MD DUMPER

USB Reader-Flasher Megadrive
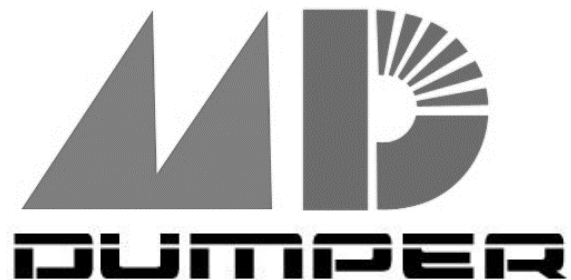
Table of Contents

Product Feature

- Read Sega Megadrive cartridge up to 128 Meg

- Support Bankswitch for ROM & Saves

- Manage / Backup / Restore your own saves

- Reflash Third-Party Cartridges

-Read Master System / Mark III Games

-Support official Sega Mapper (SSF2 / Lock-ON / VR)

-Support Third-Party / Homebrew Mapper

-Realtime Debug Sega Megadrive <> PC (DMC)

-Universal Serial Bus USB-C Power & Use

-Multi OS compatibility Windows/Linux/Mac

-Open Source Software

-Open Source Pyhton GUI

Installation

Microsoft Windows :

-Download Lastest release for Windows in the Github and extract it in a new or any folder

-Plug the USB Cable

-Wait for Windows automatic hardware installation

-Launch USB View (in the tools folder)

if everything is ok you should see USB2 Sega Dumper and it's informations

if you see a yellow warning that's mean no driver is currently attached to Sega Dumper so you must use Zadig to force WinUSB driver to Sega Dumper.

https://zadig.akeo.ie/
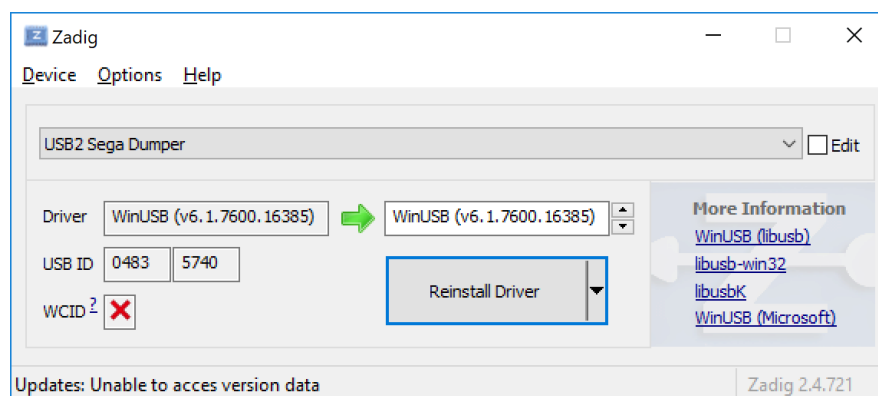
-After first installation process just do a simple reset by pressing reset button on the board.

-You can launch & use MD Dumper
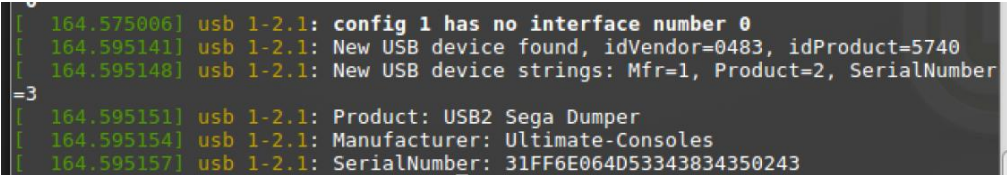
GNU Linux :

-Download Lastest release for Linux in the [Github](#) and extract it in a new or any folder

-Plug the USB Cable

-You could open a terminal and enter dmesg command for checking installation

if everything is ok you must see these lines

```
[  164.575006] usb 1-2.1: config 1 has no interface number 0
[  164.595141] usb 1-2.1: New USB device found, idVendor=0483, idProduct=5740
[  164.595148] usb 1-2.1: New USB device strings: Mfr=1, Product=2, SerialNumber
=3
[  164.595151] usb 1-2.1: Product: USB2 Sega Dumper
[  164.595154] usb 1-2.1: Manufacturer: Ultimate-Consoles
[  164.595157] usb 1-2.1: SerialNumber: 31FF6E064D53343834350243
```

-Enter sudo ./Sega_Dumper for Launch & Use.

