

# Orix/Twilighte Manual



v2021.1

(rev 24/02/2021)

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## **INTRODUCTION**

## General informations

This documentation must be used when you are with the orix version 2021.1. Or if you want to upgrade the 2020.4 version.

On <http://orix.oric.org>, you will have some link to video which will show how to use some functionality.

The board has a firmware version. This firmware can be upgraded see « Hardware and firmware upgrade » section.

The board can be upgraded too but you have to send it to upgrade the board see « Hardware and firmware upgrade » section » too.

The card has a 512KB of eeprom, and 512KB of RAM. This RAM is saved with a battery. For instance, only bank 4, 3, 2 and 1 can be switched to see others sets. It's a software limit. In the future, you will be able to displays all bank and starts any binary from theses banks. If you wants to change the set, you can use twil command. This command can switch to eeprom bank or ram bank and can switch to any set.

Some extra devices (TOM2, logitech joypad) are explained a bit in this manual, but it's not adverts, we don't ear anything:) It explains some ways to use joystick, others hardware exists in the same way)

## Features

- .tap file fast loading (with multitap files)
  - Joysticks support for a lot of games on atmos mode
  - the hobbit, defence-force (and others games) works without any patch for loading
- in system : kernel update, roms and ram update (with [orixcfg](#) binary)
- 2 DB9 Joysticks (atari)
- 512KB of EEPROM (banking mode)
- 512KB of RAM (banking mode)
- read from sdcard or usb drive (mass storage)
- ram saved with a battery
- drag and drop from the PC to the oric : It will be available on the oric (with WIFI connexion) : It requires extra hardware with a raspberry pi zero
- fast loading : 46KB per second. A game require less than one second to load and start
- cumulus compatible with the help of an other amplibus board (not provided)

## **GETTING STARTED**

## Content

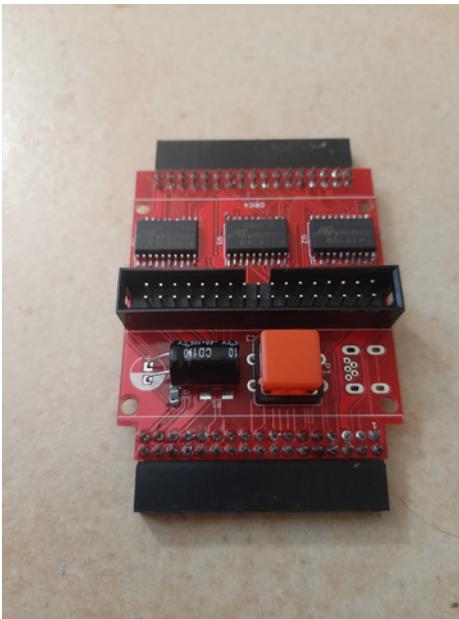


Figure 1 : Expansion board and  
reset button



Figure 2: Twilighte board

## Physicals ports



Figure 1: 2 joysticks port : left port and right port,  
1 usb port



Figure 2: sdcard port

## Hardware limits

The usb controller manage FAT32 only. Sdcard and usb key must be formatted with FAT32 filesystem. If you want to use pi zero gadget trick, you need to do a mkfs to FAT32 file system.

All tests had been done with samsung evo sdcard and sandisk usb key. A lot of sdcard works, and we did not see incompatibility with sdcard.

Sdcard controller and usb key controller can work with 32GB storage Max. But it can handle 64 GB sdcard (tested). It can handle larger sdcard/usb key reader, but only 32 and 64 GB devices was used.

## Software limits

The sdcard/usb controller can handle long filename, but Orix handles 8+3 filename only.

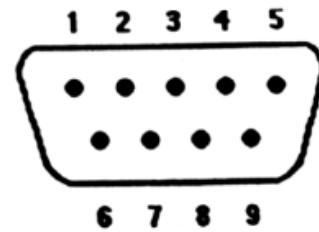
## Information about joysticks part

The left port has only 1 button. The right port has 3 buttons. The joystick pinout is atari pinout. You can use standard DB9 joystick. You can also plug « TOM2 » hardware (not provided), it can connect a usb mouse or usb joypad (wireless) to these ports. For example, logitech joypad F710 (wireless) works with TOM2.

Please note that TOM2 can only handle 2 buttons. It means that the third button can't work with TOM2 connected.

## Prise Joystick

- |                       |                       |
|-----------------------|-----------------------|
| 1 . ↑                 | 6 . Souris bouton n°1 |
| 2 . ↓                 | 7 . + 5 V.            |
| 3 . ⇐                 | 8 . Masse             |
| 4 . ⇒                 | 9 . Souris bouton n°2 |
| 5 . Souris bouton n°3 |                       |



## First boot : Initialize the storage

When the card is sent, kernel is built with a default storage. In order to know which device is the default one, you can type « mount ». You can use only one device at the same time, but you can swap easily from command line.

If you see « sdcard », then sdcard will be read by default. You can change it, with a command : « twil -u », it will switch to usbdrive. If you want to have usb drive by default, you can program kernel with the tool « orixcfg ». See Orixcfg section.

Now, if you know which device you will use by default, you can install all software on it.

Plug the device on your PC (sdcard or usb key). If you have a pi zero w, you can do this with drag and drop solution from the PC.

Download sdcard.tgz from this : <http://repo.orix.oric.org/dists/official/tgz/6502/>

```
██████ ORIX v2021.1 ████████ CPU:6502
560 KB RAM/512 KB ROM - 2020-12-03 23:37
/#mount
rootfs on / type FAT32 /dev/sda1 sdcard
#
```

It contains all software for orix there is others which are not available in this archive.

Now, use 7zip on your PC (or tar/gzip under linux), and unzip all files from this sdcards.tgz. Put all these new files in your device root folder.

Now, you can insert the device (sdcard or usbkey – or pi zero) in the twilight board and play.

