

UNIVERSAL C64  
MAGIC DESK &  
OCEAN COMPATIBLE  
CARTRIDGE

Marko Šolajić, 2020



# ABOUT ME

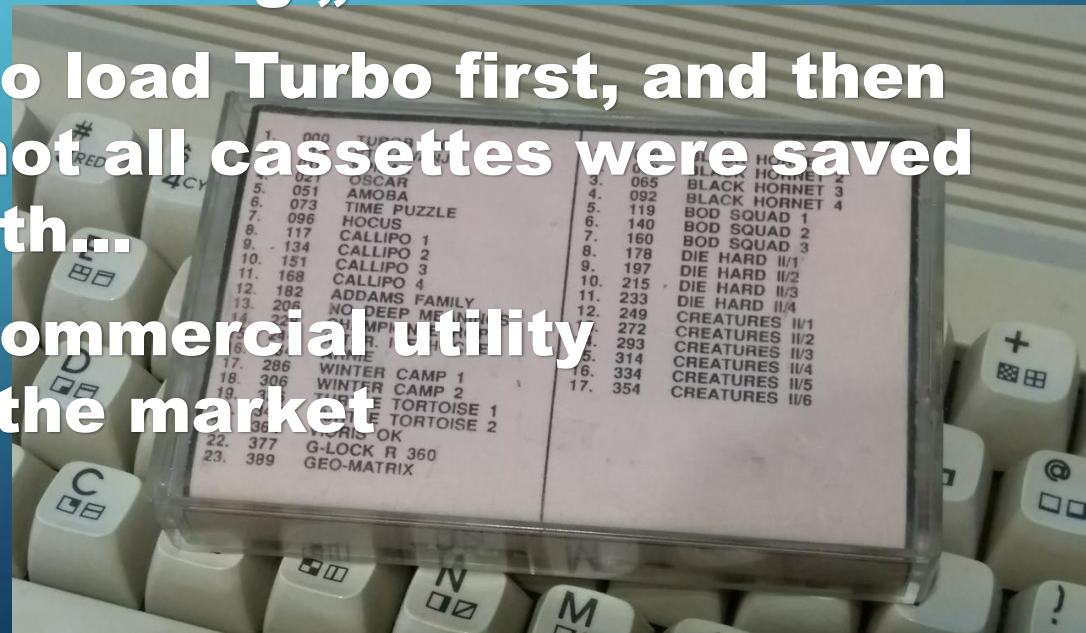
- **Born in 1980**
- **First computer: ZX Spectrum 48k (1986)**
- **Second computer: Commodore 64 (1990)**
- **Education: Electronics Engineer**
- **20+ years in the Media Industry (Broadcast & Online)**
- **Collector of retro computers, hardware tinkerer...**
  - **[www.onceuponabyte.org](http://www.onceuponabyte.org)**
  - **[blog.8bitchip.info](http://blog.8bitchip.info)**

