

HOME COMPUTER

MSXVR VIRTUALIZER

SERVICE MANUAL

Before using the computer, please, read this manual carefully and keep it for future reference.



CONTENT

* EDITORIAL.....	6
* WARNINGS	7
* CONNECTORS.....	8
* SECURITY.....	11
* CLEANING	13
* SPECIFICATIONS.....	14
* FUNCTIONALITIES.....	16
1. Turn your computer on and off safely	16
2. Reboot the system.....	19
3. Access the applications menu	20
4. Configure start options.....	21
5. Autodetect cartridges on startup	23
6. The VR-DOS.....	25
7. Insert and remove cartridges safely	26
8. Use digital or analog video out.....	28
9. Activate the screen filter to simulate a CRT.....	30
10. Change the screen resolution.....	31
11. Aspect and graphic proportion in virtual machines	32
12. Configure audio output	33
13. Listen to the audio through headphones	34
14. Adjust the audio volume	35
15. Listen to real SCC of a cartridge emulating a ROM	36
16. Update the MSXVR system	37
17. Download a file from the Internet.....	38
18. Play with a joystick or USB mouse.....	39
19. Use an MSX mouse or joystick.....	40
20. Use a USB storage drive.....	41

21.	Format / Repair USB drives in case of corruption	43
22.	Use a floppy disk USB drive	44
23.	Configure the different virtual machines of the system	45
24.	Change the colors of the VR-DOS environment	47
25.	Change the themed visual appearance	48
26.	Load a DSK, WAV, ROM file	49
27.	Load from an original cassette	51
28.	Run other virtual machines.....	52
29.	Edit a text file.....	53
30.	View a graphic file and the different ones that exist	54
31.	Play music AND VIDEO files and the different ones that exist 55	
32.	Connect to the WIFI network.....	56
33.	Connect through the network cable	57
34.	Change and configure the keyboard	58
35.	Change the default language in the system.....	58
36.	Configure the keyboard of an MSX virtual machine	59
37.	Access the VR-BASIC	60
38.	Edit a VR-BASIC program	61
39.	Load, execute and debug a VR-BASIC programme	62
40.	Save a VR-BASIC programme.....	63
41.	Use a DSK file in the system.....	64
42.	Debug a game run on a virtual machine	65
43.	Access the available cartridges and features	66
44.	Link physical slots within an MSX virtual machine	67
45.	programme a batch file.....	68
46.	Programme with VR-SCRIPT.....	69
47.	See the serial number and description of my MSXVR unit..	70
48.	Digitize sound and voices	71
49.	Audio output modes	72

50.	Listen to the original sound of the MSX cartridges.....	73
51.	Test MSX joysticks in the system.....	74
52.	Use the DB37 Extension I/O port.....	76
53.	Configure DB37 PINS.....	77
54.	Communicate Z80/R800 and the MSXVR system.....	78
55.	The \$SYSTEM unit.....	80
56.	Create an MSX ROM.....	82
57.	Access the MSXVR desktop.....	84
58.	The VR-VIEW.....	86
59.	Connect the MSXVR as USB Keyboard.....	87
*	SYSTEM SHORCUTS.....	88
*	VR-DOS SHORCUTS.....	89
*	KEYBOARD shorcuts FROM VR-BASIC.....	90
*	SHORCUTS FROM THE VIRTUAL MACHINE PLAYER.....	91
*	Problem resolution.....	92
	I turn on the computer but nothing appears on the screen.....	92
*	Technical service.....	93
	Bugs or problems.....	93
	New cartridges.....	94

★ EDITORIAL

MSX, MSX2, MSX2 +, MSXTR are registered trademarks of the MSX Association / MSX Licensing Corporation,

MSXVR is a registered trademark of VIKALB PROGRAMMING S.L.

© 2020 VIKALB PROGRAMMING S.L.

Author: Alberto De Hoyo Nebot

1st. Edition: 2020

Version 1

Copyright reserved.

In spite of the care with which the text has been composed, neither the writing nor the editor will accept any responsibility for the damages that could possibly be derived from any error that this edition could contain.

No part of this book may be reproduced, printed, photographed, microfilmed, digitally copied, analogically, or with any other existing method without the permission of the publisher.

★ WARNINGS

① To avoid fire or risk of electrocution, do not expose the computer to rain or moisture.

① To avoid electric shock, do not open the computer. In case of fault, request the services of specialized personnel.

① If the computer is opened the guarantee will be voided and we will not be held responsible for repairs.

① If you use other software that misuses the system's hardware, the guarantee for repair and / or return will be voided.



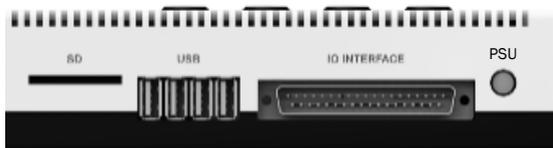
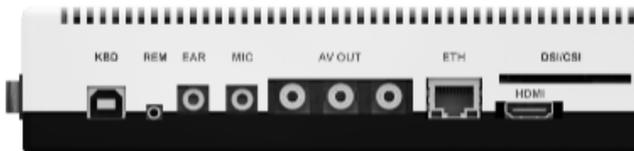
① If this icon appears  in the right corner of your screen, proceed to turn off the equipment and contact the technical services.



① If this icon appears  in the right corner of your screen, proceed to turn off the equipment and contact the technical services.

*** CONNECTORS**

KBD	USB Type B male connector. Allows you to connect the computer as an external keyboard.
REM	Remote control. Designed fundamentally to be used with a cassette.
EAR	It allows you to connect headphones or connect the audio output to another device.
MIC	Used to connect a microphone or an audio input. Designed to be used with a cassette.
AV-OUT	Analog composite video and audio output.
ETH	RJ-45 port to connect a network cable.
HDMI	Digital audio / video output.
DSI/CSI	Allows to connect a compatible screen or camera device.
SD	Memory card port.
USB	Four USB Type A female ports.
IO INTERFACE	DB37 port to connect compatible devices.
PSU	Power supply connector.



BACK VIEW



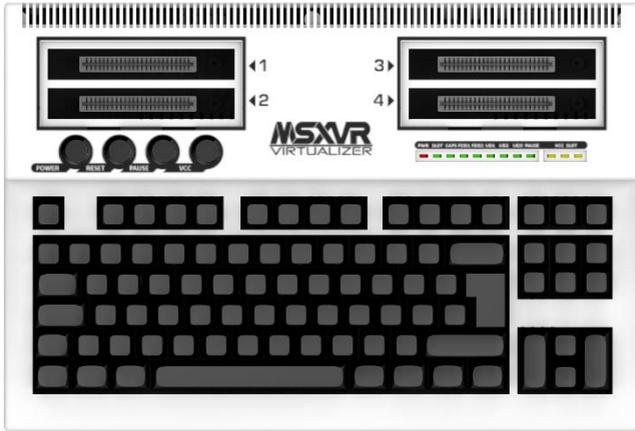
SIDE VIEW



PORT A	DB9 port A of MSX compatible play.
PORT B	DB9 port B of MSX compatible play.



POWER	Security on and off switch. It allows to close the current flow from/to the external power supply.
--------------	--



SLOT 1-4	50 pin cartridge connectors. MSX compatible. They can also operate in exclusive MSXVR mode.
POWER	The turn on and turn off button.
RESET	Sends a RESET notification to the system.
PAUSE	Sends a PAUSE notification to the system.
VCC	Enable / Disable the secure access mode to the cartridge slots.
POWER LED	Red LED indicating if the system is on or off.
USER LEDs	8 user LEDs with different programmable functionalities.
VCC LEDs	3 LEDs (+5V, -12V, +12V) that indicate whether the cartridge slots are active or not.

★ SECURITY

- Operate the computer only with a 100V~240V input power supply and a 12V/7.5A (90W) output. Incorrect specifications could damage the state of the computer or prevent its proper functioning.
- If any objects fall into the computer, solid or liquid, disconnect the power and have it checked by specialized personnel before using it again.
- When you are not going to use the unit for a long period of time, unplug it from the power outlet.
- Do not place or drop heavy objects on the power cord. Using a damaged cable can be dangerous. To disconnect the cable, pull the plug. Never pull the cable itself.
- In the event of a breakdown, unplug the power cable, and contact your dealer or go to the nearest point of sale.
- The computer consists of high precision electronic parts. Avoid dropping or hitting against other objects. Do not place it in places subject to vibration or on unstable bases.
- Do not place the computer near thermal sources such as radiators or ventilation outlets, or in places exposed to direct sunlight, excessive dust and / or humidity.
- Do not place the computer near electrical equipment as it is affected by electromagnetic fields it will malfunction.
- Good air circulation is essential to dissipate internal heat. Do not place the computer on surfaces (carpets or blankets) or near materials (curtains or tapestries) that may block the ventilation slots.

- Use only the specified peripheral devices, otherwise, problems may occur. Before connecting a peripheral device, disconnect the power, or else the internal integrated circuits could be damaged.
- If you use another SD with an operating system and software different than the official ones of an MSXVR, you must be very careful in the use of applications that use the GPIO ¹ports of the installed SBC², as it could seriously damage your computer and affect your guarantee and loss of refund.
- Do not connect an MSXVR to other computer than an MSXVR through the joystick ports. You can damage the ports and lose your guarantee.
- Do not touch the cartridge groove connections with your hands or any other utensils. It could cause a short circuit and seriously damage your equipment. This would also incur in a loss of guarantee.

¹ **GPIO**, General Purpose Input/Output interface. In the RPI the 40 pin connector.

² **SBC**, Small Barebone Computer.