MAC OS X :

/* Todo */

How to Dump your games

Before dump your game cartridge be sure MD dumper is deconnected and both cartridge slot and game slot is clean.

You can clean it with isopropyl alcohol if needed.

Plug the USB-C to USB cable in the connector and on your PC.

The status led must be following this order :

-RED power led ON

-BLUE access led ON after 3 seconds

When blue led is ON you can insert your game cartridge.

If you put your game cartridge before power on MD dumper you can have some trouble with bus conflict , you can see that with access led blinking.
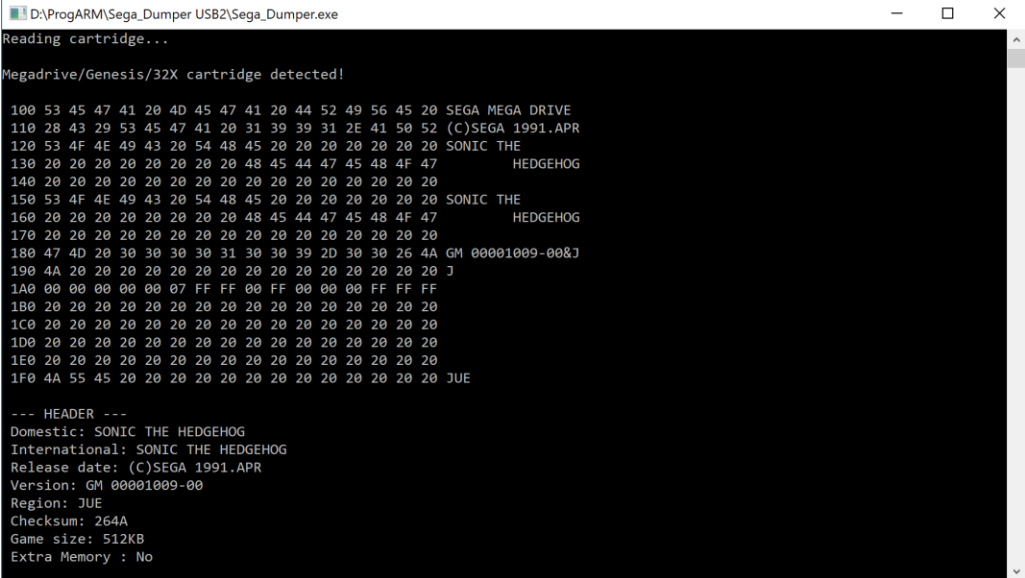
You can now start MD dumper software.

Both firmware and software version will be displayed at the top in the init hardware sequence.

```
--------------------------------
   Sega Dumper USB2 Software
--------------------------------
Init LibUSB...
LibUSB Init Sucessfully !
Detecting MD Dumper...

MD Dumper READY!
Hardware Firmware version : 2.0
Software Firmware version : 2.0
```

Games Meta-Informations

The software will start by checking Sega security code and displaying some cartridge informations stored in the beginning of the romchip.

```
D:\ProgARM\Sega_Dumper USB2\Sega_Dumper.exe                              —    □    ×
Reading cartridge...

Megadrive/Genesis/32X cartridge detected!

100 53 45 47 41 20 4D 45 47 41 20 44 52 49 56 45 20 SEGA MEGA DRIVE
110 28 43 29 53 45 47 41 20 31 39 39 31 2E 41 50 52 (C)SEGA 1991.APR
120 53 4F 4E 49 43 20 54 48 45 20 20 20 20 20 20 20 SONIC THE
130 20 20 20 20 20 20 20 20 20 48 45 44 47 45 48 4F 47          HEDGEHOG
140 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
150 53 4F 4E 49 43 20 54 48 45 20 20 20 20 20 20 20 SONIC THE
160 20 20 20 20 20 20 20 20 20 48 45 44 47 45 48 4F 47          HEDGEHOG
170 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
180 47 4D 20 30 30 30 30 31 30 30 39 2D 30 30 26 4A GM 00001009-00&J
190 4A 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 J
1A0 00 00 00 00 00 07 FF FF 00 FF 00 00 00 FF FF FF
1B0 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
1C0 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
1D0 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
1E0 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
1F0 4A 55 45 20 20 20 20 20 20 20 20 20 20 20 20 20 JUE

--- HEADER ---
Domestic: SONIC THE HEDGEHOG
International: SONIC THE HEDGEHOG
Release date: (C)SEGA 1991.APR
Version: GM 00001009-00
Region: JUE
Checksum: 264A
Game size: 512KB
Extra Memory : No
```