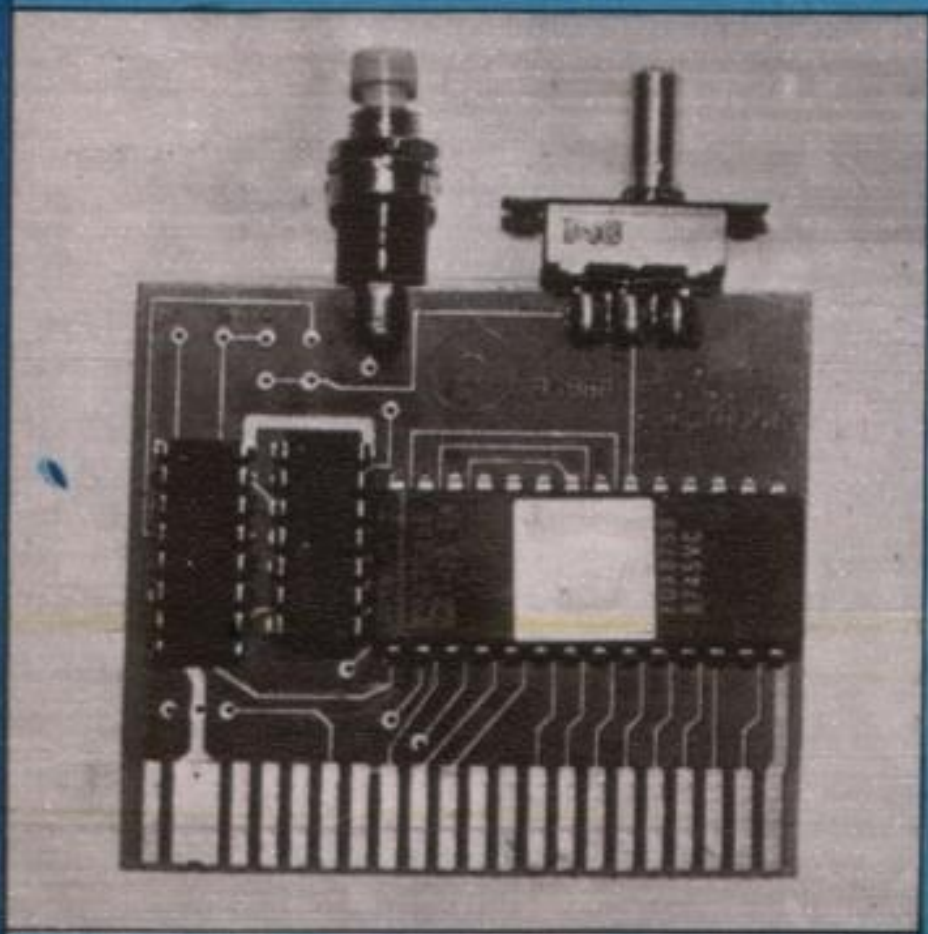


# SOME HISTORY...

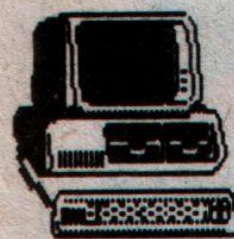
- During the 1980s and 1990s software piracy was legal (or at least, not sanctioned) where I come from
- Pirated software for C64 was available mostly as compilation cassettes
- Games were usually saved using „Turbo 250“
- Every time you needed to load Turbo first, and then to rewind to the game, not all cassettes were saved with factory head azimuth...
- Lots of homebrew and commercial utility cartridges appeared on the market

TURBO 250 BY MR. Z  
CAN HANDLE PROGRAMS  
BETWEEN \$0001-\$FF3B  
←S (NAME) SAVE PROG  
READY.





Nova, poboljšana verzija EPROM modula za C64/128 kapaciteta 32 ili 64 KB



C-64

# SC-HARD



C-128

NAJBOLJI EPROM MODULI U YU ZA VAS C64,128

1. UNIMIKS 001: DUPLIKATOR, COPY 202, TURBO 250 SL, DFAST LOADER, POD. GLAVE KAS, DPIZZA/SYS680, BOOT TRILOGIC
2. UNIMIKS 002: NEXOS V3.1 (DOS 14x), TOP MONITOR, TURBO 250 SL POD. GLAVE KAS, BOOT TRILOGIC, DISPATCH (DISK MON)
3. UNIMIKS 003: TURBO 250 SL, TURBO TAPE II, SPEC FAST, TURBO PIZZA, TOP MONITOR, COPY 190, COPY 202, SISTEM 250
5. TRAKAMIX 01: TURBO 250 SL, TURBO 2002, TURBO TAPE II, TURBO PIZZA, SPEC FAST, POD. GLAVE KASETOFONA
6. TRAKAMIX 02: TURBO 250 SL, SPEC FAST, MONITOR 49152, PODESAVANJE GLAVE KASETOFONA
7. TRAKAMIX 03: TURBO 250 SL, TURBO 2002, TURBO TAPE II, TURBO PIZZA, SPEC FAST, POD. GL. KAS, MONITOR 49152, PROFIAS 64
8. TRAKAMIX 04: SIMON'S BASIC II, TURBO 250+, SPEC FAST, POD. GLAVE KASETOFONA, TOP MONITOR, COPY 190 — (32 KB)
9. DISKMIKS 01: DUPLIKATOR, NEW NAME/ID, BOOT TRILOGIC, DFAST LOADER, FAST COPY, NEXOS V3.1 (14 x brzi DOS)
10. SIMON'S BASIC
11. GR-BASIC
12. MAE64
13. EASY SCRIPT YU
14. EX-BASIC LEVEL 2
15. STAT 64 +FORTH
16. VIZAWRITE — (32KB)
17. BOULDER DASH SUPER 16 IGRA — (32KB)
18. COLLOSUS CHESS V4.0 — SAH — (32KB)

SVAKI MODUL IMA UGRADJEN RESET TASTER KOJI RESETUJE SVE PROGRAME !  
 CENA MODULA BROJ: 5, 6 I 14 JE 18.000. DIN, MODULA BROJ: 1, 2, 3, 7, 9, 10, 11, 12, 13 I 15 JE 19.000. DIN, A MODULA BROJ : 8, 16, 17 I 18 JE 25.000. DINARA.  
 SVAKA DVA MODULA OSIM MODULA OD 32KB MOZETE DOBITI U "DUPLOM" (32KB) ZA 25.000.  
 GARANCIJA ZA SVE MODULE JE JEDNA GODINA, JER VAM NUDIMO VRHUNSKI KVALITET !!!