★ CLEANING

- Clean the exterior and keyboard with a soft dry cloth, or slightly moistened with a concentrated solution of detergent. Do not use any type of solvent, such as alcohol or benzine, as this could damage the finish.
- Cleaning should be done using only soap and water, the use of any other chemicals such as chlorides, ketones, degreasers, etc., accelerate the aging of the device and give it a yellowish color. Cleaning should be applied with a soft cloth or towel to avoid degrading of the surface shine.

★ SPECIFICATIONS

RASPBERRY PI 3B+

- QUAD CORE - 1,4GHZ
- 1Gb RAM
- SD CARD
- HDMI
- RCA (audio-composite video 50/60Hz)
- ETHERNET
- WIFI
- BLUETOOTH

VRI BOARD

- 4 x SLOTS FOR CARTRIDGES COMPATIBLE WITH THE MSX STANDARD
- 2 x JOYSTICKS DB9 PORTS COMPATIBLE WITH THE MSX STANDARD
- OSCILLATOR 3,5MHZ
- VOLTAGE MANAGEMENT: +3.3V, +5V, +12V, -12V
- PCM 16 BIT - 44Khz - INPUT
- POWER LED + 8 USER LEDs + 3 LEDs VCC SLOT
- POWER / RESET / PAUSE / VCC BUTTONS
- 4 x EXTERNAL USB
- MECHANICAL KEYBOARD 88 KEYS - ISO
- SD SLOT CARD SLOT
- HDMI CONNECTOR
- RCA AUDIO/VIDEO CONNECTOR
- ETHERNET RJ45 CONNECTOR
- PSU CONNECTOR
- USB PC - EXTERNAL-KEYBOARD CONNECTOR
- INTERFACE DB37 I/O

- FPC-30 PIN CONNECTOR (DSI / CSI)
- POWER SWITCH
- POWER ON/OFF SYSTEM
- SLOT AUDIO MIXER
- SLOT MODE CONFIGURATION (USB / I2C o MSX)
- INTERNAL MEMORY

CONTENTS OF PACKAGING

- COMPUTER MSXVR
- CABLE RCA-RCA
- CABLE HDMI-HDMI
- PSU OUT:12V/7,5A - IN:100-240V
- SERVICE MANUAL
- SD CARD 32Gb

 The VRI-BOARD allows installation of both an RPI3B + and an RPI4B or similar model. It is ready to use 2 USB 3.0 ports where appropriate and adapt the HDMI port. In order to exchange the SBCs refer to the official documentation.

★ FUNCTIONALITIES

1. TURN YOUR COMPUTER ON AND OFF SAFELY

The elements related to turning on and off an MSXVR are the following:

1. Power supply socket
2. Power supply
3. Mains connection cable
4. Power switch
5. Power button

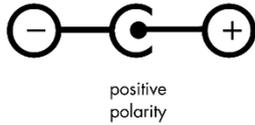


To turn on the computer, it is absolutely necessary that the power supply socket is properly connected to the computer:



In case of not using the official power supply, the alternative must have similar characteristics to that offered with the product (12V/7,5A) in addition to being connected to the mains.

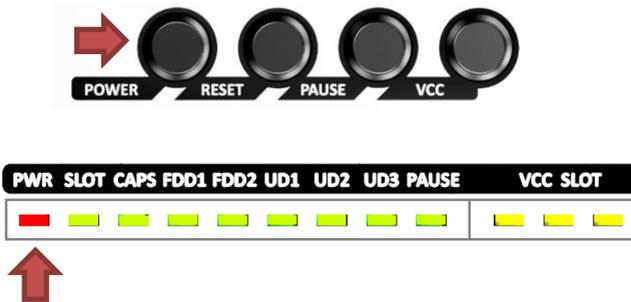
The power supply that comes with the computer is compatible in the 100-240V range. Its polarity is:



The next step would be to make sure that the switch's on position is as follows:



Now we can turn on the computer by pressing on the power button:



We will see that the red power LED illuminates and the computer begins its initialization stage. After a few seconds we will see the entry logo.

Once inside, we can turn off the computer by pressing the power button for more than a second and after this time, stop pressing. It is important to do so, so that the computer closes properly and avoid possible corruptions of the system.

 The only way to power-off the computer safely is using the POWER Button. If you remove the PSU cable too, but we don't recommend you that.

Once the computer completes the shutdown procedure, the red LED next to the rest of the LEDs will turn off. If at this point we want, for security or because we will have the computer off for a long time, disconnect the power switch, we can do so with no risk.

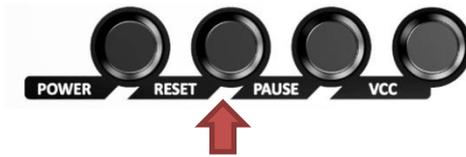
 Never remove the SD from the rear until the computer is completely turned off. In case of doing so, not only can we block the system, it could also corrupt the SD.

2. REBOOT THE SYSTEM

We may need to restart the system because some applications may have frozen, an unexpected system failure, an exception or the full screen is completely red. In this case, we can cause a system restart using the keys:



We can also provoke a RESET by using the button designed for this:



ⓘ In case of a system crash, the RESET button will not work and we will have to use CTRL + ALT + DEL

3. ACCESS THE APPLICATIONS MENU

All applications have a menu. Each application customizes its menu based on the available options.

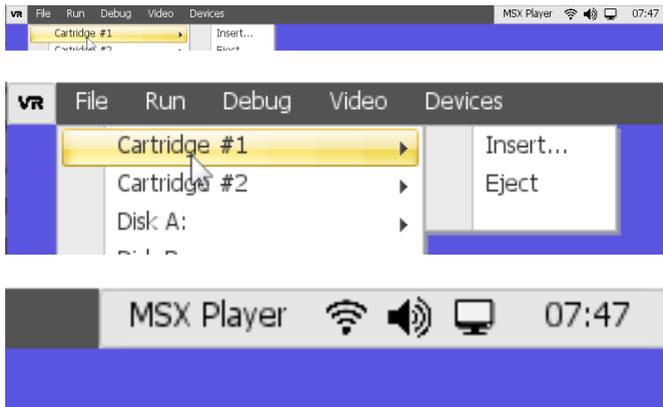
To activate the menu we can use this key combination:



Or by pressing the MENU key:



The menu bar has the VR icon, which allows you to view the current programs and also the available options by the application, then the application title and then the general "widgets" for Wi-Fi control, network, volume, etc. next to the time.



4. CONFIGURE START OPTIONS

By default, when the computer is turned on, it first detects if it has cartridges inserted and otherwise it goes directly to the VR-DOS console. The way to start the computer is user configurable and we have the following possibilities:

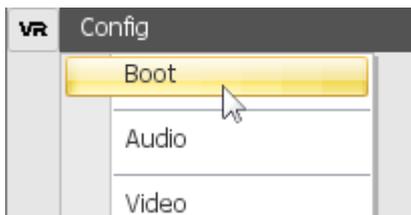
- **Cartridge boot**
- **VR-SYSTEM boot**
- **VR-DOS boot**
- **VR-BASIC boot**
- **Virtual machine boot**

We can do it using a VR-DOS command:

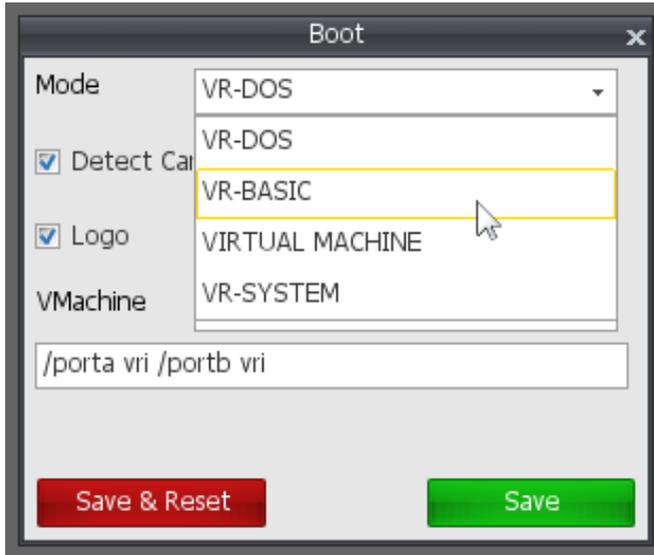
- `config /boot mode DOS`
- `config /boot mode VM`
- `config /boot mode BASIC`
- `config /boot mode SYSTEM`

```
C: />config /boot mode DOS
OK!
```

Or we can also access the CONFIG application and do it in a more visual way. Type "config" on your VR-DOS console, the application will be opened and you will access the menu:



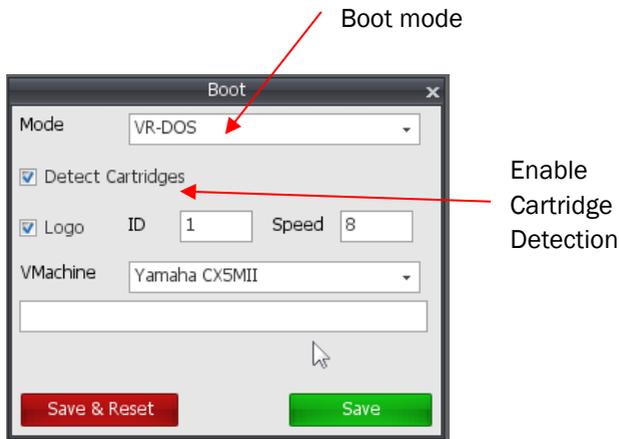
Once inside, through the BOOT menu, the boot will be configured among other aspects of the initialization system:



5. AUTODETECT CARTRIDGES ON STARTUP

In MSX computers if a cartridge is present during the powering ON, the computer will proceed to execute the cartridge. This also occurs in an MSXVR, however, it is possible to avoid this if we want to:

- **Pressing the ESCAPE key.** If while starting, the cartridge detection is enabled, pressing this key, we will avoid detection and subsequent execution of the cartridge.
- **Through the configuration menu.** If we access the CONFIG application and then the boot menu (BOOT), we can choose whether or not we want to detect cartridges.