## Upgrade from v2020.4 to v2021.1

- Download <http://repo.orix.oric.org/dists/official/tgz/6502/sdcards.tgz>
- untar/gunzip sdcards.tgz (use 7zip under windows) on your device usb or sdcard : It could require some time to copy because there is a lot of small files (tap, hlp etc)
- you can start orix on real machine, and type :

```
/#cd usr  
/usr#cd share  
/usr/share#cd carts  
/usr/share/carts#cd 2021.1
```

If you want to use usb drive for default device :

```
/usr/share/carts/2021.1#orixcfg -r -s 4 kernelus.r64
```

If you want to use sdcard for default device :

```
/usr/share/carts/2021.1#orixcfg -r -s 4 kernelsd.r64
```

- press ‘y’, and **wait until Orix reboots**

(Don’t switch off the Oric at this step)

## First step : type a command

You can access to available command from many ways :

- From /bin folders, there is binary available on current device, ‘ls’ will show you available commands
- From banks : type « help -b5 » you will see available commands

**BANK**

## Usage

Bank command is command line tool to see which bank are loaded into EEPROM bank and RAM bank. Each bank has a « signature ». Bank allows to see theses banks.

Bank can also starts a ROM with his id. In that case, you don't need to have a rom « orix friendly » and you can start it from command line. In the current bank version, there is restriction to launch a command.

### List active bank

```
/#bank
```

### List all commands from a bank

```
/#help -b5
```

### Start a specific bank

It only works for instance only if NMI is \$c000 address in this ROM

```
/#bank 1
```

**SHELL**

## Flush the current command line

Ctrl+c

## Available commands

You can see available commands with this command :

```
/#help -b5
```

The command line is limited in characters. If you reach this limit, you won't be able to type the complete command line

## Known bugs

- 1) If you return to a line when your command line is bigger than 40 columns, if you try to del a chars at the previous line, you can't.
- 2) « ./ » can not be used to launch a binary

# **BASIC11**

## Load a personal .tap file

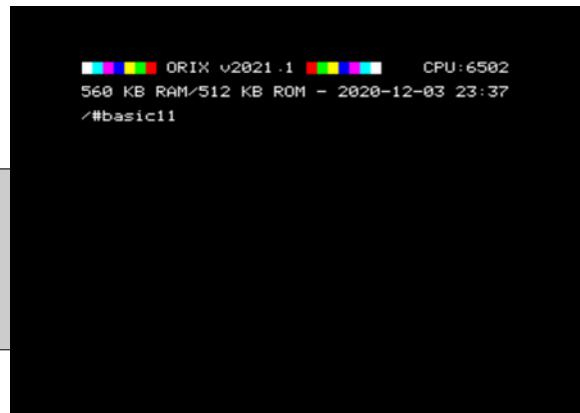
When you starts basic11 commands, the default path is « /home/basic11/ ». Each action on the basic11 mode will be done in this folder (cload/csave). If you cload a tape file, it must be in « /home/basic11 » folder.

You have downloaded a .tap file, and want to use it. Then, you can create a folder /home/basic11/

Under Orix

```
/#mkdir home  
/#cd home  
/home#mkdir basic11  
/home#cd basic11
```

Put you file in this folder from your PC, and start basic11 (you don't need to be in the «/home/basic11 » folder to start basic11 with no parameter. By default, basic11 starts in « /home/basic11/ »



## Oric.org tape file

When you downloaded sdcard.tgz and unzip it into sdcard or usbkey device, there is many tape file included in this archive. You don't need to move these type file, if you know the key, you can starts it from commands line. In this case, it will load the correct basic1.1 rom to start the tape file (see below), and the correct joystick configuration if it's correct.

## Oric.org tape file update

Each week a new software.tgz is generated. You can download it from « repo » and unzip it on the device. It will generate last tape file and last joysticks configuration.

## Search a tape file from command line

Basic11 has also many.tap files inserted in sdcard.tgz

Try to find the software with option -l

```
/# basic11 -l
```

If you find your software, you can do perform **ctrl+c**.

You can type space to do a pause.

On that case, you can launch the tape file like :

```
/# basic11 «KEYDISPLAYED
```

#basic11 -l		
key	NAME	
1815HACK	1815	
X6048	2048 BYTES ZOOMING CIRCLES DEM	
266CIRCL	512	
3D	FONGUS	
3DLUFAR	3D LUFFAR-SCHACK	
3DMAZ	3D MAZE/BREAKOUT	
3DWALK	3D MUNCH	
FREECELL	3K FREECELL	
4KGRIDS	4K GRIDS FOR CHILDREN	
4KKONG	4K KONG	
4KBBOX	4KBBOX	
4KFIRE	4KFIRE	
4KQIX	4KQIX	
6502ORIC	6502 MAN CMPI DEMO	
ACCOUANT	R 1M AIC ERRE MER>	
ACHERON	ACCOUNT BOOK	
ACROBATE	ACHERON'S RAGE / LA RAGE D'AC	
ADDBOOK	ACROBATES	
ADDSOUS	ADDRESS BOOK	

When KEYDISPLAYED is the key displayed in key column. Please note that the key must be in **UPPERCASE**

## Load a tap file from command line

Note that MYFILE must be in **UPPERCASE**

```
/# basic11 «MYFILE
```

If MYFILE is in the oric.org database, it will launch the software with the filename MYFILE.

If basic11 command does not find MYFILE in the oric.org database, it will try to load it from /home/basic11/ folder.

## Save your program

If you start « basic11 » with no options, basic rom will starts and each csave (or cload) actions will store files in « /home/basic11 » folder

## Start basic11 menu

If you type « basic11 -g » on command line, you will have a menu with all software which have a download link on oric.org (only atmos version and when a tape file is available).

```
/#basic11 -g
```

You can use left and right letters to change to a new letter. If the letter is empty, it means that there is no available tap file for this letter.

You can use up and down link to navigate into software. If you press enter, the software will starts.



Note that not all games are working yet. Some times, chars are corrupted. If the joysticks does not works, there is two case :

- the game does not call rom routine to manage keyboard
- keyboard mapping is not done yet

You can use arrows to navigate into the menu :

- up and down to select the software
- right and left to switch to the menu letters

Some letters are empty. It means that there is no software with tape file available on oric.org for this letter

## Quit basic11

If you want to quit basic11 from interpreter command line, you can type « QUIT ». This will force to reboot to Orix (you can also use reset button)

## How the .tap file starts

If you only type « basic11 », this will start bank 6 (normal basic rom). The default folder in that case is «/home/basic11 »

If you type « basic11 » with a tape file as an argument, there is 2 cases

1. The tape file (key) is already known in oric.org website, then basic11 try to find it in its databank file (/var/cache/basic11/ folder). If the key is found, it will start the tape file located in «/usr/share/basic11/... »
2. If the key is unknown, it will try to find it in «/home/basic11 »

If the tap file is in the oric.org db file, basic11 will load the software configuration from the db software file (as joystick configuration, and the id of the rom). Basic11 load the right rom into ram bank, override the default basic11 path to the tape file folder (« *usr/share/basic11/[firstletter software]* ).