SLOBODAN SCEKIC, BULEVAR 23. OKTOBRA 87,  
 21000 NOVI SAD, TEL: 021/59-573 ( OD 8 DO 14 h )

<https://blog.8bitchip.info/56-dissecting-ex-yugoslavian-c64-cartridges-part-1/>

# COMMODORE'S MAGIC DESK



MAGIC DESK I  
TYPE & FILE

COPYRIGHT (C) 1983  
BY COMMODORE SOFTWARE



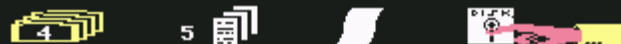
This acts like a typewriter  
The page scrolls left and right  
while the green cursor remains  
in the center

I can backspace to change characters,  
but there is no way to manipulate  
blocks of text

10 15 20 25 30 35 40 45



Another File  
AT&T\_Unix\_PC  
Desk\_Mate  
Magic\_Desk  
New File



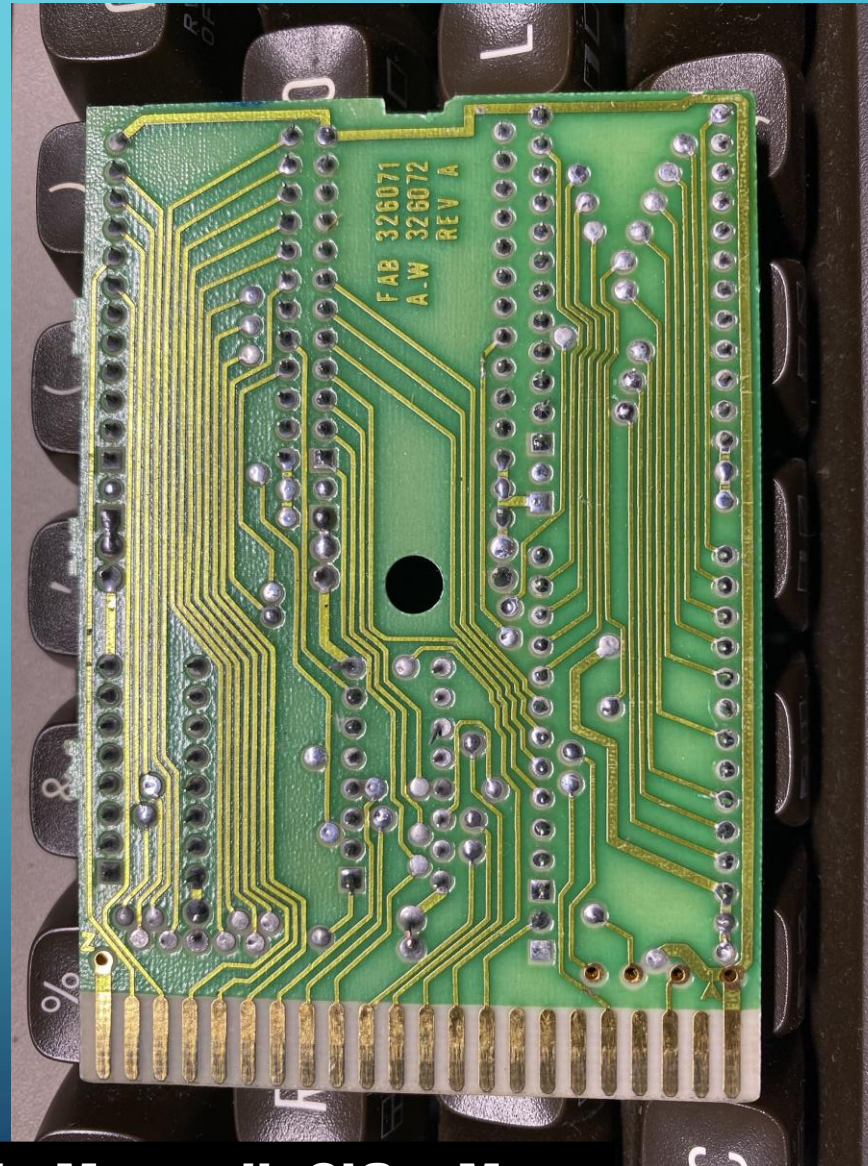
## HELP MENU-DESK

- 1) MOVE BY MOVING JOYSTICK
- 2) POINT TO FUNCTION DESIRED
- 3) PRESS FIRE BUTTON TO ACTIVATE



Photos from <http://toastytech.com/guis/magdesk.html>