Other options are:

- **LOGO.** We indicate whether or not we want to launch the initial logo.
- **ID.** We can choose between different types of logos. You can even create your own.
- **SPEED.** It serves to establish the speed of execution of the logo, it is a parameter that independently manages each logo program.
- **VMACHINE.** It allows us to indicate which virtual machine we will execute in case we have chosen the VIRTUAL MACHINE MODE. Next to the type of machine, we can specify with which parameters we will initialize it.

6. THE VR-DOS

This application inspired by the well-known MSX-DOS allows the execution of simple commands with which the system interacts. Although its use is mainly designed to manipulate files and drives, from the VR-DOS we can access all types of tools and applications.

The VR-DOS incorporates the known commands in the MSX-DOS in addition to new ones such as: as, config, help, mount, net, kill, dsktool, ziptool, play, edit, gr, pkg, wget, report, system.

From VR-DOS we can execute files:

.BAT	Batch files.
.PI	VR-Script files
.APP	VR-OS application files.

VR-DOS commands accept parameters that allow them to be executed with different behaviors. These parameters will always be set in the form `/<param>`

For all commands the `/?` parameter will always return some kind of help displayed on the screen. We can also invoke this help with the help command, for example: `c:> help basic`

7. INSERT AND REMOVE CARTRIDGES SAFELY

We can do this using the VR-DOS commands:

```
C: />gr /on
WARNING!! Don't insert or remove cartridges
from slots

C: />gr /off
OK!! Now you can remove or insert cartridges
from slots
```

With GR /ON we make the slots, DB9 and DB37 active and therefore the extraction or insertion of cartridges is not safe, neither for the computer nor for the cartridges,

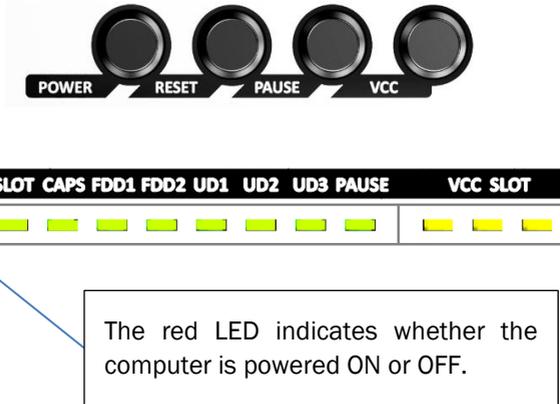
With GR /OFF the slots are disconnected and therefore the insertion and removal of cartridges is completely safe.

i Observe the status of the VCC SLOT LEDs indicating if the slots, DB9 and DB37 are active. In this is the case we should never insert or remove a cartridge or we could damage the computer.



The different LEDs indicate true voltage states -12V, +12V y +5V

It is also possible to enable or disable the slots using the VCC button. Each time we press it, we will alternate between on and off. Observe the status of the LEDs to know which situation you are in.



i It is important NOT to remove the SD while the computer is on, which is, when the RED LED is on.

8. USE DIGITAL OR ANALOG VIDEO OUT

By default, the system starts using the digital HDMI connector as video output. A compatible HDMI monitor is expected to be connected to it. If the system starts up and there is no monitor connected and then we perform this action, it may be necessary to restart the system.

Once the system is started we can alternate between digital or analog video using VR-DOS commands or through the main menu bar.

From VR-DOS to switch to digital video:

```
C: />config /video output digital
Change video to: DIGITAL and this will reset
the system. Are you sure (Y/N)?
```

From VR-DOS to switch to analog video:

```
C: />config /video output analog
Change video to: ANALOG and this will reset
the system. Are you sure (Y/N)?
```

Through the menu:

If we are in the VR-DOS, we will show its menu (more information on page 20)

In this way and by using the cursor (with a USB mouse for example) we will activate the video options through the widget:



From this panel, we can see the following options: TV and HDMI

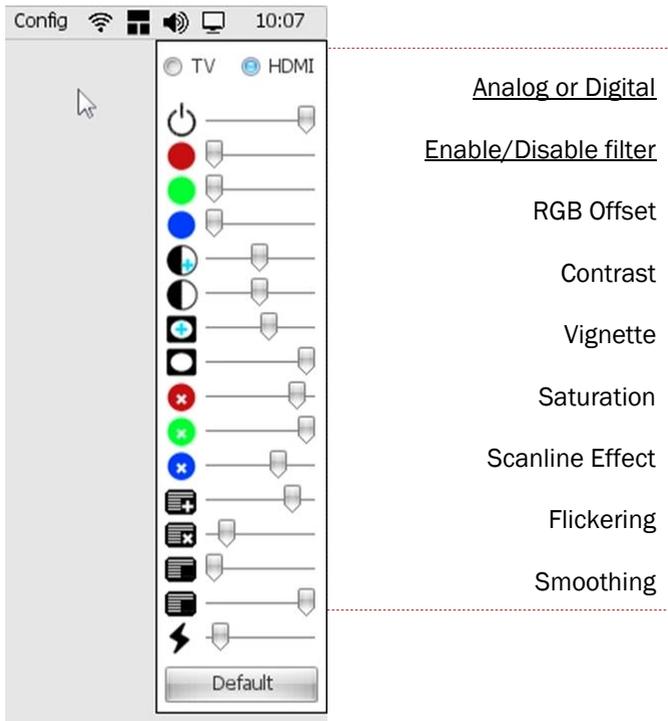
We will see the one that we have active at that moment (in the image above, the HDMI option) and we can change it if we want.

 By changing the video mode we will be forced to reboot the system.

Once changed, the computer will always boot in that video mode until we decide to change it again.

9. ACTIVATE THE SCREEN FILTER TO SIMULATE A CRT

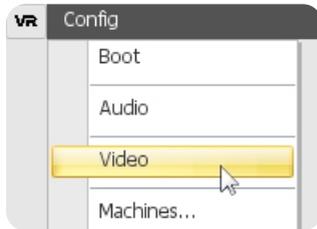
Accessing the video widget, through the main menu (see page Error: the source of the reference was not found), we can activate, deactivate or configure the screen CRT filter. You can choose different parameters and adjust it to your liking.



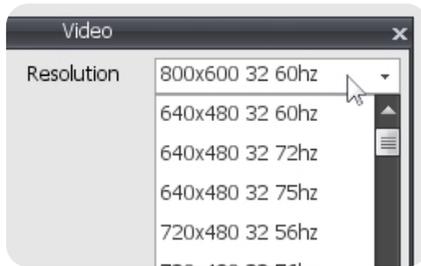
i With the “DEFAULT” button we can return to the default values.

10. CHANGE THE SCREEN RESOLUTION

We can access the video properties from the config application:



And then change the resolution among the available ones:



i The optimal resolution in terms of efficiency and performance is 800x600. A higher resolution may cause the system to go slower and a higher consumption of video memory.

i Changing the resolution will involve rebooting the system.

11. ASPECT AND GRAPHIC PROPORTION IN VIRTUAL MACHINES

Once inside the “player” application, we can access its video options menu and from there alternate between the different formats. For example, we are going to launch a ROM that we have in our SD:

```
C:/play "barbarian_the_duel-msxdev.rom" /msx2
```

This will launch the ROM for MSX2 and from here we can access the menu (see page 21). We access the “video” section:



We can navigate the different video devices, for example if we have a machine with a V9990. To change the appearance of the output screen we will navigate the different settings, being able to choose between:

- 1X
- 2X
- 3X
- ORIGINAL
- EXPANDED

12. CONFIGURE AUDIO OUTPUT

By default, the system starts using the DIGITAL video output (via HDMI). However, we can change to analog using VR-DOS commands or through the menu. It should be noted that we can have the video output in one mode and the audio output in another. It is not necessary that both are equal.

From VR-DOS change to digital audio:

```
C:/>config /audio output digital
Current audio output is: DIGITAL
```

From VR-DOS change to analog audio:

```
C:/>config /audio output analog
Current audio output is: ANALOG
```

Through the menu:



We access the menu (see page 20) and access the audio widget. From here we can choose between analog (TV) or digital (HDMI). It is not necessary to restart the system.

 The music from the cartridges always come out of the analog output.

13. LISTEN TO THE AUDIO THROUGH HEADPHONES

The headphones are connected to the standard Jack-stereo 3'5 output on the back of the computer. The headphones use the analog audio output of the system. The audio sources present in an MSXVR are:

- **SYSTEM AUDIO** (virtual machines and operating system)
- **CARTRIDGE AUDIO**

The CARTRIDGES AUDIO always comes out through the ANALOG output and we can control the volume of its mixer.

The SYSTEM AUDIO can be configured as it is mentioned in section 12. We can control its volume both digitally and analogically.