It means that if you load this kind of software and you can quit the software, each file action in basic11 rom, will be performed in « *usr/share/basic11/[firstletter software]* . »

## Not working tapes (for instance)

- All Oric-1 games (but it can be fix with a new basic rom )
- Software which does not work (25), but the number can be reduced in the future release.

cobra	Cobra pinball	Damsel in distress
Le diamant de l'ile maudite	Durendal	HU*BERT
Hunchback	Schtrompfs	Stanley
Them	Titan	Visif
Xenon III	Dig Dog	Elektro Storm
Kilburn Encounter	Le tresor du pirate	L'aigle d'or
Le secret du tombeau	Volcanic demo	Clavidact
Compatible (micropuce)	Contre attaque	CW-Morse
DAO Cobra Soft		

## Tape with altered charset

Fire flash	Scuba Dive
------------	------------

## **Joysticks issues**

We did keyboard/joystick mapping for a lot of games, but we did not set the keyboard mapping for all software. If you want to help us, contact us.

Some game does not work because they handle their own keyboard routine. It could be handle with hardware tricks but, it's not done.

Some others games uses special keys (SHIFT, CTRL) for direction or the first button. Theses cases are not handle yet : but it could in the future.

## **Software update changelog**

You need to download software.tgz in the official repo for :

- Mr wimpy added to the archive (takes effect 20/01/2021)
- Airfox added to the archive (takes effect 20/01/2021)
- Atlantid added to the archive (takes effect 20/01/2021)
- Centrale nucléaire added to the archive (takes effect 20/01/2021)
- Cobra invaders added to the archive (takes effect 20/01/2021)
- Coctail Recipies added to the archive (takes effect 20/01/2021)
- Crusher added to the archive (takes effect 20/01/2021)
- Death Driver added to the archive (takes effect 20/01/2021)
- Challenge voile added to the archive (takes effect 20/01/2021)
- Breakout 1K added to the archive (takes effect 20/01/2021)
- DAO added to the archive (takes effect 20/01/2021)
- echecs asn
- dialogue

« added to the archive » means that you need to download softwares.tgz from the repo after the displayed date to get it in the archive

**BOOTFD**

## Introduction

bootfd is a tool to boot the boot sector when a drive is connected. Insert a disk and type :

```
/#bootfd
```

The binary is located to bin folder. It will load microdisc rom and start it. If the binary displays that it does not found microdis.rom, then place microdis.rom file in the right folder.

If you have firmware 1, you will be able to load « blake's 7 ». If you have firmware 2, all sedoric .dsk should start.

For instance, only Space99 does not work, it stops after intro.

**CKSUM**

## Usage

Cksum is a tool to compute a checksum of a file and displays its size.

```
/usr/share/basic11#ls
1
4
a
basicsd.rom basicsd0.rom basicsd1.rom
basicsd2.rom basicsd2.rom basicsd3.rom
basicus.rom basicus0.rom
basicus1.rom basicus1.rom basicus2.rom
basicus2.rom basicus3.rom
e
f
h
i
l
o
r
t
u
x
z

/usr/share/basic11#cksum basicsus2.rom
2153917165 16384 basicsus2.rom
/usr/share/basic11#■
```

DF

## Usage

It displays available blocks on current device

df let the usb controller in an unstable state at the end of the execution. That is why you should get an error message after. You just need to launch « ls » to correct this (it performs a reset to the usb/sdcard controller)

## **DSK-UTIL**

# Introduction

This tool is useful to extract files from dsk file. You can extract it, and uses command line tool to use it. For example, if you extract a basic program (.bas in FT DOS .dsk file), you can see it with « list » binary. If it's a .hrs/.hir file, you can read it with viewhrs file.

You can create a «/home/sedoric/ » folder and adds .dsk sedoric files in this folder

Some .dsk files are imported in sdcard.tgz. For sedoric, you can have a look to «/usr/share/sedoric/ » and for ft dos : « /usr/share/ftdos »

## List files from .dsk (sedoric)

```
/home/sedoric# dsk-util -s ls sed.dsk
```

## Extract a file from sedoric .dsk file

```
/home/sedoric# dsk-util -s e sed.dsk myfile.hrs
```

## Extract only .hrs files from sedoric .dsk file

```
/home/sedoric# dsk-util -s e sed.dsk *.hrs
```

**FORTH**

## Use forth

You can use forth language. It works the same ways than Tele forth (it's teleforth but it write file on sdcard/usbdrive).

You can download Teleforth langage in order to see how to program in forth.

When you type « forth » forth starts with the current folder directory.

If you were in /, forth will load and save file in this folder.

In others cases, you can create a forth folder in home and goes into it in forth for example :

```
/#mkdir home  
/#cd home  
/#mkdir forth  
/#forth
```

if you type « cd forth» in forth environnement, all files actions will be perform in « /home/forth »

## **HEXDUMP**

# Introduction

Can dump in hexadecimal and ascii the content of a file. Ctrl+c and space are working



The screenshot shows a terminal window for the ORIX v2021.1 software. The title bar indicates "ORIX v2021.1" and "CPU:6502". Below the title, it says "560 KB RAM/512 KB ROM - 2020-12-09 13:58". The command entered is "/#cd bin /bin#hexdump file". The output displays memory dump information from address 00000 to 00600. The left column shows memory addresses, the middle column shows the hex values, and the right column shows the ASCII representation. The ASCII output includes characters like 'ori', 'j', 'H', 'b', 'l', '3', 'w', '@', 'P', 'LB', and 'P'.