# COMMODORE'S MAGIC DESK



Photos courtesy of Gavin Maxwell, @iGavMax

# COMMODORE'S MAGIC DESK

**Excerpt from VICE manual:**

**16.11.3.20 19 - Magic Desk, Domark, HES Australia**

**Size: 32Kb, 64Kb or 128Kb sizes (4 to 16 banks of 8Kb each)**

**EXROM active (lo) (0)**

**GAME inactive (hi) (1)**

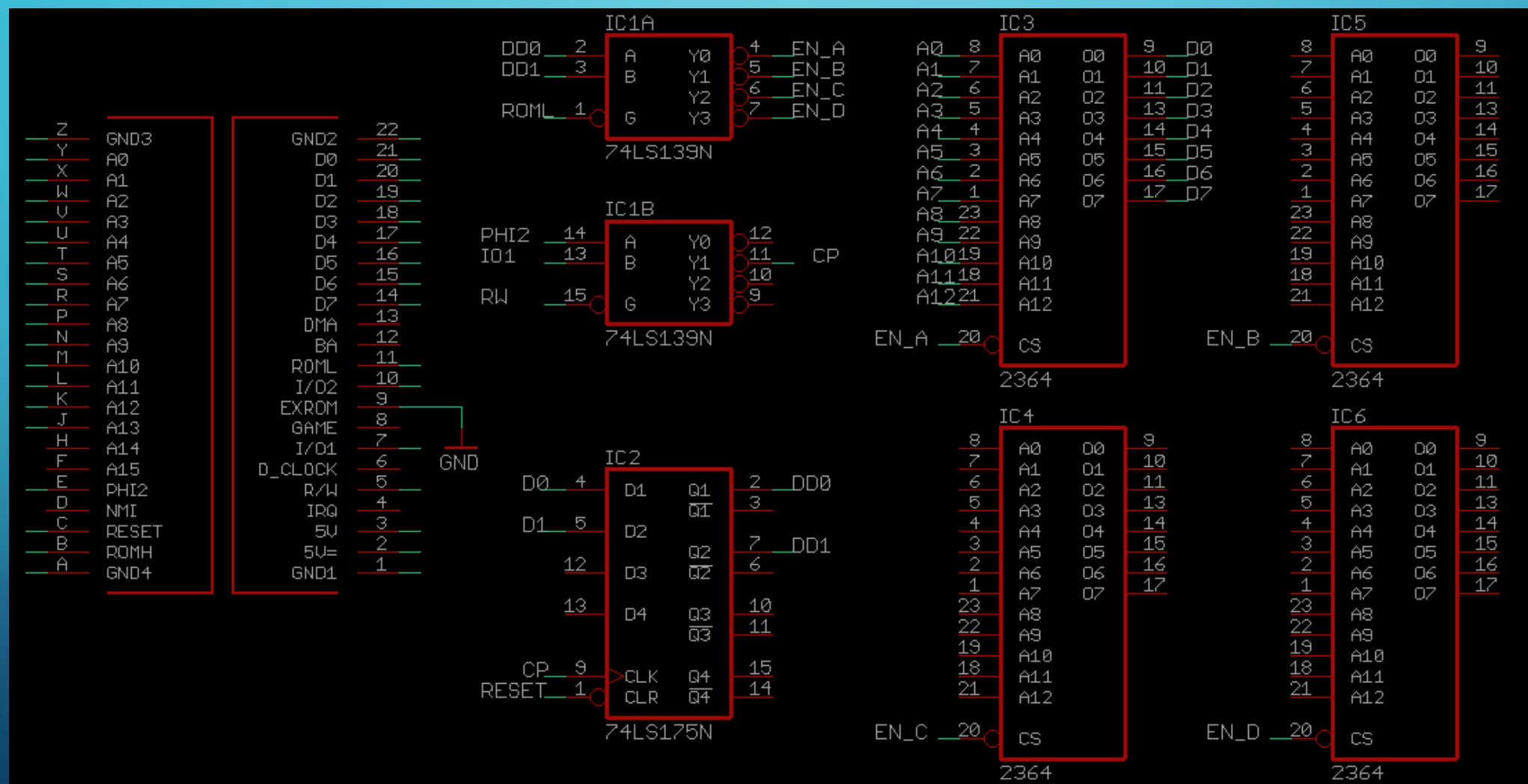
**Startup mode: 8k Game**

**Load address (banks 00-15) - \$8000-9FFF**

**This cartridge type is very similar to the OCEAN cart type: ROM memory is organized in 8Kb (\$2000) banks located at \$8000-\$9FFF. Bank switching is done by writing the bank number to \$DE00. Deviant from the Ocean type, bit 7 is cleared for selecting one of the ROM banks. If bit 7 is set (\$DE00 = \$80), the GAME/EXROM lines are disabled, turning on RAM at \$8000-\$9FFF instead of ROM.**