14. ADJUST THE AUDIO VOLUME

We can either use a VR-DOS command:

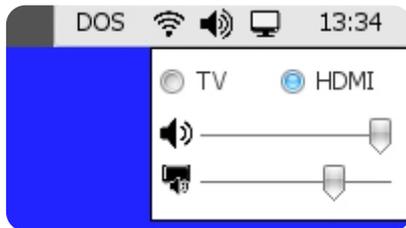
To modify the system volume.

```
C: />config /audio volume 75  
OK!
```

To modify the volume of the cartridge slot output:

```
C: />config /audio_slots volume 75  
OK!
```

Or we can access the main menu bar, the audio icon:



The volume ranges from 0 to 100. The volume will affect the type of audio output that we have active:

- DIGITAL
- TV (ANALOG) and only for the SYSTEM AUDIO (virtual machines and operating system)
- CARTRIDGE SLOTS (analog output - TV)

15. LISTEN TO REAL SCC OF A CARTRIDGE EMULATING A ROM



We will need a real cartridge that generates SCC sound, for example, any Konami game with this chip.

First we do `GR /OFF` to make sure we don't damage the system. Once done, we insert the cartridge in slot 2, 3 or 4. Since we will use slot 1 to virtualize the ROM.

Once inserted, we do `GR /ON` again.

Now we can execute a ROM that uses SCC and make use of the real SCC with the following VR-DOS command:

```
C: />play SMAMBOW.rom /msx2+ /mapper2 vri
```

`/mapper2` means that we have our SCC cartridge in Slot2.

We could use other slots to virtualize and connect the cartridge with SCC. The PLAY command allows you to combine with all these factors.

 **THE CARTRIDGE AUDIO** is always heard through the ANALOG output

We can control the volume of the audio that comes out of the cartridges through the audio mixer (see page 36)

16. UPDATE THE MSXVR SYSTEM

We can do it in two ways:

- ONLINE update
- Update using SD

For the ONLINE update, we need to have an Internet connection, either by Ethernet or by WIFI.

Once connected, we will write the following VR-DOS command:

```
C: />pkg /update
```

This way of updating allows you to always have the latest version of the MSXVR firmware without losing personal information that we have included in the SD.

For the SD update, we will need to update the last existing image of the MSXVR firmware. We will download the latest version and dump it on an SD.

 It is important to know that if we rewrite the SD we will lose any personal information we have in it.

17. DOWNLOAD A FILE FROM THE INTERNET

You can use the VR-DOS command with name “wget”, here is an example:

```
C: /> wget http://msxvr.es/index.html
Downloaded: index.html ... 5 Kbytes  OK!
```

You can download a ZIP file and then unzip it into a folder with the “ziptool” command:

```
C: /> ziptool /E example.zip
```

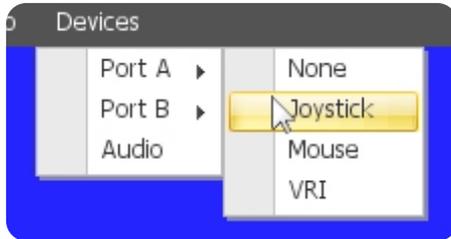
This will remove all files and folders from the ZIP and copy them to the local directory where we are, creating folders and files recursively. For more information about “ziptool” use /?

If we want everything to be decompressed from a specific folder we can do:

```
C: /> ziptool E: example.zip newfolder
```

18. PLAY WITH A JOYSTICK OR USB MOUSE

We will need to connect a USB joystick to the MSXVR. Once connected, we start a virtual machine and through the options menu (CTRL + ALT + M) we can access the device section:



Here it is indicated that we want to use as a device connected to Port A or B of the virtual machine:

- **None.** No device
- **Joystick.** A USB joystick
- **Mouse.** A USB mouse
- **VRI.** With an MSX compatible device connected to port A or B of the MSXVR.

In addition, the VR-VIEW (the system that manages the user interface) allows usability with both a joystick and a USB mouse.

19. USE AN MSX MOUSE OR JOYSTICK

We have these options to use real MSX devices in MSXVRs.

To navigate the system interface:

```
C:/>config /gr driver add msxjoystickA
```

We can choose both an MSX joystick assigned to port A or B. The same applies to an MSX mouse, we can use “msxmouseA” or “msxmouseB”

To play games on virtual machines:

```
C:/>play nemesis.rom /porta vri /portb vri
```

In the parameters “/ porta” and “/ portb” we can establish what type of device we want to use within the virtual machine. The options are:

- **VRI.** Real MSX devices.
- **MOUSE.** A mouse connected to the USB
- **JOYSTICK.** A joystick connected to the USB

20. USE A USB STORAGE DRIVE

The MSXVR automatically mounts USB drives that connect to the system. You can access automatically using the mounting unit that has been used. It is also possible to mount the units with the unit name you consider.

To see the options for the “mount” command:

```
C: />mount /?
```

Using VRTUNNEL

To make an MSXVR drive visible in a virtual machine, a mechanism called “VRTunnel” is used. This mechanism allows you to see the units mounted as drives of the virtual machine. To make use of this we can use the "wizard" of the player:



VRT # 1 is the unit that we want to mount in the virtual machine and F: will be the name that we will assign in that unit.

 To use the VRTunnel, the virtual machine must have capacity and operating system with implemented drives

On MSX machines

If we start VRTunnel with an MSX2 + or MSXTR, unless an MSXDOS operating system is found in the unit to be mounted, we can go to MSXBASIC and from there we can access the different folders with CALL CHDRV and with CALL CHDIR.

If we start with a hard disk prepared in DSK format, with NEXTOR, we can also make use of the features that this system allows.

Example call with command interface:

```
c:/>play *.rom /msxtr /dev vrtunnel@@d:/#F:  
/hdd1 c:/hdd/myharddrive.dsk
```

21. FORMAT / REPAIR USB DRIVES IN CASE OF CORRUPTION

To format an USB drive mounted in the system, we can use the VR-DOS command:

```
C:>format
```

Depending on the partition type we want to create, we can use:

```
C:>format A: /FAT32
```

```
C:>format A: /EXT4
```

```
C:>format A: /NTFS
```

 This does not apply to USB Floppy Disk drives. For these types of units see section 22.

In the event that one of our USB drives returns wrong information or does not allow certain files to be used or deleted, etc, meaning it has probably been corrupted. To repair this, we can use the command:

```
C: />chkdsk A:
```

This tool will find out the type of unit in question, type of partition, etc. And it will try to solve the possible problems.

22. USE A FLOPPY DISK USB DRIVE

If you connect the unit to the MSXVR, you will automatically see that it will be mounted in the system as A:, or B:, or the first available unit name.



If you want to start a virtual machine using this unit, you can do it with this VR-DOS command:

```
C: /> play A: /msx2
```

Being A: a floppy disk drive. Actually, the unit can be any of the ones that you have mounted in the system, it will depend on whether you use FAT12 or FAT16, which can be used from an MSX virtual machine.

To Format

You can use the VR-DOS command:

```
C: /> format A: /FAT12 /S720
```

In this way, we would arrange our disk. In this case, the format used by the MSX with double density.

 At the moment it is not possible to format single density disk: /S360

23. CONFIGURE THE DIFFERENT VIRTUAL MACHINES OF THE SYSTEM

In an MSXVR we can find different virtual machines. The way to start these machines is established based on an editable profile. We can have as many profiles as we want. These default profiles are found in a system folder:

```
C:/>dir $SYSTEM:/vmachines/configs/
```

Inside this folder we will find XML files with the configuration of each machine.

The BIOS necessary for the different virtual machines will be found, by default, in:

```
C:/>dir $SYSTEM:/vmachines/roms/
```

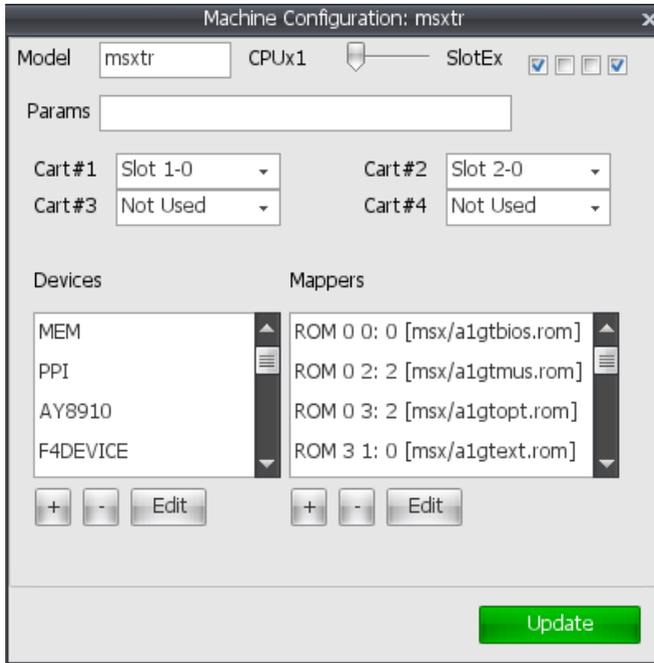
For a friendlier management of the different machines and profiles, we have the application:

```
C:/>config
```

Firstly, we choose the machine configuration. We can create new, edit or delete the ones we have.



Once inside a configuration, we can edit its different properties. In the case of an MSX machine, we can choose the model, expanded slots, link with hardware slots, add devices and mappers.



 If you modify the XML factory , every time you update the system, the changes you have made will be reverted. If you want to create new virtual machines, use different names.

24. CHANGE THE COLORS OF THE VR-DOS ENVIRONMENT

Using the “color” command, we can indicate the color of the ink, background and border. Here is an example:

```
C: /> color 15 1 1
```

These colors are saved and if we restart the machine they will be preserved.