If you cartridge is dirty or damaged Sega security code may not be readed and an error message will be displayed.

The same error message is displayed for a formatted flash cartridge.

In the header parts you can read a summary of all the useful information.
The game and ram size are automatically registered in software so you can use these later for automatic dump mode.
if the game have no backup ram (like sonic 1) you will not see ram info

You can now use the first option of the menu for start a ROM Dump

If you want to read some unofffical games witch don't use correct information on Metadata you can use the manual dumping mode and specifiy the size of the output dumped file.

Dump (Automatic Mode)

C:\Windows\System32\cmd.exe

```
--- MENU ---
1) Dump MD ROM
2) Dump MD Save
3) Write MD Save
4) Erase MD Save
5) Write MD Flash
6) Erase MD Flash
7) Master System Mode
8) Flash Memory Detection
9) Debug Mode

Your choice:
1
1) Auto (from header)
2) Manual
 Your choice: 1
Sending command Dump ROM
Dumping please wait ...

Rom Size : 512 Ko
ROM dump in progress...

Dump ROM completed !

D:\ProgARM\Sega_Dumper USB2>
```

Automatic mode will directly dump the game.
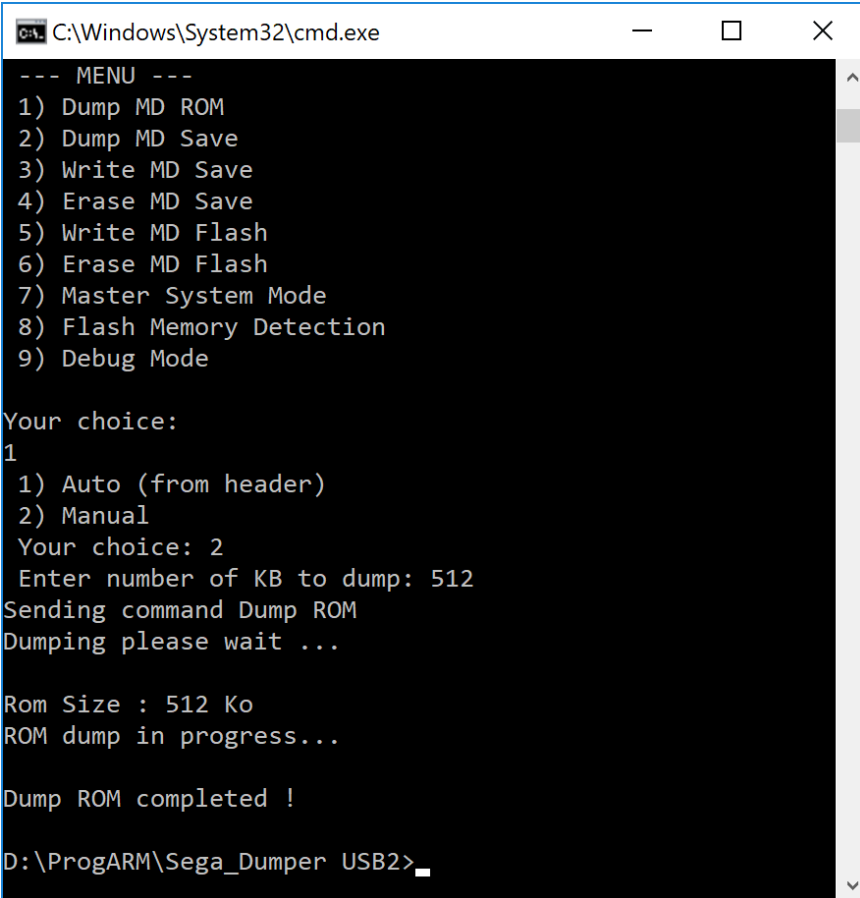The size of the output file is taken from game meta information.
After dump is completed a file called dump_smd.bin is created.
The created file is generated in an emulator friendly format (Endianness is reversed)
You can directly launch it in your emulator.