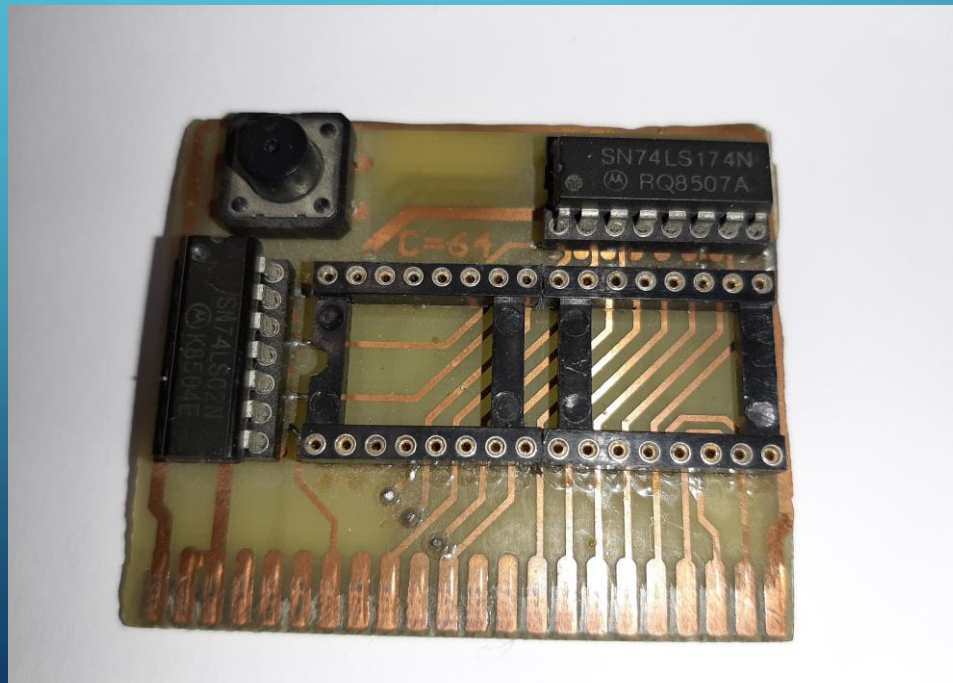
**In the cartridge header, EXROM (\$18) is set to 0, GAME (\$19) is set to 1 to indicate the RESET/power-up configuration of 8 kB ROM.**

# COMMODORE'S MAGIC DESK



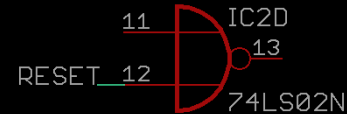
# MAGIC DESK COMPATIBLE CARTRIDGE

- Followed the VICE manual for the design
- Expanded to 256k
- Bit 7 set – EXROM goes high – cartridge disabled
- First published version had a bug