Address	Hex Value	ASCII
00000	01 00 6F 72 69 01 00 00	.ori...
00003	00 00 00 00 00 00 00 00	"....."
00100	A9 22 00 00 BA 9E 6A 92	'i...j'
00103	20 23 22 20 93 1B 20 4B	"...H
00200	15 29 63 15 D8 6D 2D 96	'b..j'
00203	A3 49 BD 6C 55 5D 5D 2D	'l..'
00300	18 F8 60 69 55 5D 5D 2D	@.3
00303	AC 19 60 69 55 5D 5D 2D	'w.
00400	A9 20 29 AC 19 60 69 55	'@.0'
00403	2D B2 19 29 AC 19 60 69	P.LB.0
00500	28 29 19 4C 42 00 60 55	
00503	0C B2 29 29 BC 19 A0 52	P...
00600	20 20 19 A9 BE A2 1D 20	

## **IOPORTS**

## **Introduction**

Displays I/O address of the board

LS

## **Introduction**

« ls » list all the file in the current folder. Token are supported (\*,?) ex : « ls ?e.tap » will list all files with a ‘e’ in the second letter

### **list all the files in the current folder**

```
/#ls
```

### **List all \*.tap files**

```
/#ls *.tap
```

### **List size and datetime of the file**

```
/#ls -l
```

**MONITOR**

## **Usage**

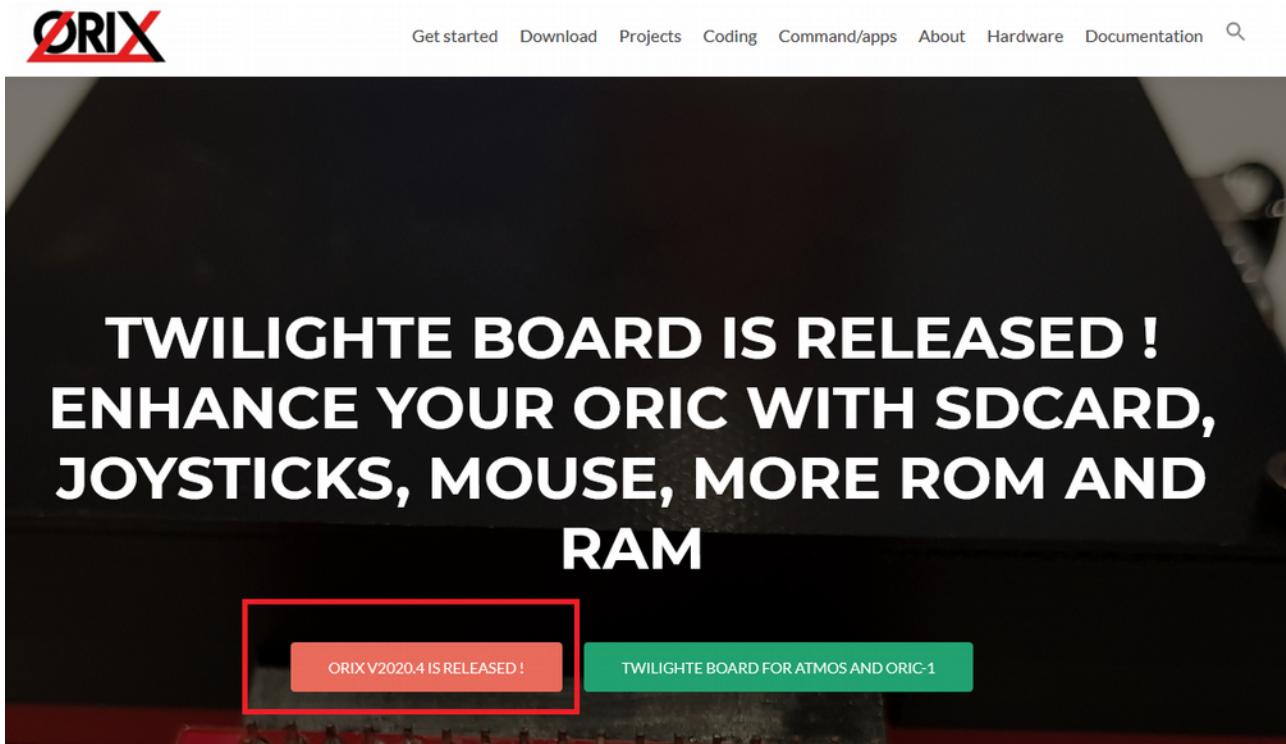
Monitor is a rom which can displays a monitor. It's teleass without assembler part.

**ORIXCFG**

## Update kernel, shell : orixcfg

When a new released is done, you can update the eeprom with the new kernel and new roms.

If you want to know if you need to update the kernel, you can compare your current version, and the last release version. You can go to <http://orix.oric.org> You need to have a look to this release below :



If on your Oric screen, it's not the same value, you can update it. The sequence of the Orix release is Year.X. There is 4 releases a year, and each one must be done until you reach the final one, in order to avoid some case. If your version is v2020.3 and the last available version is v2021.4. You need to update to v2020.4, then v2021.1, v2021.2, v2021.3, v2021.4.

It's maybe possible to jump to version v2021.4, but it's at your own risk because there is a « chance » that some kernel calls changed, and orixcfg could do wrong step.

## Update kernel, shell

When you need to update kernel, you can update it with orixcfg. You just need to define set 4 on the command line. This step is very **dangerous** if you don't load the right file. There is no verification and any file on the command line will be load in the kernel set. Usually, kernel set file is named kernxxxx.r64.

If you did something wrong on this step, you won't be able to start orix again. It means that you will need to remove eeprom from the card and program it with a eeprom programmer

This next command will load kernel.r64 to kernel set. Please wait until Orix reboots. If you have a kernel 2020.3 and you need to load a kernel 2021.1, you will need to load previous kernel set before the update of 2021.1.

.r64 extension means that it's a 64KB set. It's usually used to define that the file contains 4 roms of 16KB.