You must reset the board by pressing the push button(reset button) near USB
connector for doing another dump (or unplug – plug the USB)

Dump (Manual Mode)

```
C:\Windows\System32\cmd.exe                              —    □    ×

--- MENU ---
1) Dump MD ROM
2) Dump MD Save
3) Write MD Save
4) Erase MD Save
5) Write MD Flash
6) Erase MD Flash
7) Master System Mode
8) Flash Memory Detection
9) Debug Mode

Your choice:
1
 1) Auto (from header)
 2) Manual
 Your choice: 2
 Enter number of KB to dump: 512
Sending command Dump ROM
Dumping please wait ...

Rom Size : 512 Ko
ROM dump in progress...

Dump ROM completed !

D:\ProgARM\Sega_Dumper USB2>_
```

Manual mode will dump the game at the specified size.
If the game is smaller than specified size it will be mirrored.
If the game is bigger than specified size you will miss data.
After dump is completed a file called dump_smd.bin is created.

Every official game has correct Meta information so you should only use this mode for homebrew.

MD Dumper support Bankswitch mode so if the game size is more than 16 MEG and have backup ram it will be correctly dumped even in Automatic mode.

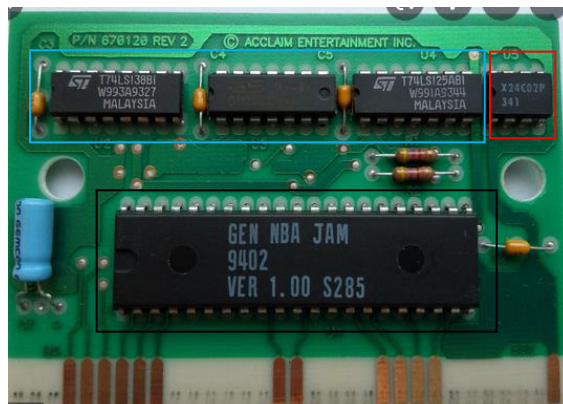# SaveManagement

Supported Save type SRAM / Serial EEPROM

Sega Megadrive cartridge use two different technologies for storing user data

1) Classic parallel 5V SRAM technology + CRC battery for power it when
    console is turned OFF
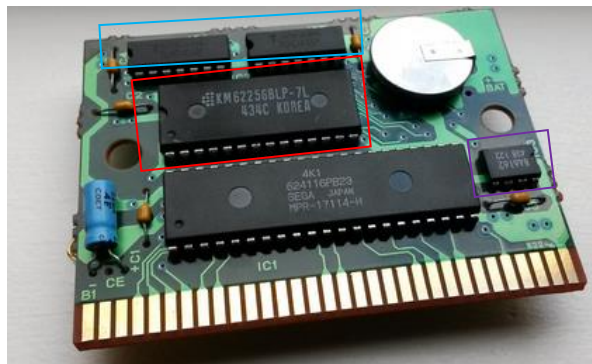
-   Logic chip for SRAM/ROM access
-   CRC Battery
-   SRAM chip (8k or 32k)
-   SRAM power regulator
-   ROM chip

2) Serial EEPROM I²C/Microwire/SPI

-   Logic chip for EEPROM/ROM
    access
-   EEPROM chip
-   ROM chip

Emulator Compatibility

The supported emulator is Genesis Plus GX .this emulator has accurate emulation and 100% compatibility even for unofficial games.

You could use your favorite emulator for launch dumped games but the save format used by MD dumper is same as Genesis Plus GX format (raw 16 bits).

You can start a game in your console , dump the save with MD Dumper and continue your adventure in emulator or reflash your progress in the cartrigde.