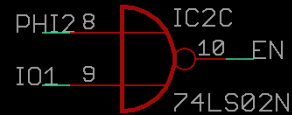


# MAGIC DESK COMPATIBLE CARTRIDGE

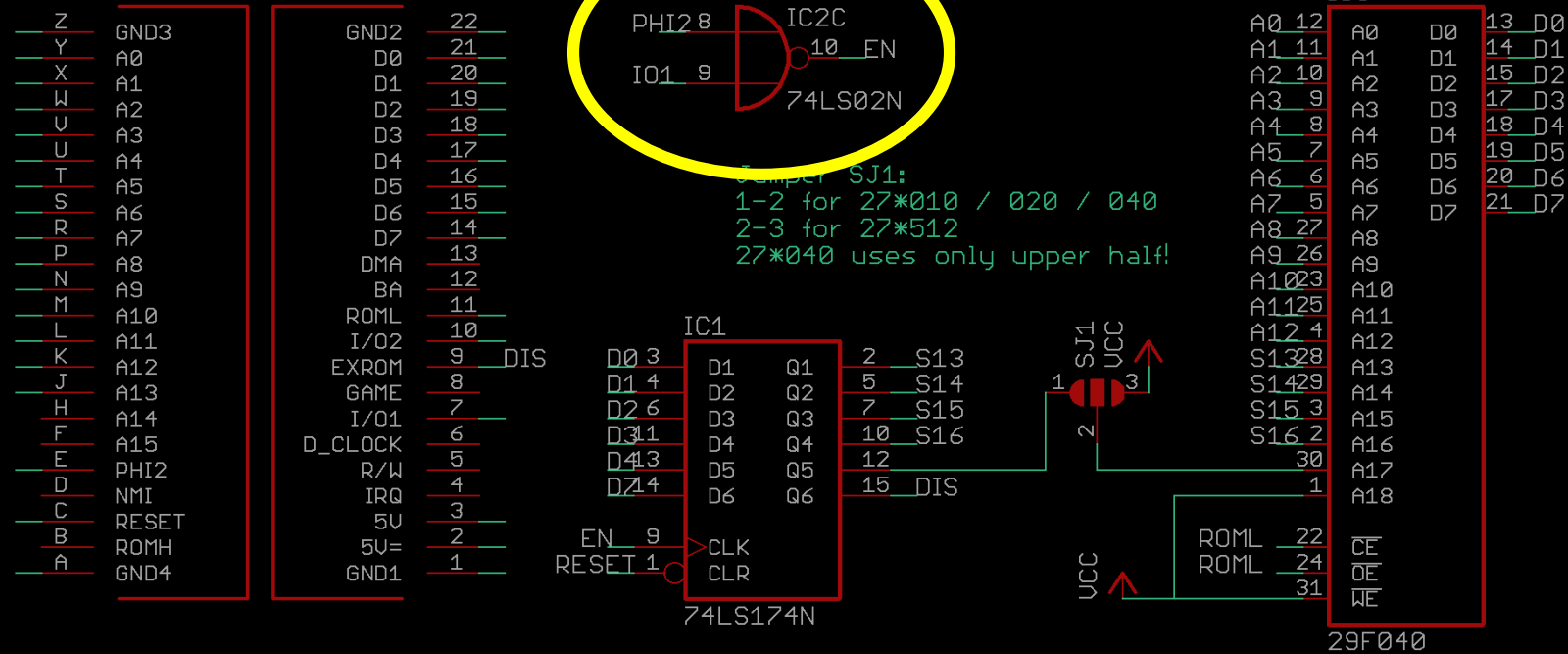
Not really used for anything.  
Pad 12 of IC2 used as layer transition  
because we made boards without hole plating.



**PHI2 MUST BE INVERTED!**



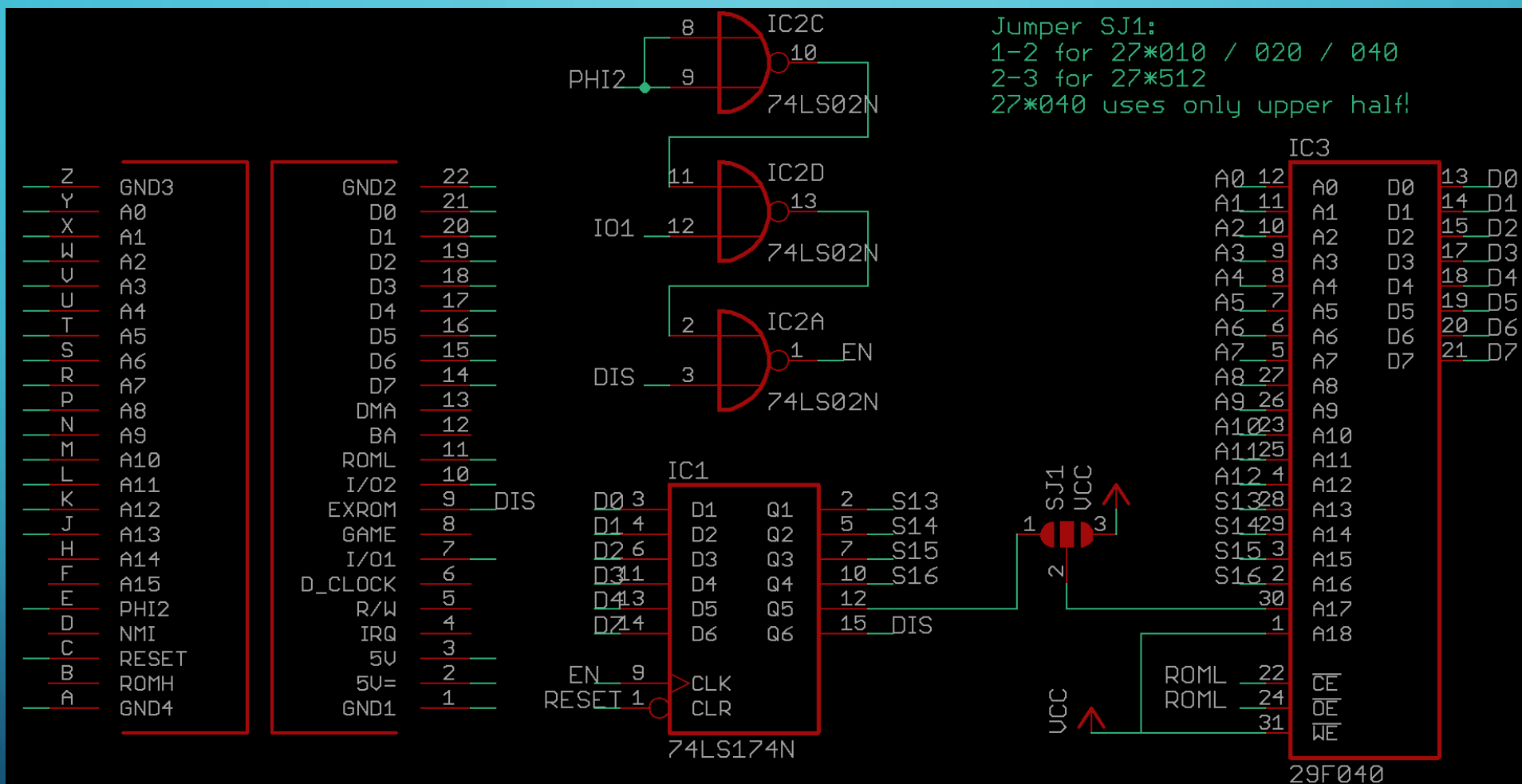
Jump SJ1:  
1-2 for 27\*010 / 020 / 040  
2-3 for 27\*512  
27\*040 uses only upper half!