Please note that we provide 2 kernels version. One named « kernelsd.r64 » which means that the default device will be sdcard, and the other one « kernelus.r64 » which means that default device will be « usb » (usbkey). If you load the wrong kernel at this step, you can use twil command to switch to the right device, and you can start again kernel update with the right file (kernelsd.r64 or kernelus.r64 depending of your configuration).

```
/#orixcfg -r -s 4 kernelsd.r64
```

## Load a ROM into a ram slot

Space between values and switches are not optionnal, orixcfg needs theses spaces

```
/#orixcfg -w -s 0 -b 4 myrom.rom
```

This command will load myrom.rom (in the current path), in RAM bank 4 in set 0

## Load a set of ROM into ROM slot

```
/#orixcfg -r -s 0 myrom.r64
```

This command will load myrom.r64 (in the current path), in set 0. For instance, you can not load one bank, you need to load 64KB set.

## Clear bank ram or initialize it

Ram bank are not initialized when the board is tested. If you have garbage on screen when you uses bank (after you used twil -w). You have to clear all ram bank (ram bank are battery saved).

If you want to clear bank 4 of the set 0, you can do this command. You need to do this command for each bank of each set. For instance, there is no switch to clear all the ram with one command.

```
/#orixcfg -w -s 0 -b 4 -c
```

**PWD**

## **Introduction**

Displays current PWD

**SHA1**

## **Usage**

Sha1 is a tool to displays a string into sha1 encoding

**STORMLORD**

## **Introduction**

Stormlord is Stormlord game port to Orix. You can use joysticks to plays to this game.

Only one joystick port is working on this version

**TWIL**

## **Introduction**

Twil command can displays the current firmware of twilighte card, and can swap root folder to usbkey or sdcard.

Twil command can also swap bank 4, 3, 2 and to eeprom set or ram set.

## **Displays Twilighte board firmware**

```
/#twil -f
```

## **Swap to sdcard for root file system**

```
/#twil -d
```

## **Swap to usb key for root file system**

```
/#twil -u
```

## **Switch to ram set**

```
/#twil -w
```

## **Return to eeprom set**

```
/#twil -r
```

## **Switch to another bank set**

if you are in ram set, it will display bank 4, 3, 2 and 1. When you start Orix, the default set is 0. There is 7 sets. If you are in eeprom set and set 4, you will see again kernel, shell etc in bank 3 and 1

```
/#twil -s1
```

## **PI ZERO CONNECTION FOR DRAG AND DROP**

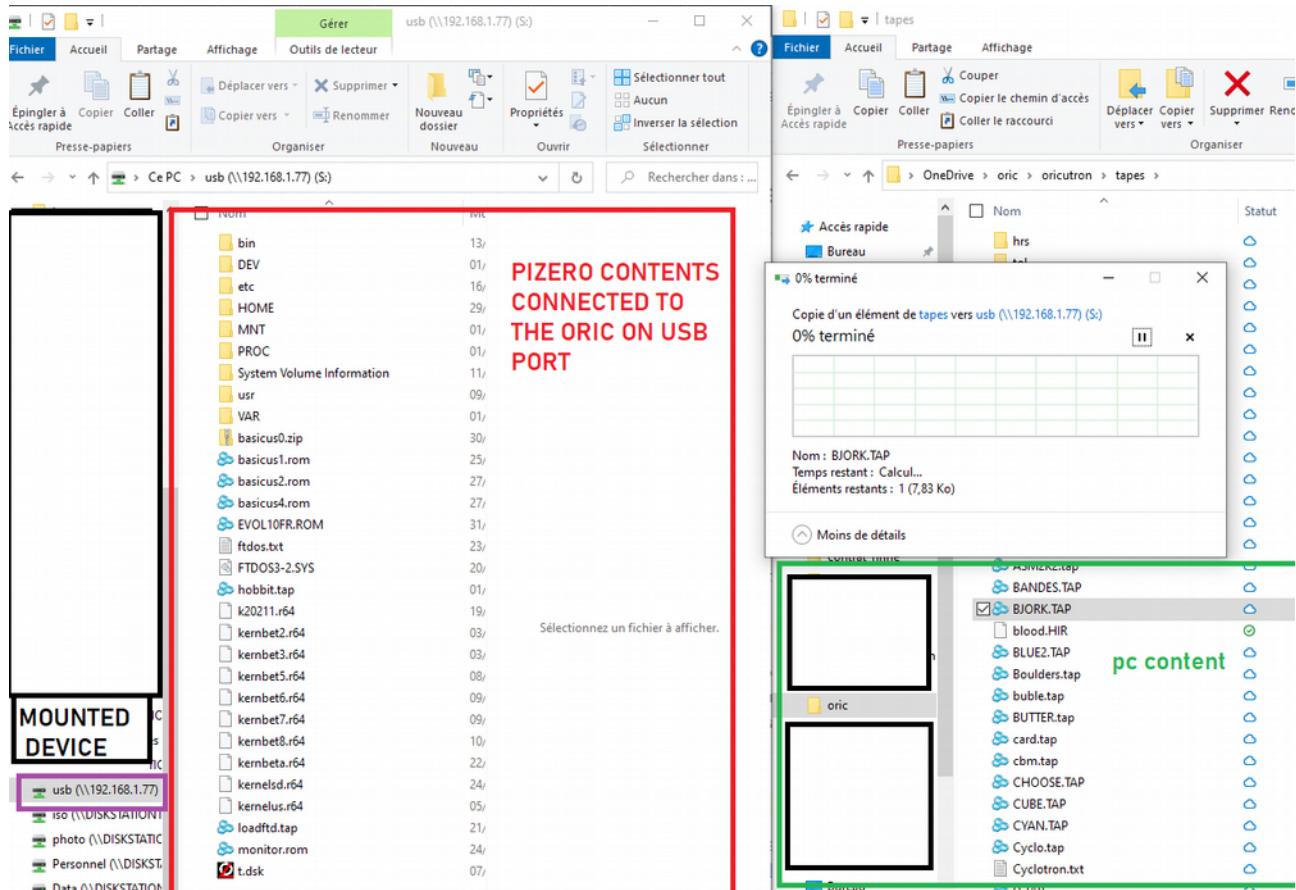
# Drag and drop or file copy to the pi zero

If you have a pi zero, you can use it to simulate a usb key with wifi connectivity for drag and drop.