Some games use serial EEPROM as backup ram.
You can find a list here :
https://krikzz.com/pub/support/everdrive-md/v2/gen_eeprom.pdf

Reading backup ram for these games has not currently supported.
Maybe in a future software upgrade :)

MD Dumper support Bankswitch mode for save too.
Bankswitch ram games will be correctly dumped without modification.

Backup a save from Cartridge to PC

 Insert your cartridge on the edge slot the stickers must be on the front of the PCB.

Start MD Dumper , you will see some save information extracted from header.

Choose the second menu option : Dump MD Save
like the dump rom option you have multiple dumping mode:

Header information of every official games is correct so you could use automatic mode.
Other mode is for manual mode for specific extra ram size on homebrew PCB.
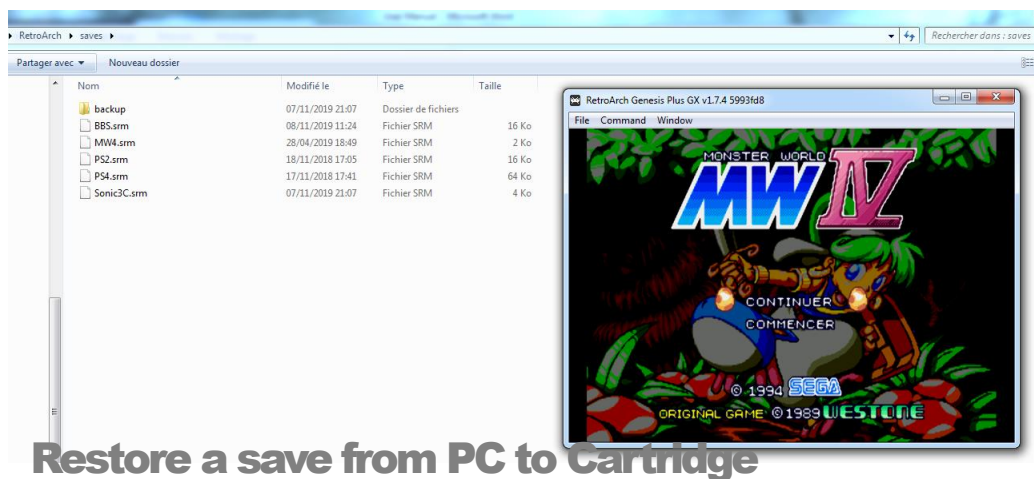Two files is created :

-dump_smd.srm is the save data in Genesis Plus GX compatible format
-raw.srm is an exact dump of the ram chip with no modification.

you just need to copy the dump_smd.srm in the save data of Genesis Plus GX and rename it with the same name of your dumped game.
Forexemple :
MW4.bin for Monster World IV and MW4.srm for save.

Restore a save from PC to Cartridge

Restore or send a save from PC to cartridge is easily as the previous step.

You just need to copy your save file intoMD Dumper folder.

Start MD dumper and choose third option : Write MD Save

write the name of the file with the extension.

for my exemple MW4.srm

ram chip on the cartridge will be fully erased before flash.

```
--- MENU ---
1) Dump MD ROM
2) Dump MD Save
3) Write MD Save
4) Erase MD Save
5) Write MD Flash
6) Erase MD Flash
7) Master System Mode
8) Flash Memory Detection
9) Debug Mode

Your choice:
3
 ALL DATAS WILL BE ERASED BEFORE ANY WRITE!
 Save file: MW4.srm
SRAM Sucessfully Erased ...
SRAM Sucessfully Writted ...
```

When this step is over you can remove USB cable and plug the cartridge in your console to continue your progress.

Flashing an home-made cartridge

Flash Memory Detection

MD-Dumper support Write Mode for home-made flash based cartridge.

It use the /LWR signal (pin B28 of the cartridge slot) as /WE signal of flash memory.

First things you could do is try to detect the Manufacturer ID and Chip ID.

Result with M29W640D flash in the Krizz Flash Kit cartridge :

```
Your choice:
8
-= Flash Memory Detection -=

Flash data at address 0 : 0x00
Flash data at address 1 : 0x00

1) Try to detect Microchip / SST flash memory : Flash ID : 20ED

No compatible Flash detected

2) Try to detect STMicroelectronics flash memory : Flash ID : 20ED

Flash Memory detected !
Memory : M29W640D
Capacity : 64Mb
Voltage : 3.3V

3) Try to detect Macronix flash memory : Flash ID : 20ED

No compatible Flash detected

E:\ProgARM\Megadrive_USB2>
```

Flash Memory Erase

Choose option 6 for perform a manually full flash chip Erase.