The available colors are:

0	Transparent
1	Black
2	Green
3	Light green
4	Dark blue
5	Light blue
6	Dark red
7	Cyan
8	Red
9	Light red
10	Dark yellow
11	Light yellow
12	Dark green
13	Magenta
14	Gray
15	White

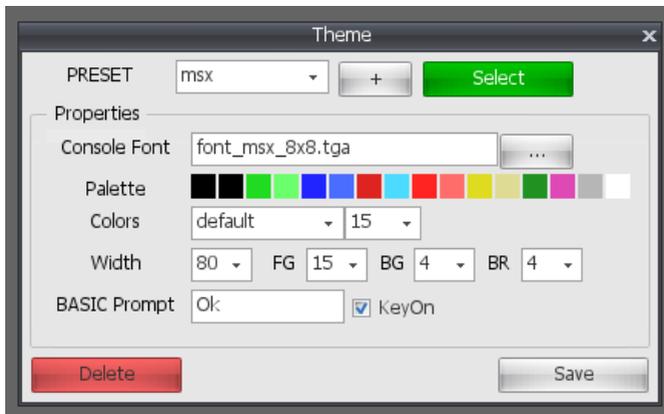
ⓘ This color palette is the one corresponding to the MSX preset. The pallets can change depending on the preset used.

25. CHANGE THE THEMED VISUAL APPEARANCE

A preset is a set of properties that define aspects and colors within the graphical environment of the MSXVR. This aspect affects both VR-DOS, VR-BASIC and VR-VIEW. There are several default presets: MSX, CPC, ZX and C64.

```
C: />config /theme preset MSX
```

We can use the “config” application to modify presets, delete them or create new ones.



The presets are saved in the “**\$SYSTEM:/view/presets/**” system folder and the files are in XML format.

26. LOAD A DSK, WAV, ROM FILE

Virtual machines can be launched according to the extension of a file or by indicating which system "/ system" and which model "/ model" we want to boot.

```
C: /> play file.dsk /msx2
```

```
C: /> play file.dsk /system msx /model msx2
```

In both cases, an MSX2 machine with a disk inserted in A would open:

In the same way we could have done:

```
C: /> play *.rom /msx2 /dsk file.dsk
```

Since the ROM extension is linked by default to MSX machines.

If we wanted to open a ROM in ZX Spectrum we would do:

```
C: /> play *.rom /system zx
```

The combinations and ways of launching PLAY are very wide.

For example, to launch a ROM cartridge:

<pre>play file.rom</pre>	It will launch the ROM in MSX1 mode
<pre>play file.rom /msx2+</pre>	It will launch the ROM in MSX2 + mode
<pre>play *.rom /cart1 file1.rom /msxtr</pre>	It will launch the ROM in MSXTR mode

To launch a WAV file:

```
C: />play file.wav
```

This will access the BASIC of the MSX1 and from there we can use the cassette.

With CTRL + ALT + F11, we show the cassette panel. From here we can activate it, load a file and rewind. We can also see the progress of the tape or the sound input meter (if you are digitizing the audio input)



We can also access the player's wizard to access all these options:

```
C: />play /wizard
```

```
C: />play /w
```



Other known file extensions: TAP, TSX, CDT, TZX, T64, BIN, C64, COL, SG, Z80, MDR, D64, G64, NIB, CRT, PRG

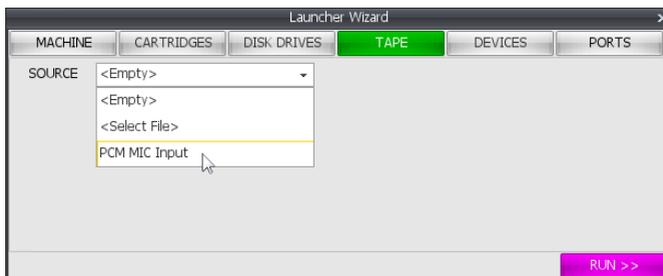
27. LOAD FROM AN ORIGINAL CASSETTE

Thanks to the audio scanning system that the MSXVR has, we can connect a cassette and load tapes in real time. We can also use the REM (remote) to control the motor of the cassette.

To start a virtual machine with this capability, from the command line it would be, for example, using an MSX2 machine:

```
C:/>play *.rom /msx2 /tape mic
```

And from the “wizard” of the player it would be indicated in the corresponding section:



From the "player" we can access the menu options for cassette or the accessible panel using the corresponding key combination (see page **Error! Marcador no definido.**)

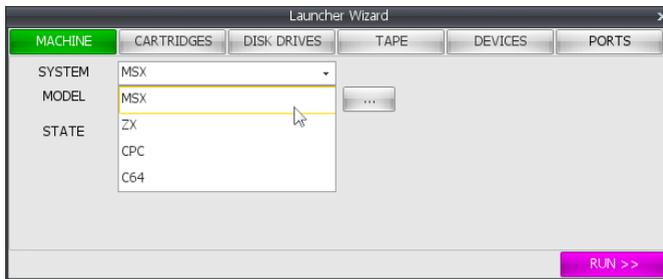
Hitting the play on the MSXVR implies starting to digitize audio. If we have the REM connected, our cassette will be activated (obviously we must have the PLAY on the cassette too)

28. RUN OTHER VIRTUAL MACHINES

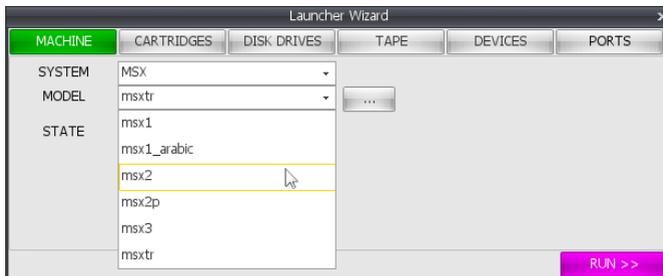
The MSXVR system is a live one. Thanks to system updates, the kernel is nourished by new virtual machines.

These machines are recognizable through different applications. Especially the "player" which is used to launch ROMS, tape files, disk, etc. understandable by the different machines.

If we launch the "wizard" of the player we can see the available virtual machines:



Within each machine we will find the different configurations (models):



29. EDIT A TEXT FILE

We can use the text editor that has the MSXVR by default. To invoke it from VR-DOS we can do it as follows:

```
c:/>edit
```

This will open the editor with an empty document. If we want to open an existing text file, we will do so by indicating its name:

```
c:/>edit file.txt
```

If the file “file.txt” (in this case) did not exist, it would open a new document and we can save it with that name.

The text editor allows it to recognize by the extension used what type of file we are editing and if it is a known extension, it will apply the most appropriate syntax highlighted.

30. VIEW A GRAPHIC FILE AND THE DIFFERENT ONES THAT EXIST

If we use the “play” command, it will recognize the file extension and launch the default image viewer. We can also open the image using the viewer application we prefer. In the case of the MSXVR there is a default image viewer "imageviewer".

```
C: />play logoscreen.png
```

```
C: />imageviewer logoscreen.png
```

The graphic formats or extensions supported by imageviewer are: PCX, BMP, TGA, GIF, PNG, JPG, SC2, GE2, SC5, GE5, SC7, GE7, SC8, GE8, SC9, GE9, SC10, SCA, SC11, SCB, SC12, SCC, SR7, SR8, SRS, PIC, SCR, MKI, MAG, MAX

Within the image viewer, we can convert to other formats and have the ability to apply modifications to the original: changes in size, canvas, colors, rotation, etc.

You can also launch the viewer to view a collection of images. You can progress with page forward and backward between them.

```
C: />play images/*.scx
```

31. PLAY MUSIC AND VIDEO FILES AND THE DIFFERENT ONES THAT EXIST

Using the “play” command, we can launch the multimedia player that allows us to listen to different audio formats such as: WAV, OGG, MP3, KSS, TMU, PT3, VGM, VGZ, WYZ

And video files as: EVA, OGV, MP4, MKV, MPG, AVI

Examples:

```
C:/>play spectro.pt3
```

```
C:/>play *.wav
```

32. CONNECT TO THE WIFI NETWORK

Through command line:

```
C: /> config /wifi connect MYONO2 884443343225
```

Indicating the SSID_NETWORK and the password. If we only indicate the SSID_NETWORK it will ask us for the password and we can enter it in encrypted form.

```
C: /> config /wifi connect MYONO2  
Pwd?*****
```

We can also connect through the “widget” that can be found in the application menu bar (CTRL + ALT + M)



Once the panel is opened, we can see our configuration of both the ETH and WIFI. We will also see the available Wi-Fi networks that we can always refresh by using the "Scan" button.



33. CONNECT THROUGH THE NETWORK CABLE

The RJ45 connector that you can find on the back of the MSXVR, allows you to connect the computer to a network.



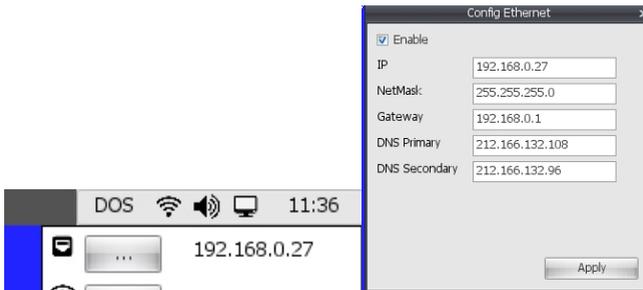
If you have connectivity, you can verify it by accessing the widget of the network menu:



or through the DOS command line:

```
C: />config /ETHERNET  
  
C: />config /WIFI
```

You can configure your ethernet connection using the network widget and accessing the properties:



34. CHANGE AND CONFIGURE THE KEYBOARD

In order to change the assigned keyboard language, we can use the following command:

```
C: />config /keyboard es
```

In this case "es" corresponds to the ISO-3166 code.