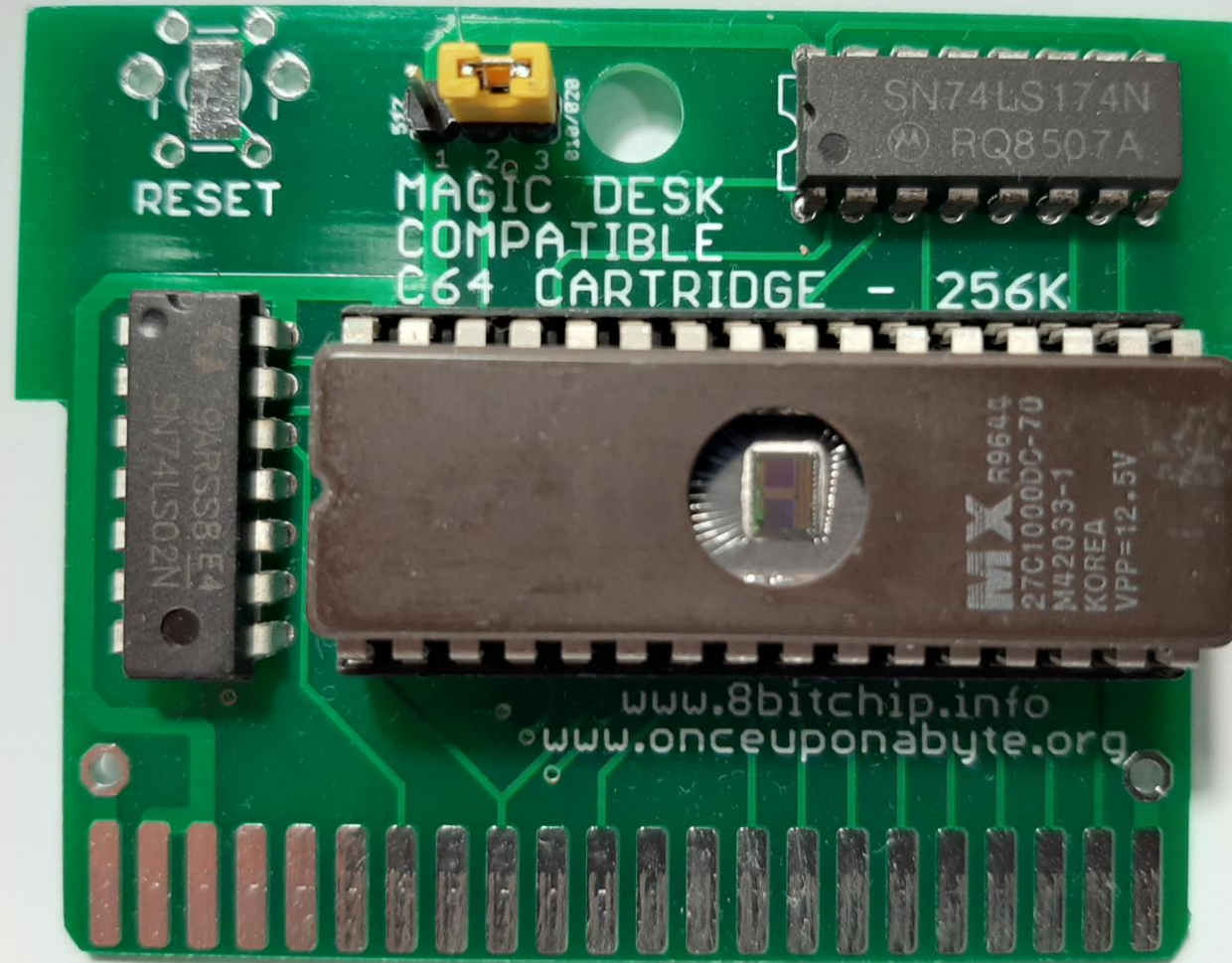
# MAGIC DESK COMPATIBLE CARTRIDGE

- **Followed the VICE manual for the design**
- **Expanded to 256k**
- **Bit 7 set – EXROM goes high – cartridge disabled**
- **First published version had a bug**
- **Clock needs to be inverted**
- **Side effects: Worked on my C64C, didn't work on my friend's C64 and C128**
- **On to version 2**