End of erase will be automatically detected by toggling chip pin.

Time for a complete Erase depends of flash technology (average is less than one minute)

On board Led will be turned "On" when Erase is finished.

MD dumper will check if memory is empty before init a write sequence.

```
--- MENU ---
1) Dump MD ROM
2) Dump MD Save
3) Write MD Save
4) Erase MD Save
5) Write MD Flash
6) Erase MD Flash
7) Master System Mode
8) Flash Memory Detection
9) Debug Mode

Your choice:
6
 ERASE SMD flash in progress: 100%
E:\ProgARM\Megadrive_USB2>
```

If you dump the flash after an erase you will see only 0xFF bytes/word

Offset	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
00000000	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
00000010	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
00000020	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
00000030	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
00000040	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
00000050	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
00000060	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
00000070	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
00000080	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
00000090	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
000000A0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
000000B0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
000000C0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
000000D0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
000000E0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
000000F0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ

dump_smd.bin

Flash Memory Write

For sending your game/homebrew copy your file in the same folder of Md dumper

Select option 5 " Write MD Flash " and enter complete name with extension :

```
--- MENU ---
1) Dump MD ROM
2) Dump MD Save
3) Write MD Save
4) Erase MD Save
5) Write MD Flash
6) Erase MD Flash
7) Master System Mode
8) Flash Memory Detection
9) DMC : Direct Megadrive Connection
0) Debug Mode

Your choice:
5
 Launch Flash Write command :
Detecting Flash Memory ID...
Flash ID : 20ED
STMicroelectronics Flash use algo number 2
Detect if Flash is empty...
Flash Memory is not empty
Erasing flash with algo 2
ERASE SMD flash in progress: 100%
Flash Erased sucessfully
 Please enter rom file name
  ROM file: Sonic2.md
Writing flash with algo 2
 SMD flash completedprogress: 100%

E:\ProgARM\Megadrive_USB2>
```

1) MD dumper will check if memory is empty before init a write sequence.

2) MD Dumper will check his memory table and select correct flash algo

Speed progress depend of the game size and flash type but average speed is 100 Ko/s.

Master System Compatibility

MD Dumper is also compatible with your Master System / Mark III cartridge.

You can use the Tototek or any compatible Adaptater/Converter.

Just plug the adapter + SMS cartridge and launch MD Dumper you cartridge will be detected directly :

Select option 7 " Master System Mode " and press enter.

After dump is completed a file called dump_sms.sms is created.

Firmware Upgrade

MD Dumper New hardware version is based on ARMSTM32F4 so have an embedded bootloader for easy firmware update.

Bootloader is : WeACT HID Bootloader

For starting board in update mode you just need to press Keybutton for 2 seconds and press Reset.

Wait 2 seconds, release both button and MD Dumper should start in bootloader mode.

In bootloader mode you can see the LED blinking in progressive mode.

You also can see the USB bootloader mode with Usbview tools
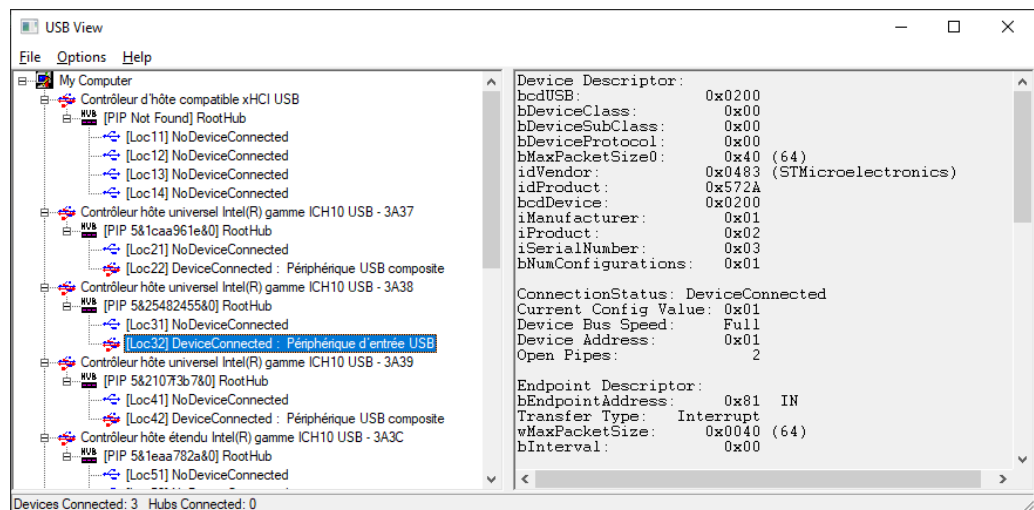
Now you can make a folder with all the file of the Lastest release version in the