You need to follow this documentation : <http://orix.oric.org/drag-and-drop-files-from-pc-to-the-card/>

Please note that you must connect pi to usb twilighte port on his usb port (not the psu port). Also note that pi consumes power and if you use a psu lower than 2 A, you should have some hardware errors

Some usb cable are only for charge, it means that it won't work with the card and pi zero, because it missed data wires



## **CUMULUS COMPATIBILITY**

## How to connect a cumulus

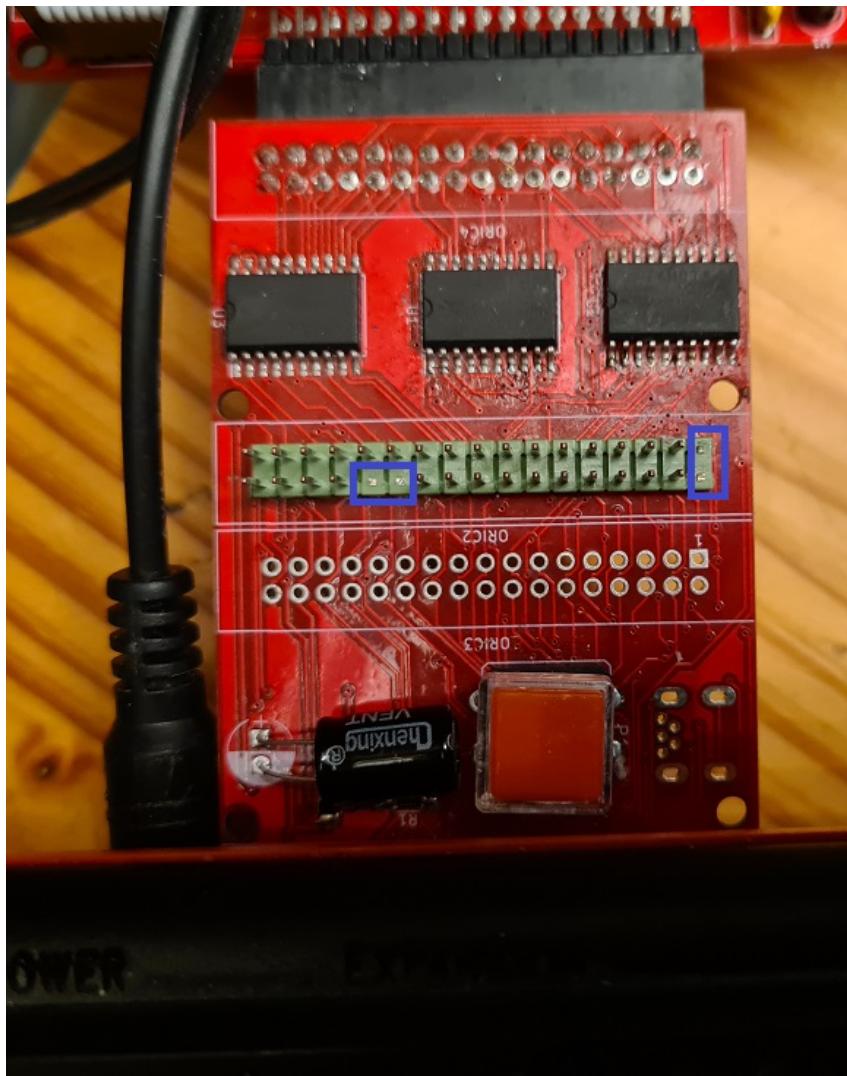
On the current firmware (Firmware 1) : and current hardware (board version v0.65), we have to do some hacks to have cumulus working. But, you will only launch two diskfile. Anyway, you can access to drive with no restriction, except bank switching. See « Hardware and firmware upgrade », if you want to avoid theses modifications

In firmware 1, and with board modification, there is only two working disk : Blake's 7 and VIP2015.

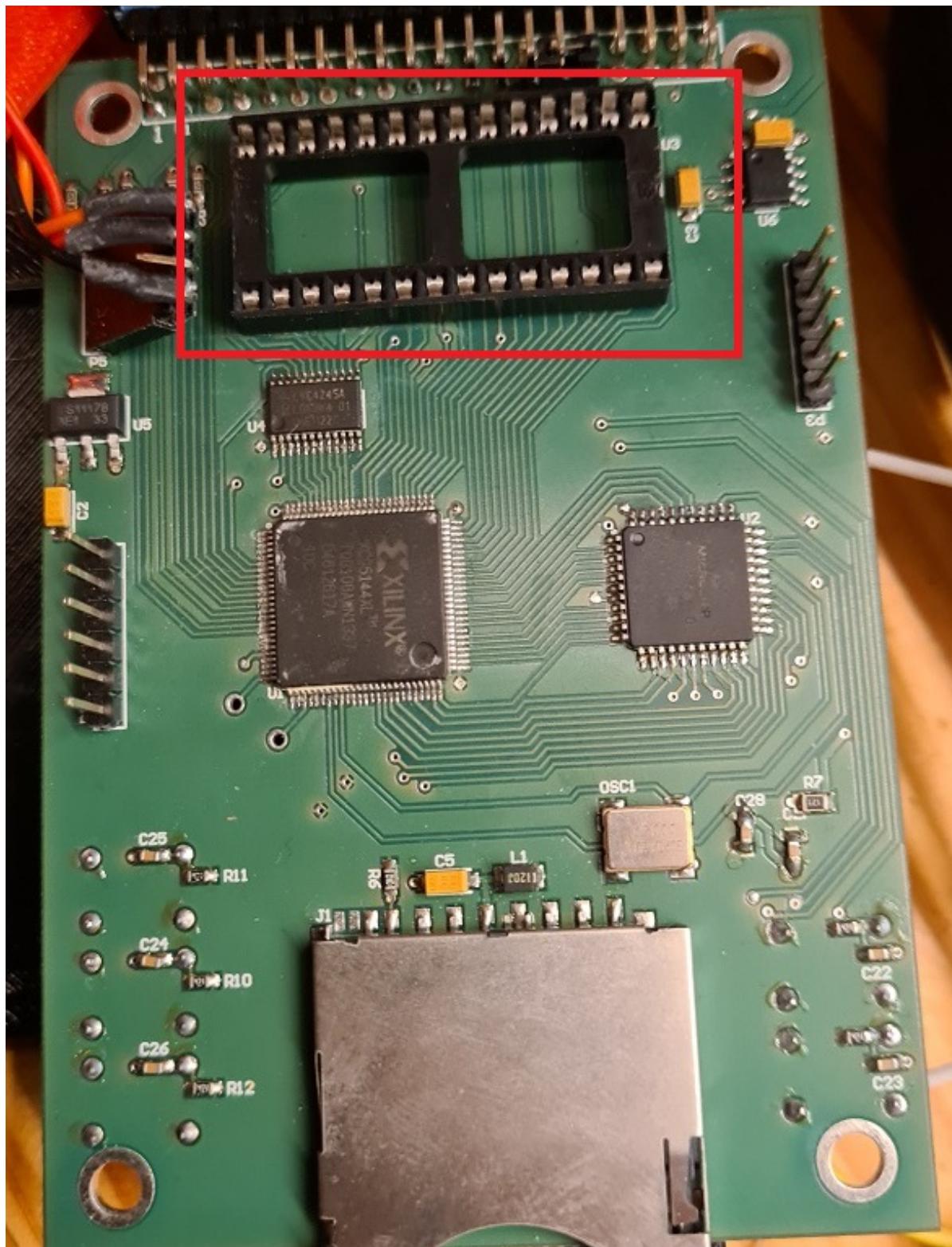
Please, test your cumulus on the oric connected to the board. If it does not work on your Oric, it won't work too with card plugged !

