intend to own any MSX equipment, or if you simply want to find out about MSX, get involved! Come along to the MSX Users Group — we'll even give you a cup of tea or coffee.

Cheers, Erik Kowarski (committee member)

For further information contact Erik (09) 272 2118 or Bob Strother (09) 418 4894 or write to Max Cowin, P.O. Box 87, Mt Hawthorn, W.A. 6016.

# USER GROUPS

Brisbane Spectravideo & MSX Users Group
C/- Mrs Lucille Parker (Secretary)
25 Primrose Street
Woodridge
Queensland 4114

Melbourne Spectravideo & MSX Users Group C/- John Halford, 48 Shawlands Ave, Blackburn South, Victoria 3130. Phone (03) 878 6169. Meeting on the first Saturday afternoon of each month at the Balwyn Community Centre, Whitehorse Road, Balwyn, sharing public domain software and looking at new equipment.

Wellington Spectravideo Users Group
P.O. Box 26-050
Newlands
Wellington 6004
New Zealand

# BOOKS . BOOKS

## THE MISSILE & OTHER PROGRAMS for SPECTRAVIDEO 318/328

### by Bernard Scott

This is a learn-by-doing book of 20 programs. It contains games, graphics displays, music and sounds library, novelties and educational programs.

Copious notes are included with most of the programs to help you understand their construction and to allow you to extend them and write your own programs. Several of the programs appear in different versions to let you discover the different capabilities of the Spectravideo.

The book is printed on A4 sheets and stapled, but with punched holes for easy insertion into a cover and for ease of typing. The publisher advised that updates to the book are sent to all purchasers.

The book is only available by mail order at $9.95, from Abspect Software, RMB 288, Creswick, VIC. 3363.

Publisher: Abspect Software
58 Pages

Each issue of COMPUTER FORUM will contain program listings for you to type in. When entering these programs it is a good idea to save off to cassette or disk every 10 or 20 lines and then continue. Then if the power goes off or another major disaster occurs, you will not have to type in the whole lot again.

Another check is to verify each save using the CSAVE? command. To use this command, CSAVE your program, then rewind the tape and type CLOAD? and press enter. This command will then compare the program on the tape with the one in memory, to verify that it was saved correctly.

All of the listings are printed in 40 column format. If you enter WIDTH40 before typing them in, you will be able to line up the characters in the listing with the text on screen.

Take care that you do not mistake the letter I for 1 or an O for a zero. Where graphics characters are used in the program, they will be shown as @1@. This symbol will then be repeated at the end of the listing with instructions concerning the graphics character used.

All of the listings have been tested on MSX and SV318/328 computers and do work. Should you have any problems, we suggest that you thoroughly check your work as errors can creep in very easily. Should you not wish to type in these listings, send a blank tape together with $2 to COMPUTER FORUM and we will post a copy to you. Do not forget to tell us which computer you have.