MD Dumper Github Firmware Release

-Sega_Dumper.bin is the ARM compiled code for the STM32

-WeACT_HID_Flash-CLI is bootloader tools for flashing binary

-usbview can help you to view all USB connection of your PC and attached peripherals

-flash.bat is the automatic script for flash binary (call HID flash with Sega_Dumper.bin)

You just need to run cmd script flash.bat :

STM32F4 MD-Dumper code is now successfully updated.

Extra Hardware

Sega LOCK-ON
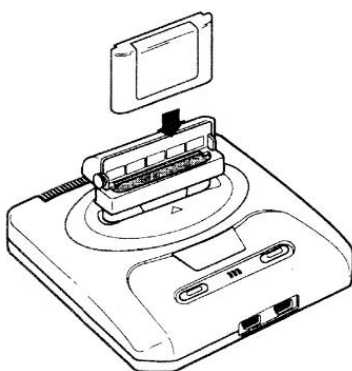

```
--- HEADER ---
Domestic: SONIC & KNUCKLES
International: SONIC & KNUCKLES
Release date: (C)SEGA 1994.JUN
Version: GM MK-1563 -00
Region: JUE
Checksum: DFB3
Game size: 2048KB
Extra Memory : No
Extra Hardware : Sega Lock-ON
```

MD dumper new hardware revision support Sonic & Knuckles SEGA LOCK-ON technology.

Now you can :

-dump Sonic & Knuckles (Sonic & Knuckles cartridge only)

-dump Blue Sphere (Sonic & Knuckles + Sonic 1 or Tanglewood)

-dump Sonic 2 & Knuckles (Sonic & Knuckles + Sonic 2 cartridge)

-dump Sonic 3 & Knuckles (Sonic & Knuckles + Sonic 3 cartridge)

Just select option 1 DUMP ROM and both cartridge UP and LOW should be detected.

If not be sure to clean it properly.

When dump is completed a file will be created in the same folder of Sega Dumper.exe

Possible result is :
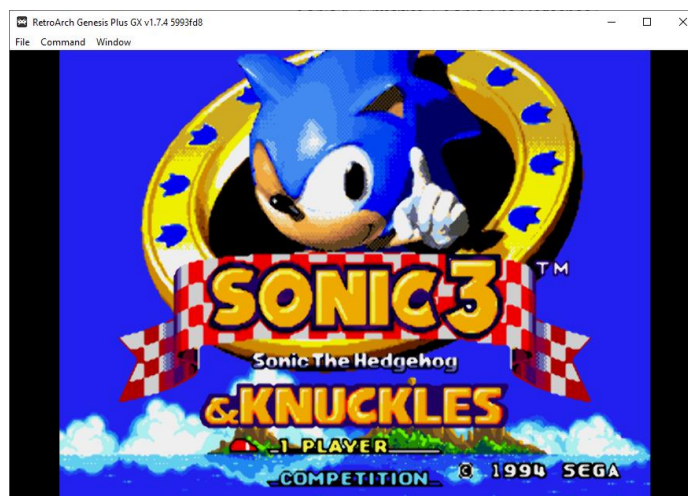
Sonic & Knuckles + Sonic The Hedgehog.bin