We can also configure it through the “config” application

```
C: />config
```

35. CHANGE THE DEFAULT LANGUAGE IN THE SYSTEM

To change it we can use the command:

```
C: />config /locale es
```

In this case "es" corresponds to ISO-3166 code

In the same way, it is possible to do this also using the “config” application.

36. CONFIGURE THE KEYBOARD OF AN MSX VIRTUAL MACHINE

In order to configure a keyboard of an MSX machine, we need to access the machine editor and access the PPI device.

```
C: />config
```

We access “Machines...” and then any of the available MSX machines. In the list of devices, we access the PPI and we will see an MSX keyboard with each key mapped to one on our keyboard.



We can change the key we want and update the template, with UPDATE. Or, we can clone the template and assign it another name. All templates are in the system unit “\$ SYSTEM / vmachines / kbd-layouts /”. These templates are saved in XML format.

37. ACCESS THE VR-BASIC

```
VR-BASIC version 1.0  
(c) MSXVRTeam Corp. 2013-2019  
3778174976 bytes free  
Ok
```

The VR-BASIC is the application that allows access to the enhanced MSXBASIC interpreter that this computer implements. The VR-BASIC aims to be compatible with all existing MSXBASIC versions and also offers new features that facilitate and improve its use. The direct way to access VR-DOS is by using:

```
C:/>basic
```

We can also directly start a BAS or CAS or any file that contains information about an MSXBASIC program.

```
C:/>basic tristan.cas
```

How to use MSXBASIC commands and how to program in this language can be found in dozens of books and manuals, as it is quite extensive, we will discuss everything related to VR-BASIC in another manual.

38. EDIT A VR-BASIC PROGRAM

We can use the VR-BASIC console itself, writing the line number, writing the code and pressing the carriage return to store. This is the way to programme in most BASIC interpreters, as in the case of the MSXBASIC.

```
10 cls
20 print "Hello!"
30 end
```

Or we can use the text editor included in the same tool. For this we will write CALL EDIT or _EDIT and press return.

The editor allows you to dump the code when interpreting and capture it once we enter. In case the code has been modified outside the editor, we will be asked if we want to reload it or ignore it. From the editor we can execute the program (CTRL + R) and in case of an error, we will be indicated by the line number where it was committed.

```
1  cls
2  print "hola"
3  print "adios"
4  end
5
```

 The VR-BASIC editor allows editing without line numbers and also allows the use of labels to make use of them with GOTO and GOSUB

39. LOAD, EXECUTE AND DEBUG A VR-BASIC PROGRAMME

One of the things that has always been missed in the MSXBASIC is the flexibility, usability and manipulation of the code, in addition to real-time debugging. These themes have been improved in the VR-BASIC.

To run programs in VR-BASIC we can do it in the following ways:

From VR-DOS command line

```
C: />basic game.bas
```

The file name can be a .BAS, .CAS, .TXT or any type of text file. VR-BASIC allows loading both precompiled BASIC (binary) and BASIC in ASCII format.

From the VR-BASIC

With the known MSXBASIC statements such as CLOAD, LOAD and RUN. If we load a file with CAS extension, we will be able to load the different BASIC programmes that it contains as if it were a cassette.

With the BASIC programme running, we can activate the debugger using the keyboard shortcut: CTRL + D

40. SAVE A VR-BASIC PROGRAMME

To save our VR-BASIC programmes we can do it with the known MSXBASIC commands, for example:

```
save "ejemplo.bas"  
Ok  
|
```

We can indicate any drive and folder we want that is available in the system.

We can also open the editor and save from this application:

```
call edit
```

41. USE A DSK FILE IN THE SYSTEM

DSKs are disk images. They can be floppy disk images or hard disk images. Let's look at a couple of ways to use them:

- Mounted as a unit

```
C:/>mount E: basic.dsk
Mounted Ready Only!
```

From here, we can access E: and use the DSK as another unit of the system. To unmount it we will use the command:

```
C:/>mount /U E:
Unmounted!
```

- With the DSKTOOL utility

```
D:/>dsktool /D basic.dsk
          SAVES          <DIR>
          TMP            <DIR>
          SETTINGS      <DIR>
          COMMAND.COM    6656
          COMMAND2.COM  23184
          MSXDOS.SYS     2432
          MSXDOS2.SYS   4870
          SCROLL.BAS     197
          SPR.BAS        549
          STARS.BAS      403
          BASIC1.BAS     379
          MUSIC.BAS      136
          R.BAS          324
          S1.BAS         130
          S8.BAS         59
          S9.BAS         59
          TEST.BAS      2988
14 entries found - 42366 bytes used
```

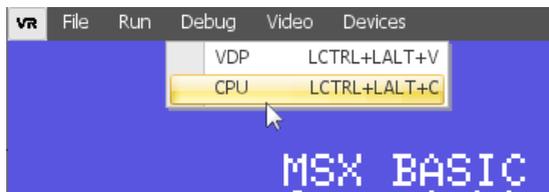
You can see more options to create DSKs with different formats, to add or delete files, etc. to do this type the command:

```
C: /> DSKTOOL /?
```

42. DEBUG A GAME RUN ON A VIRTUAL MACHINE

From the "player", using the key combination: CTRL + ALT + C, we will launch the CPU debugger.

Also accessible from the application menu:



Through the command line, we can also set how to start the debugger:

```
C: /> play *.rom /debug  
C: /> play game.rom /debugbp 0x4010  
C: /> play game.rom /debugbp Enemy2_Attack  
/symfolder ./release
```

43. ACCESS THE AVAILABLE CARTRIDGES AND FEATURES

To be able to access all the slots and see what is connected, detect cartridges, etc. we have the tool in the command line:

```
C: />gr /?
```

Detect the inserted cartridge:

```
C: />gr /D
```

In a particular slot, for example slot 3:

```
C: />gr /S3 /D
```

Save a cartridge in a file:

```
C: />gr /S myfile.rom
```

Show the contents of a cartridge, for example, the first 100 bytes from the address 0x4000:

```
C: />gr /P 0x4000 100
```

Disassemble code at a specific address:

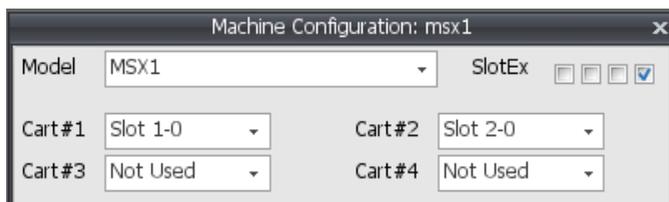
```
C: />gr /DASM 0x4000 256
```

44. LINK PHYSICAL SLOTS WITHIN AN MSX VIRTUAL MACHINE

We can link any slot / subslot of an MSX machine with any of the four cartridge slots that an MSXVR has.

Through machine configuration

Within the configuration of a machine, we will find:



We can decide which slot / subslot to assign to each of the physical slots of the computer

When we invoke the “play” command

```
C:\>play *.rom /grslot1 2,1,0 /grslot2 3,2,0
```

We set the real slot 2 to the logical slot 1 and subslot 0 and the real slot 3 to the logical slot 2 and subslot 0.

45. PROGRAMME A BATCH FILE

Using a text editor, we can create a .BAT file that allows us to launch different VR-DOS commands automatically.

We could also use:

```
c: /> copy con RUN.BAT
```

And once you finish editing press CTRL + Z

To see its content we can do:

```
c: /> type RUN.BAT
```

Within a .BAT we can use different commands, in addition to invoking other .BAT or system executables.

Within a .BAT file we can make use of the parameters: %1, %2, %3, etc. and also of the system variables such as %TIME%, %MSXVER%, etc.

 For more information you can look in the MSXDOS 2.4 user guide or also in the VRDOS manual.

46. PROGRAMME WITH VR-SCRIPT

We can use the text editor that comes by default in the system. By implementing a basic interface we can determine the type of application we want. For example, the following script creates a DOS application:

```
C:/>edit myscript
```

```
1  class MyScript implements DOS_Program
2  {
3      virtual Start()
4      {
5          GetDOS().GetConsole().PrintLn("Hello World!");
6          End(0);
7      }
8  }
```

Once the code has been entered in the text editor, we can save it as "myscript.pi", exit to DOS and execute it:

```
C:/>myscript
Hello World!
```

There are different templates to implement programmes: Engine_Program, GL_Program, BASIC_Program and View_Program. The basic one that any programme should implement is "Engine_Program". Using this, we can create our own templates.

47. SEE THE SERIAL NUMBER AND DESCRIPTION OF MY MSXVR UNIT

Using the VIEW command of the VR-DOS we can access the version information such as serial numbers and hardware identifiers of your computer:

```
D: />ver
VR-DOS Kernel version 1.0
MSXVR version 0.1.0
MSXVR build 11853
S/N: 000-000-000-000
ALIAS: MSXVR Cool!
UDID: 00326-10000-00000-AA985
(c) MSXVRTeam Corp. 2013-2019
```

We can change the ALIAS using the command.

```
C: />config /alias change "nuevo alias"
```

The **ALIAS** is a distinctive ASCII text format that can be used to identify you in games and applications.

The **S/N** is the serial number that uniquely identifies your board. It cannot be modified.

The **UDID** is the number that uniquely identifies your device. It cannot be modified.

48. DIGITIZE SOUND AND VOICES

In order to use the microphone input and digitize audio, we will use the “mic” command

```
C:/>mic audio.wav
```

By default it will stop once we press the space bar. However, we can indicate a recording duration, in milliseconds.

```
C:/>mic /duration 5000 audio.wav
```

The quality of the digitized audio will be 16 bits, 44Khz in mono. Unless another setting is established.