# CONVOY



This listing is in Spectravideo SV318/328 format. For MSX owners, see the note at the end of the listing.

```
10 REM                  CONVOY
20 REM
30 REM YOU CAN ONLY ADD TO YOUR SCORE
40 REM BY SINKING MERCHANT SHIPS IN THE
50 REM CONVOY. THE ESCORT SHIPS CANNOT
60 REM BE SUNK AND HITTING ONE OF THEM
70 REM WILL REDUCE YOUR LIVES BY ONE.
80 REM IF A TORPEDO GOES RIGHT THROUGH
90 REM THE CONVOY WITHOUT HITTING A
100 REM MERCHANT SHIP THEN 100 WILL BE
110 REM DEDUCTED FROM YOUR SCORE.
120 REM YOU MUST SINK AS MANY CONVOYS
130 REM AS POSSIBLE BEFORE YOUR FUEL
140 REM RUNS OUT.
150 DEFINTA-Z:COLOR15,1,1:SCREEN1,2:N=RN
D(-TIME)
160 LV=5:SS=3:SH=255:FU=255
170 GOSUB540
180 ONSPRITEGOSUB370:SPRITEON
190 STRIG(0)ON:ONSTRIGGOSUB440
```

```
200 GOSUB590:COLOR15,4,4:CLS
210 GOSUB470
220 GOSUB460
230 GOSUB500
240 GOSUB330
250 IFSH<-12THENGOSUB460:SH=255
260 GOSUB290
270 GOTO240
280 REM MOVE ESCORTS
290 SH=SH-SP:PUTSPRITE22,(SH,E),14,3
300 IFSH<236THENPUTSPRITE23,(SH+20,E),14
,3
310 IFSH<216THENPUTSPRITE24,(SH+40,E),14
,3
320 RETURN
330 IFSU<255THENSU=SU+SSELSESU=0:SS=INT(
RND(1)*5)+3:FU=FU-3:LINE(255,181)-(FU,19
1),12,BF:IFFU<30THEN650
340 IFF=1THENT2=T2-5:PUTSPRITE21,(T1,T2)
,1,1:IFT2<8THENF=0:T2=155:PUTSPRITE21,(0
,209):IFSCTHENSC=SC-100:LINE(108,0)-(130
,8),1,BF:LOCATE108,0:PRINTUSING"#####";S
C
350 GOSUB290:PUTSPRITE20,(SU,165),1,2:RE
TURN
360 REM SPRITE COLLISION CHECKING
370 SPRITEOFF:PUTSPRITE21,(0,209):F=0:IF
T2>70THEN400
380 FORP=0TO11:GOSUB330:SX=VPEEK(6913+P*
4):IFSX>T1-12ANDSX<T1+16THENIFVPEEK(6912
+P*4)>T2-16THENPUTSPRITEP,(0,209):T2=209
:SL=SL-1:SC=SC+100*SS:LINE(108,0)-(130,8
),1,BF:LOCATE108,0:PRINTUSING"#####";SC:
IFSL=0ANDLV>0THENGOSUB500
390 NEXT:SPRITEON:RETURN
400 LV=LV-1:LINE(42,0)-(54,8),1,BF:LOCAT
E42,0:PRINTLV
410 IFLV=0THEN650
420 RETURN
430 REM TRIGGER PRESSED
440 IFF=1THENRETURNELSESPRITEON:F=1:T1=S
U:T2=155:RETURN
450 REM E=ESCORT DEPTH,SP = ESCORT SPEED
460 E=INT(RND(1)*30)+96:SP=INT(RND(1)*5)
+1:RETURN
470 LINE(0,0)-(255,8),1,BF:LOCATE0,0:PRI
NT"LIVES: ";LV;" SCORE: ";:PRINTUSING"##
###";SC;:PRINT" HIGH SCORE: ";:PRINTUSIN
G"#####";HS
480 LINE(0,140)-(255,191),12,BF:LOCATE0,
181:PRINT"FUEL:":LINE(30,181)-(255,191),
8,BF:RETURN
490 REM PLACE CONVOY ON SCREEN
500 SL=12:X=20:Y=16:L=1:FORS=0TO11:IFX>2
20THENL=L+1:Y=Y+16:IFLMOD2THENX=20ELSEX=
50
510 PUTSPRITES,(X,Y),15,0:X=X+75:NEXT
520 RETURN
```

```
530 REM TITLE SCREEN
540 CIRCLE(128,96),80,4,,,1.3:LINE(68,11
0)-(188,110),4:PAINT(128,109),4
550 DRAW"BM128,0C15D40BD110D40BM55,98R40
BR65R40"
560 LOCATE110,90:PRINT"CONVOY"
570 RETURN
580 REM BUILD SPRITES
590 FORI=0TO127:READA:VPOKE&H3800+I,A:NE
XT:RETURN
600 DATA 32,32,38,38,39,47,255,255,127,0
,0,0,0,0,0,0,16,16,16,208,208,208,255,25
4,252,0,0,0,0,0,0,0:REM (2296) CONVOY SH
IPS
610 DATA1,1,3,3,3,3,3,3,1,3,0,2,1,0,0,1,
0,0,128,128,128,128,128,128,0,128,0,0,0,
0,128,0:REM (1052) TORPEDO
620 DATA0,0,0,0,1,63,255,127,127,0,0,0,0
,0,0,0,64,64,64,224,224,254,255,254,252,
0,0,0,0,0,0,0:REM (2228) L TO R SUB
630 DATA2,2,2,15,31,255,127,63,0,0,0,0,0
,0,0,0,0,192,192,192,224,248,255,255,0,0
,0,0,0,0,0,0:REM (2055) ESCORT SHIPS
640 REM END OF GAME
650 IFSC>HSTHENHS=SC
660 LOCATE40,150:PRINT"ANOTHER GAME (Y/N
) ";
670 I$=INKEY$:IFI$="Y" OR I$="y"THENSH=0
:LV=5:SS=3:SH=255:SC=0:D=0:LINE(40,150)-
(200,160),12,BF:GOSUB470:GOTO220
680 IFI$="N" OR I$="n"THENEND
690 GOTO670
```