If you want to use cumulus, you have to :

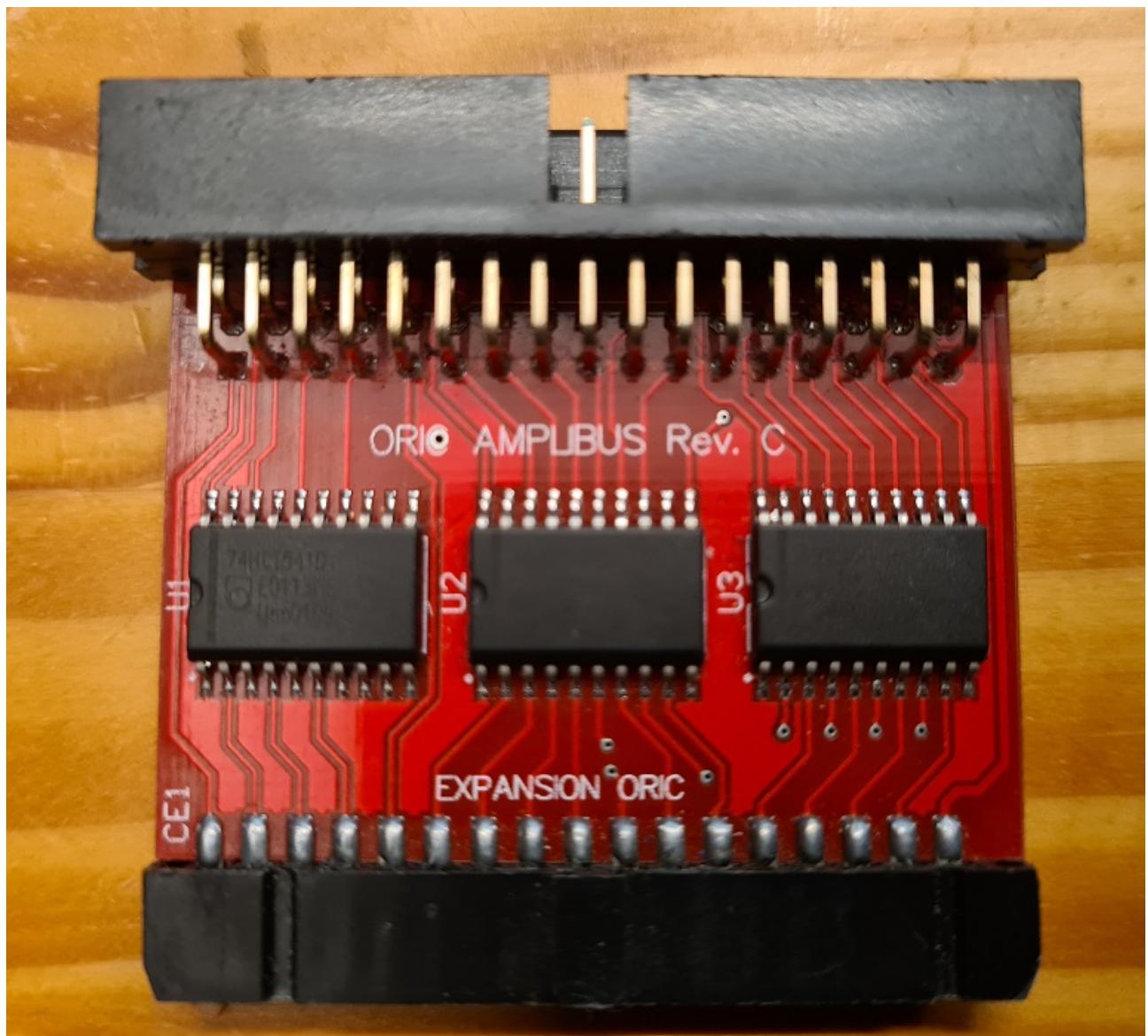
- 1) cut 4 pins on daughter card (ROMDIS, MAP, A14, A15)