49. AUDIO OUTPUT MODES

The audio of virtual machines outputs:

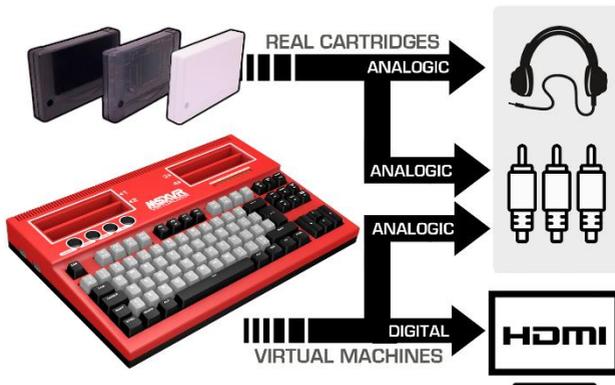
- Through HDMI (DIGITAL Output)
- Through the RCA (ANALOG output)
- Through the EAR Jack (ANALOG output)

The audio of the cartridge slots outputs:

- Through the RCA (ANALOG output)
- Through the EAR Jack (ANALOG output)

At the same time, audio outputs from both the DIGITAL and ANALOG output.

You can control both volumes separately.



50. LISTEN TO THE ORIGINAL SOUND OF THE MSX CARTRIDGES

MSX cartridges can include different types of sound chips such as additional PSG, DAC, SCC, OPLL, OPL2, OPL3, OPL4, among other possibilities. Many of these cartridges generate sound through a dedicated line in the slots, others, however, require cable connection to the cartridge.



To listen to the sound of the cartridges you must use the EAR audio output or the RCA Audio Out connections.

You can also control the output volume through the audio mixer for the cartridges.

You will find another references to this topic in sections 14, 15 and 51.

51. TEST MSX JOYSTICKS IN THE SYSTEM

We can see if they work to handle the cursor in the windows environment, for this we will use the VR-DOS command:

```
c:\>config /gr driver add msxjoystickA
```

If our joystick is in port B, we will use “msxjoystickB”

 Do not connect controls that are not compatible with MSX

We could also create the following script:

```
1 class Service implements DOS_Program
2 {
3     constants:
4         GP_UP = (1<<0);
5         GP_DOWN = (1<<1);
6         GP_LEFT = (1<<2);
7         GP_RIGHT = (1<<3);
8         GP_A = (1<<4);
9         GP_B = (1<<5);
10        GP_STROBE = (1<<6);
11
12    properties:
13        msx = null;
14        lastP0 = 0;
15        lastP1 = 0;
16
17    virtual Init ()
18    {
19        _dos = GetDOS();
20        msx = _dos.GetMSX();
21
22        msx.GR_Init();
23    }
24
25    virtual Final ()
26    {
27        msx.GR_Exit();
28    }
29
30    function LogMsg (_str)
31    {
32        _dos = GetDOS();
33        _dos.Println(_str);
34    }
35
36    virtual Move ()
37    {
38        _p0 = msx.GR_ReadPort (0);
39        _p1 = msx.GR_ReadPort (1);
40
41        if (_p0 != lastP0)
42        {
43            LogMsg ("PORT_0 = " + GetPortDebug(_p0));
44            lastP0 = _p0;
45        }
46
47        if (_p1 != lastP1)
48        {
49            LogMsg ("PORT_1 = " + GetPortDebug(_p1));
50            lastP1 = _p1;
51        }
52    }
53
54    function GetPortDebug (_p)
55    {
56        _str = "";
57        _str += (_p & GP_UP) == 0 ? "UP " : "";
58        _str += (_p & GP_DOWN) == 0 ? "DOWN " : "";
59        _str += (_p & GP_LEFT) == 0 ? "LEFT " : "";
60        _str += (_p & GP_RIGHT) == 0 ? "RIGHT " : "";
61        _str += (_p & GP_A) == 0 ? "A " : "";
62        _str += (_p & GP_B) == 0 ? "B " : "";
63        _str += (_p & GP_STROBE) == 0 ? "STROBE " : "";
64        return _str;
65    }
66 }
67
```

52. USE THE DB37 EXTENSION I/O PORT

We can do this by accessing the GeekReader interface. From this interface we can access all the hardware inputs/outputs created for the MSXVR among other functionalities.

From the script, the available functions are:

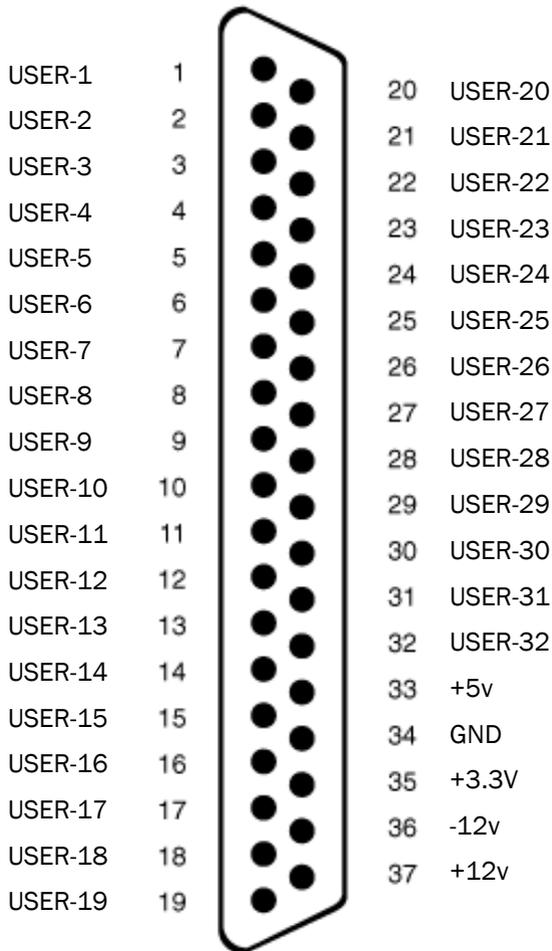
- **SetIOExtPU:** allows you to configure PULL UPs in certain bits. It admits a parameter that is the bitMask. Where 0 is no pull-up and 1 is pull-up.
- **SetIOExtDir:** allows you to configure whether the bits work an input or input. It admits a parameter that is the bitMask. Where 0 is writing and 1 reading.
- **ReadIOExt:** allows you to read from the port.
- **WriteIOExt:** allows you to write to the port. It supports a parameter that is a bitMask.

To obtain the GeekReader interface from the script we would do:

```
1  class Example implements DOS_Program
2  {
3      virtual Start()
4      {
5          _gr = GetEngine().GetGeekReader();
6          _gr.SetIOExtDir(0x0000);
7      }
8  }
```

The voltage of every USER pin is +5v. And the amperage is 0.25mA.

53. CONFIGURE DB37 PINS



From USER-1 to USER-32 are user pins with configurable address (input or output).

54. COMMUNICATE Z80/R800 AND THE MSXVR SYSTEM

We have created a backdoor to communicate with the CPUs used in the MSX or machines with Z80, in order to offer new functionalities and two-way communication between the virtualized machine and the operating system of the MSXVR.

The new instruction is called "trap" and uses encoding not used by any other instruction in the Zilog Z80 and R800. In this case:

```
ED FD nn nn
```

This instruction can modify all registers and flags, according to the value of 16 bits that we pass as an argument.

For example:

CODE	IN	OUT	FLAG	FUNCTION
0000				It generates a breakpoint.
0001			Z	Allows us to know if we are in an MSXVR looking at the Z flag. The instruction is finished, if Z is active then we are in an MSXVR
0002	A		Z	Assign SLOT mode MSX or MSXVR. If the register A = 0, we will use MSX mode and if A <> 0, MSXVR mode. The instruction is finished, if Z is active, this means that the MSXVR mode has been set.
0003	ALL	ALL	ALL	Call a function of a VR-Script context. In our virtual machine, we must have

				established both the context and the function to invoke. After the return of this function, any flag or register could have been modified.
0004	A, HL, DE			<p>DB37 I/O. It includes all operations related to this port.</p> <p>A = function code HL = 16 low bits DE = 16 high bits</p> <p>A = 0, Bit address (0=salida, 1=entrada)</p> <p>A = 1, Bit Pullups (0=no, 1=si)</p> <p>A = 2, Bit reading A = 3, Bit writing</p>
0005	A			<p>LEDs. Allows you to turn on and off user LEDs. To do this, we will use each bit of register A. If the bit is 0 it will turn off and if the bit is 1 it will turn on. The order of the bits corresponds to the order from left to right of the LEDs.</p>

 Query in the Programming Manual Book to know more about this communication method.

55. THE \$SYSTEM UNIT

The \$SYSTEM unit is a hidden unit where the operating system accesses data for its configuration, applications and everything necessary for its correct operation.

This unit contains the following folder structure:

Apps	The applications that we install on the system are stored here.
Bin	It is a generic folder where different types of data that can be used by the VRDOS, VRBASIC or VRVIEW are stored.
Classes	Generic use scripts are stored here to be used in different applications and VRSCRIPT.
Databases	Folder where databases are used by the system.
Dll	Dynamic link libraries are stored here to be used from VRSCRIPT or by the system.
Docs	Contains text documents with user support information. The assistant uses it as memory from where to obtain data to offer help.
Downloads	Folder reserved for downloading files from the Internet.
Libs	Here libraries that can be used by different applications such as AS (pp / compiler / linker) or other programming tools are stored .
Temp	Folder with temporary files. The contents of this folder can be deleted at any time.