**NOTE :** FOR MSX CHANGE LINES150,340,
380,400,470,480,560,660 AS FOLLOWS

```
150 DEFINTA-Z:COLOR15,1,1:SCREEN2,2:C=RN
D(-TIME):OPEN"GRP:"AS#1
340 IFF=1THENT2=T2-5:PUTSPRITE21,(T1,T2)
,1,1:IFT2<8THENF=0:T2=155:PUTSPRITE21,(0
,209):IFSCTHENSC=SC-100:LINE(104,0)-(130
,8),1,BF:PSET(104,0),1:PRINT#1,USING"###
##";SC
380 FORP=0TO11:GOSUB330:SX=VPEEK(6913+P*
4):IFSX>T1-12ANDSX<T1+16THENIFVPEEK(6912
+P*4)>T2-16THENPUTSPRITEP,(0,209):T2=209
:SL=SL-1:SC=SC+100*SS:LINE(104,0)-(130,8
),1,BF:PSET(104,0),1:PRINT#1,USING"#####
";SC:IFSL=0ANDLV>0THENGOSUB500
400 LV=LV-1:LINE(42,0)-(54,8),1,BF:PSET(
42,0),1:PRINT#1,LV
470 LINE(0,0)-(255,8),1,BF:PSET(0,0),1:P
RINT#1,"LIVES";LV;"SCORE";:PRINT#1,USING
"#####";SC;:PRINT#1," HI SCORE";:PRINT#1
,USING"#####";HS
480 LINE(0,140)-(255,191),12,BF:PSET(0,1
91),1:PRINT#1,"FUEL:";LINE(30,191)-(255,
191),9,BF:RETURN
```

```
560 PSET(110,90),4:PRINT#1,"CONVOY"
560 PSET(40,150):PRINT#1,"ANOTHER GAME (
Y/N) ";
```

# MATHS

THIS PROGRAM IS SUITABLE FOR SV318/328
AND MSX COMPUTERS

```
10 REM MATH EXERCISER TO PRACTICE
20 REM ADDITION. SUBTRACTION, DIVISION
30 REM AND MULTIPLICATION.
40 REM THE LARGEST NUMBER FOR ADDITION
50 REM AND SUBTRACTION (LA) AND THE
60 REM LARGEST NUMBER FOR MULTIPLY AND
70 REM DIVIDE (LM) ARE STORED IN LINE
80 REM 110. CHANGE THESE IF NECESSARY
90 CLS:SCREEN0,0:R=RND(-TIME)
100 LOCATE12,4:PRINT"MATH EXERCISER"
110 LA=31:LM=12
120 LOCATE0,16:PRINT"PLEASE ENTER YOUR N
AME";:INPUTN$
130 CLS:PRINT:PRINT:PRINT"Hi ";N$;" let'
s do some sums...":PRINT:PRINT:PRINT
140 PRINT"DO YOU WANT TO -":PRINT:PRINT"
1. ADD":PRINT"2. MULTIPLY"
150 PRINT"3. DIVIDE":PRINT"4. TAKEAWAY":
PRINT:PRINT
160 PRINT"ENTER YOUR CHOICE 1 TO 4 ";:IN
PUTL:IFL<1 OR L>4THENGOSUB470:GOTO120
170 ONLGOTO180,240,300,360
180 GOSUB420
190 LOCATE5,9:PRINTX" ADDED TO "Y:LOCATE
15,15:PRINT"   ";:LOCATE5,15:PRINT"ANSWE
R = ";:AN=X+Y
200 INPUTA:IFA=ANTHENGOSUB530ELSEGOSUB54
0:IFWA<>0GOTO190
210 FORT=1TO1000:NEXT
220 IFS=10THENS=0:GOTO480
230 GOTO180
240 GOSUB420
250 LOCATE5,9:PRINTM" TIMES "M1:LOCATE15
,15:PRINT"   ";:LOCATE5,15:PRINT"ANSWER
= ";:AN=M*M1
260 INPUTA:IFA=ANTHENGOSUB530ELSEGOSUB54
0:IFWA<>0GOTO190
270 FORT=1TO1000:NEXT
280 IFS=10THENS=0:GOTO480
290 GOTO240
300 GOSUB420
310 LOCATE5,9:PRINTD" DIVIDED BY "D1:LOC
ATE15,15:PRINT"   ";:LOCATE5,15:PRINT"AN
SWER = ";:AN=D/D1
320 INPUTA:IFA=ANTHENGOSUB530ELSEGOSUB54
0:IFWA<>0GOTO190
330 FORT=1TO1000:NEXT
340 IFS=10THENS=0:GOTO480
350 GOTO300
360 GOSUB420
370 LOCATE5,9:PRINTX+Y" TAKE AWAY "Y:LOC
ATE15,15:PRINT"   ";:LOCATE5,15:PRINT"AN
SWER = ";:AN=X
380 INPUTA:IFA=ANTHENGOSUB530ELSEGOSUB54
0:IFWA<>0GOTO190
390 FORT=1TO1000:NEXT
400 IFS=10THENS=0:GOTO480
410 GOTO360
420 CLS:LOCATE0,5:PRINT"WHAT IS THE ANSW
ER TO ...":PRINT:S=S+1
430 X=INT(RND(R)*LA)+1:Y=INT(RND(R)*LA)+
1
440 M=INT(RND(R)*LM)+1:M1=INT(RND(R)*LM)
+1
450 D=M*M1:D1=M
460 RETURN
470 CLS:LOCATE0,16:PRINT"WRONG NUMBER. P
LEASE TRY AGAIN":FORT=1TO750:NEXT:RETURN
480 FORT=1TO1000:NEXT
490 CLS:LOCATE5,5:PRINT"YOUR MARK IS ";S
R;"OUT OF 10"
500 I$="":LOCATE10,10:PRINT"MORE (Y/N) "
;
510 I$=INKEY$:IFI$="Y"ORI$="y"THEN120ELS
EIFI$="N"ORI$="n"THENEND
520 GOTO510
530 SR=SR+1:LOCATE0,21:PRINT"CORRECT!!"+
SPACE$(27):PRINT"THAT MAKES ";SR;" RIGHT
 ";N$:RETURN
540 IFWA<2THENLOCATE5,21:PRINT"ARE YOU S
URE, PLEASE TRY AGAIN";:WA=WA+1:FORT=1TO
1000:NEXT:RETURN
550 WA=0:LOCATE5,21:PRINTSPACE$(38):LOCA
TE5,21:PRINT"THE ANSWER IS ";AN:FORT=1TO
1000:NEXT:RETURN
```