Sonic & Knuckles + Sonic The Hedgehog2.bin
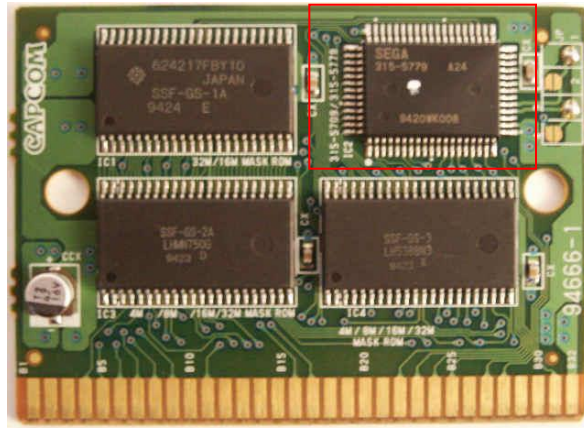
Sonic & Knuckles + Sonic The Hedgehog3.bin

Be sure to use a compatible emulator for running these game not all emulator support LOCK-ON for storing save.

Note : In the current release (V2.1) dump save in LOCK-ON mode is not supported yet.

Sega 315-5779 (Super Street Fighter 2)

Sega 315-5779 is the special Sega chip in the game Super Street Fighter 2.

This game use it for store ROM up to 40 Meg.

You can see correct Extra Hardware detection in ROM information:

```
--- HEADER ---
Domestic: SUPER STREET FIGHTER2 The New Challengers
International: SUPER STREET FIGHTER2 The New Challengers
Release date: (C)T-12 1994.JUN
Version: GM MK-12056-00
Region: E
Checksum: E41D
Game size: 4096KB
Extra Memory : No
Extra Hardware : Sega 315-5779 Mapper Super Street Fighter 2
```

Header of the game specify a 32Meg cartridge but result is the full 40 Meg data.

Just selection option 1 DUMP ROM and dump will start in SSF2 classic mode

```
Your choice:
1
Extra Hardware detected dump in mode : SSF2 Classic
Rom Size : 5120 Ko
Bankswith bank 1-7 to $080000 - $3FFFFF
Dumping please wait ...
ROM dump in progress...
Bankswith bank 8-9 to $300000-$3FFFFF
Dumping please wait ...

Dump ROM completed !
```

You can find a 40 Meg / 5120 Ko dump_smd.bin ROM Dump

SSF2 Extended

/* To Do*/

Some Homebrew use same bankswitch code as SSF2 for make bigger ROM.

Exemple : Titan Overdrive 2 and Sonic 2 Delta….

MD dumper support this feature, you just need to have SEGA SSF at 0x100 in your rom Header.

```
00000100  53 45 47 41 20 53 53 46  20 20 20 20 20 20 20 20  SEGA SSF
00000110  28 43 29 54 49 54 41 4E  32 30 31 37 2E 41 50 52  (C)TITAN2017.APR
00000120  4F 56 45 52 44 52 49 56  45 20 32 20 20 20 20 20  OVERDRIVE 2
00000130  20 20 20 20 20 20 20 20  20 20 20 20 20 20 20 20
```

SSF2 Full

SSF2 Full is the Sega 315-5779 used at full capacity : 512 Meg ROM + SRAM.

At this time only Demon Of Asterborg use that.

For use MD Dumper in this mode be sure to have SEGA DOA at 0x100

```
00000100  53 45 47 41 20 44 4F 41  20 20 20 20 20 20 20 20  SEGA DOA
00000110  4E 45 4F 46 49 44 20 53  54 55 44 49 4F 53 20 20  NEOFID STUDIOS
00000120  44 45 4D 4F 4E 53 20 4F  46 20 41 53 54 45 42 4F  DEMONS OF ASTEBO
00000130  52 47 20 20 20 20 20 20  20 20 20 20 20 20 20 20  RG
```

Virtua Racing

/* To Do*/

Watermelon Mapper

/* To Do*/

DMC : Direct Megadrive Connection

/* To Do*/

Release Notes

-13/03/2022 : Add DMC support + Acclaim EEPROM

-18/02/2022 : Second Hardware version release (ARM STM32F4)

-01/06/2021 : Electronic component shortages -_-'

-29/12/2019 : First Public Release (ARM STM32F1)