User	Data associated with the user are stored here. Many applications save in it information created and associated with its use.
View	Stores information related to the environment and user interface.
VMachines	It contains everything related to virtual machines: machine configurations, keyboard layouts and the BIOS files of the different machines.

 It is advisable not to alter the contents of this unit in a random way and without knowing very well what is being done, this could cause the system to become unstable or stop working.

56. CREATE AN MSX ROM

In order to create a ROM or other type of binary file that can be launched by a virtual machine, we can use the AS tool. This application allows you to preprocess, compile and link different types of files. It is the tool par excellence to develop in the virtual machines of the MSXVR.

The AS tool and all its functionality is quite extensive, however, let's see some examples of use:

```
C:/>as /size 32K /OUT game.rom test.asm
```

Where test.asm can be:

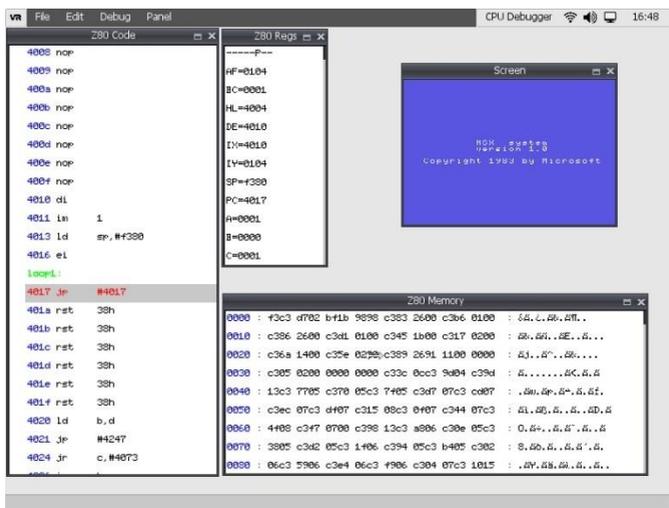
```
1  .module Test
2
3  .area _CODE
4
5  _main:
6      .romheader
7
8      di
9      im 1
10     ld sp, 0xF380
11     ei
12
13     loop1:
14         jp loop1
15
16
17
```

At the end of the command, several files will have been generated, including the "game.rom" of 32Kb.

We can execute it with:

```
c:\>play game.rom
```

Once executed, we can debug it by opening the CPU debugger and we will see the point where it is located.



Another of the files generated is the "game.map". This text file contains information about the resolution of addresses and sizes of the different areas and symbols compiled and linked.

57. ACCESS THE MSXVR DESKTOP

Yes, you read correctly, the MSXVR has a desk where you can organize your applications and games. To access this application we can either configure the boot (see page 22) or from VR-DOS writing the following command:

```
C: />system
```

In general, the "system" statement is used to raise levels of interface simplicity within the system. For example, if we are in VR-BASIC to return to VR-DOS we will do:

```
call SYSTEM
```

And from VR-DOS to upload to another simpler interface we will use "system" again as we have seen previously.

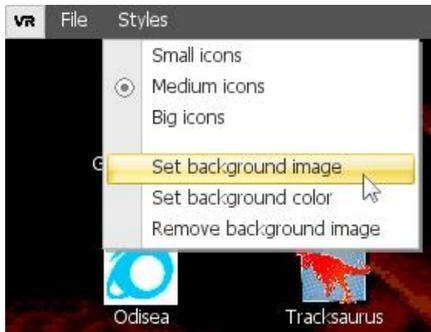


From the desktop we can create links to applications that we have installed in the system.

We can create new, edit and delete them.



We can also assign wallpaper, either with a simple color or through an image that we have accessible in our units.



58. THE VR-VIEW

VR-VIEW is the graphical desktop and window based environment used by all system applications and tools. This environment uses the VR-SCRIPT as a way to interact, so, in essence, everything that we are going to build natively within the system, can be developed using this programming language.

Applications in the MSXVR can be created in both window mode and full screen mode. All applications have a context menu and are associated with a window.

From the window descriptor, we will be able to create child windows (MDI) and controls such as buttons, labels, text boxes, lists, images and many other types that allow us a comfortable and easy design to interact with users.

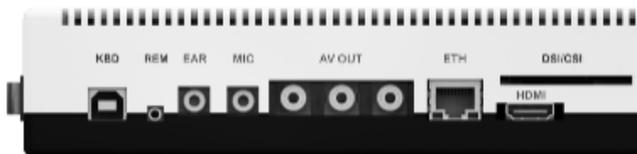
An example:

```
1  class Example implements View_Program
2  {
3      virtual Start()
4      {
5          _wnd = CreateWindow();
6          _menu = _wnd.CreateMenu();
7          _section = _menu.AddSection("File");
8          _section.AddItem("Exit", this, "OnClose");
9          _wnd.SetTitle("My Window");
10         _mdi = _wnd.CreateMDIFrame(100, 100, 200, 200);
11         _mdi.SetTitle("My MDI");
12         _button = _mdi.CreateButton(10, 10, 100, -1);
13         _button.SetText("Hello World!");
14     }
15
16     function OnClose()
17     {
18         End(0);
19     }
20 }
```

59. CONNECT THE MSXVR AS USB KEYBOARD

It is possible to connect the MSXVR as a standard USB keyboard and use it on a PC, MAC or LINUX.

For this we will use the USB Type-B Male port that has on the back:



Using such a cable:



We connect one side of the cable to the MSXVR and the other to a USB port on the computer where we want to use the keyboard.

i It is important that the MSXVR is turned off, since the port only works in this case. When the MSXVR is on, the KBD port is disabled and the keyboard operates only for the MSXVR.

Once connected to the host computer, the USB will be detected and can be used as a keyboard.

*** SYSTEM SHORCUTS**

CTRL + ALT + B	Open VR-BASIC console
CTRL + ALT + D	Open VR-DOS console
CTRL + ALT + E	Open File Explorer
CTRL + ALT + RIGHT	Change to next process
CTRL + ALT + M	Open application menu
CTRL + ALT + F	Show FPS
CTRL + ALT + ESC	Enter safe mode

*** VR-DOS SHORTCUTS**

CTRL + M or MENU	Show/Hide menu
CTRL + RIGHT	Change to the next process in progress
CTRL + D	Open a new VR-DOS console
CTRL + C	Interrupt execution
CTRL + Z	Interrupt data entry
CTRL + K	Go to the beginning of the line
CTRL + R	Insert
CTRL + H	Backspace
CTRL + I	Tabulate
CTRL + 8	Swap video setting
UP / DOWN	Move between the last commands entered
CTRL + UP / DOWN	Move up/down scroll
CTRL + HOME	Go to the beginning of the scroll
CTRL + END	Go to the end of the scroll
CTRL + PAGEUP/PAGEDOWN	Move up/down scroll page

*** KEYBOARD SHORCUTS FROM VR-BASIC**

CTRL + C	Stop execution CTRL BREAK
CTRL + V	Paste from the clipboard
F11	Reduce execution speed
F12	Increase execution speed
CTRL + F12	Exchange Maximum execution speed and normal speed.
CTRL + D	Start debugger
CTRL + Q	Close BASIC and return to DOS

*** SHORTCUTS FROM THE VIRTUAL MACHINE PLAYER**

CTRL + ALT + C	Open CPU debugger
CTRL + ALT + V	Open VDP debugger
CTRL + ALT + Q	Close app
CTRL + ALT + O	Next video device
CTRL + ALT + 9	Previous video device
CTRL + ALT + 7	Next video alignment mode
CTRL + ALT + 6	Show all video devices
CTRL + ALT + PRINT	Take a screenshot
CTRL + ALT + R	Machine reset
CTRL + ALT + 1	Change Hertz
CTRL + ALT + F10	Show/Hide audio device panel
CTRL + ALT + F11	Show/ Hide cassette panel
CTRL + ALT + F12	Show/Hide execution speed

★ PROBLEM RESOLUTION

I TURN ON THE COMPUTER BUT NOTHING APPEARS ON THE SCREEN

- **Is the power LED on?**
 - If it is not, make sure the power supply is properly connected.
 - Also make sure that you have pressed the Power button and that the Power Switch is in the on position (see page 17)
- **Is there an SD with an official image inserted in the slot?**
 - If this is not the case, insert an SD with an official recorded image.
 - If there is an SD, it may be corrupt. Try formatting and recording another image on it. We recommend you to use another SD or verify its status using it in another computer or reading medium.
- **Did you previously set the TV output and have an HDMI on?**
 - To be sure that the computer has booted up and is functioning properly, press the key combination: CTRL + ALT + ESC to enter safe mode.

★ TECHNICAL SERVICE

Next we will tell you how you can offer us information about a problem or how to collaborate with the collection of data to improve the operation of the system.

BUGS OR PROBLEMS

Any problem you might have, you can report it through an Internet connection using the VR-DOS command:

```
c: />report
```

NEW CARTRIDGES

If you have an original cartridge, which the database has not detected. To verify this use the command:

```
c: />gr /D
```

If you do not get information about the title, it is an “unknown” cartridge, so you can help us catalog it in the database by using the report. The report will send the data that you indicate about the cartridge information, the type of mapper ³you use and the SHA1 ⁴mark of the same. The option to send us a dump is optional, private and, as appropriate, can help us solve problems.

 For any other problem or if you need to comment on any incident, you can use email: support@msxvr.com

³ Refers to the mapper used by the cartridge to manage access to ROM and / or internal functionality.

⁴ Secure Hash Algorithm. It is a fingerprint that uniquely identifies the ROMs of the cartridges.