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**SANYO**



PHC-27 MSX COMPUTER



PHC-33 MSX COMPUTER



**MSX**

## SANYO MSX COMPUTERS

### SPECIFICATIONS

| | PHC-27 | PHC-33 |
|---|---|---|
| ROM | 32K MSX BASIC | 32K MSX BASIC |
| RAM | 32K | 32K |
| VIDEO RAM | 16K | 16K |
| DISPLAY | 40x24 Text | 40x24 Text |
| | 32x24 Text | 32x24 Text |
| | 256x192 Graphics | 256x192 Graphics |
| | 64x48 Graphics | 64x48 Graphics |
| | 32 Sprites | 32 Sprites |
| | 16 Colours | 16 Colours |
| SOUND | 3 Channel | 3 Channel |
| | 8 Octave | 8 Octave |
| KEYS | 48 Alphanumeric | 48 Alphanumeric |
| | 21 Control | 21 Control |
| | 4 Cursor | 4 Cursor |
| | | 6 Cassette |
| INTERFACES | 2 Joystick | 2 Joystick |
| | 2 Cartridge | 2 Cartridge |
| | 1 Centronics | 1 Centronics |
| | 1 Cassette Port | |
| OUTPUTS | TV | TV |
| | Composite Video | Composite Video |
| | Audio | Audio |
| RESET BUTTON | NO | YES |
| IN-BUILT CASSETTE | NO | YES |
| ACCESSORIES | TV Cable | TV Cable |
| | Cassette Lead | |
| | Owner's Manual | Owner's Manual |
| | Programming | Programming |
| | Manual | Manual |
| SIZE (mm) | 400Wx220Dx60H | 390Wx300Dx80H |
| WEIGHT | 2.4Kg | 3Kg |



MJY002 MSX
JOY STICK

SMP30 COLOUR
GRAPHIC PRINTER
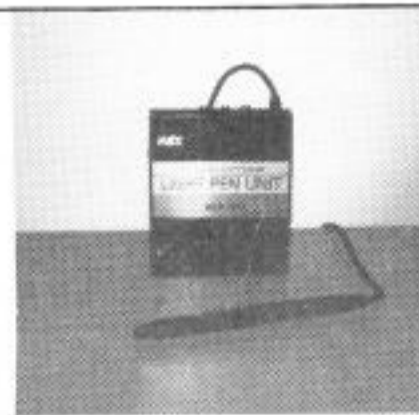




MLP001 MSX
LIGHT PEN

34CM COLOUR
TV/MONITOR