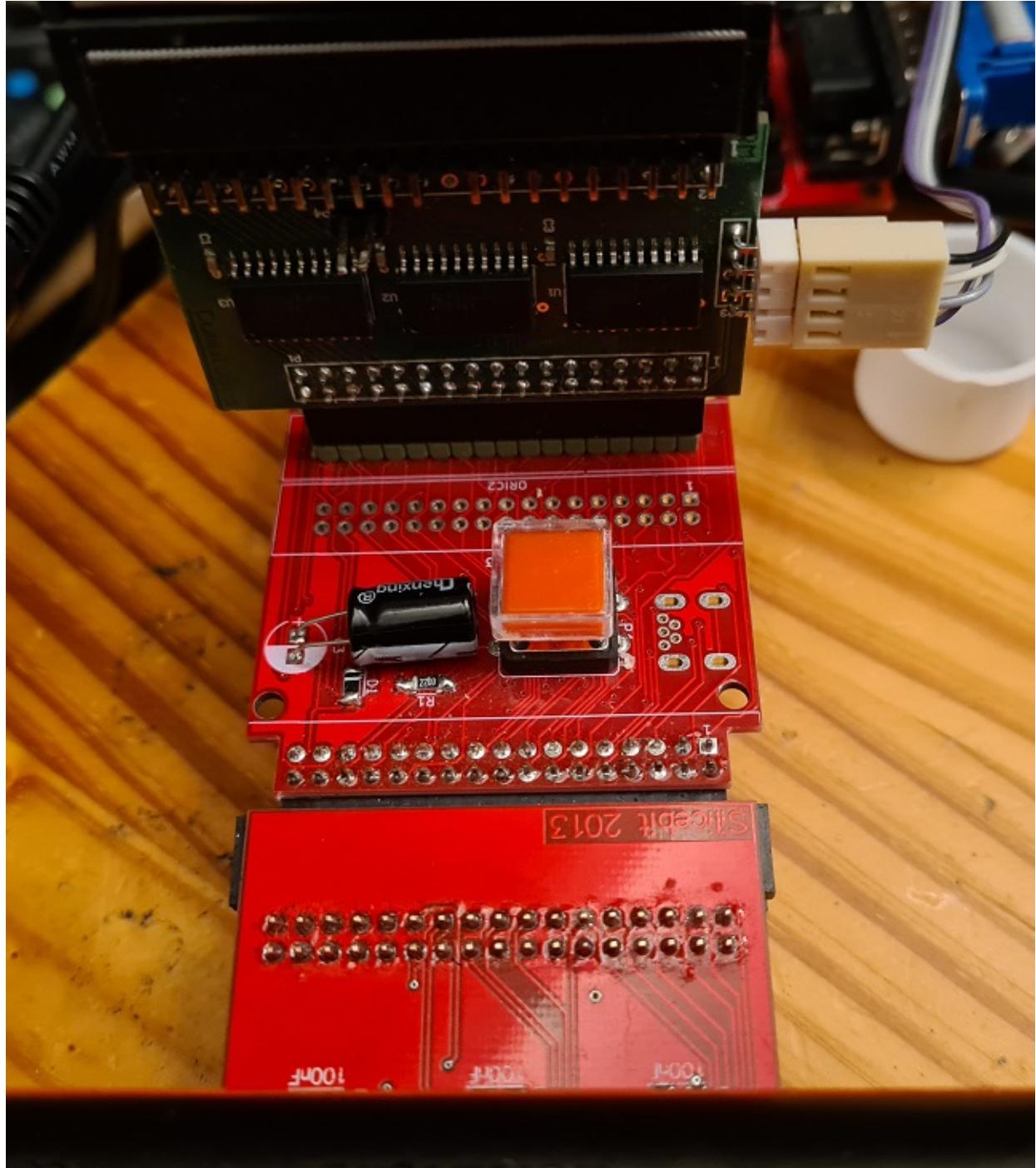
- 2) remove eprom from cumulus



3) add another amplibus before twilighte daughter board



4) Connect all cards to the oric



## Twilighte board firmware compatibility

Only firmware 2 is available to use boot sector to start Microdisc disk.

## **HARDWARE AND FIRMWARE UPGRADE**

## **Firmware upgrade**

There is only one firmware available. The version 2 is in development.

### **First method : For those who have programmers and some hardware tool**

But, when it will be released, you could update the firmware with :

- 1) a plcc extractor
- 2) altera software (Quartys v13)
- 3) a Jtag programmer
- 4) solder the jtag connector
- 5) get .pof file

### **Second method : send the card to the author of the card (me)**

In that case, fimware upgrade will be done, and you could ask to upgrade to new board version to add (sometimes new functionnality)

## **TROUBLE SHOOTING**

## **'ls' displays garbage on screen**

Insert your sdcards or your usb drive into your PC. You should have strange « file » on the sdcards : remove these files.

## **Impossible to mount a usb key or a sdcards**

The sdcards must be in FAT32 format

## **Screen garbage when i use bank**

If you have screen garbage when you switched to ram bank before with « twil -w »

It means that ram bank are not initialized. See orixcfg section to fix it

## **Pi zero always reboots**

Check your PSU. If you have a 2A PSU and you have a pi zero, cumulus and TOM2 connected, you should reach the PSU limits. If you can't get another PSU, you can disable bluetooth of your pi zero, or you can also downclock from 1Ghz to 700mhz for example.

You can also use a 3A PSU. In the future, it will be possible to add another PSU on the board.

## **When i start Orix, filesystem is unstable or displays usb controller not found**

If you have pi zero connected, it could answer to the controller partial information or could hang the usb controller because controller does not understand usb data when it sends information to usb port.

You have to wait a bit. If you want to verify this, you can switch off the oric (and then the pi zero), switch on the oric with Orix, and type 'debug', if you have another value than #AA for ch376 check exists, it's the problem, if you do 'debug' another value will be displayed but not #AA. In fact, when pi zero boot, usb controller is unstable.

## **« Usb drive controller not found »**

You can reach this message in some case :

1. device (sdcards or usbdrive is missing)
2. after a launch of « df » command : There is an issue, the controller is in incorrect state after this command. It's a bug

You can usually fix it by launching « ls » twice. Because « ls » handles a reset order to the usb controller when it does not produce the correct answer. It means that if USB controller is not working well, ls displays the error message and will produce a reset command to the controller. If you launch ls again, it will work.

## **Kernel panic**

When kernel can't solve a « free memory kernel call» in a binary, it could produce a kernel panic. In that case, you need to do a reset. There is a bug in kernel 2021.1 which could produce this error. It will be corrected as soon as possible.

## Q&A

## **I want to change the current directory**

See « cd » command

## **I want to see which bank are loaded into ROM and RAM**

See «bank» section

## **I want to read a .dsk file**

You can only extract files from a .dsk file (see « dsk-util »)

If you have a cumulus board, you can use « bootfd » and connect your cumulus on expansion board  
« see how to connect a cumulus section »

## **ANNEXES**

## Firmware version

Version	Features	Known bugs
1	RAM/ROM switch, ROM programmation, joysticks, usb controler	N/A
2	Start all sedoric disks from cumulus	N/A