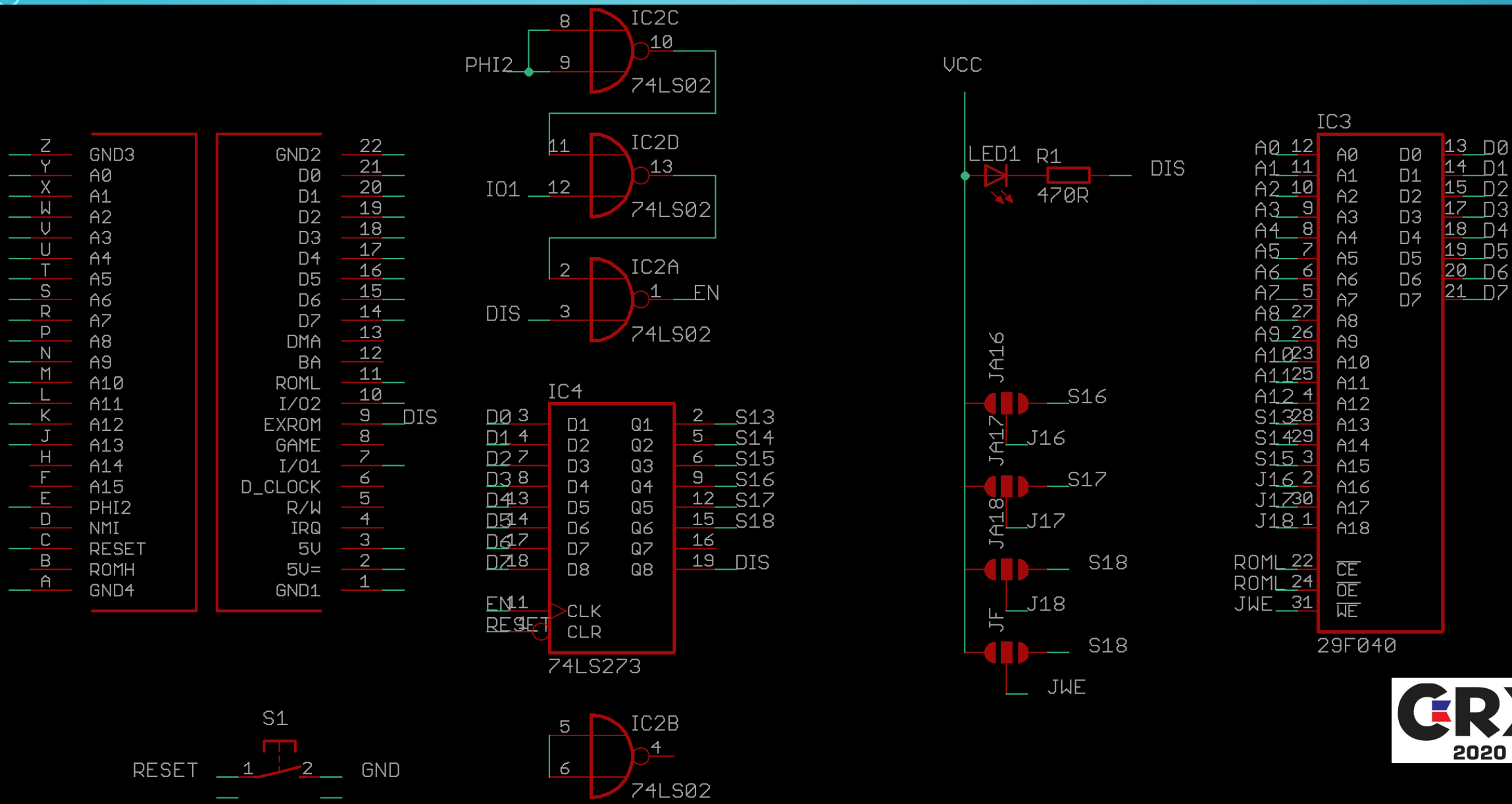
# MAGIC DESK COMPATIBLE CARTRIDGE



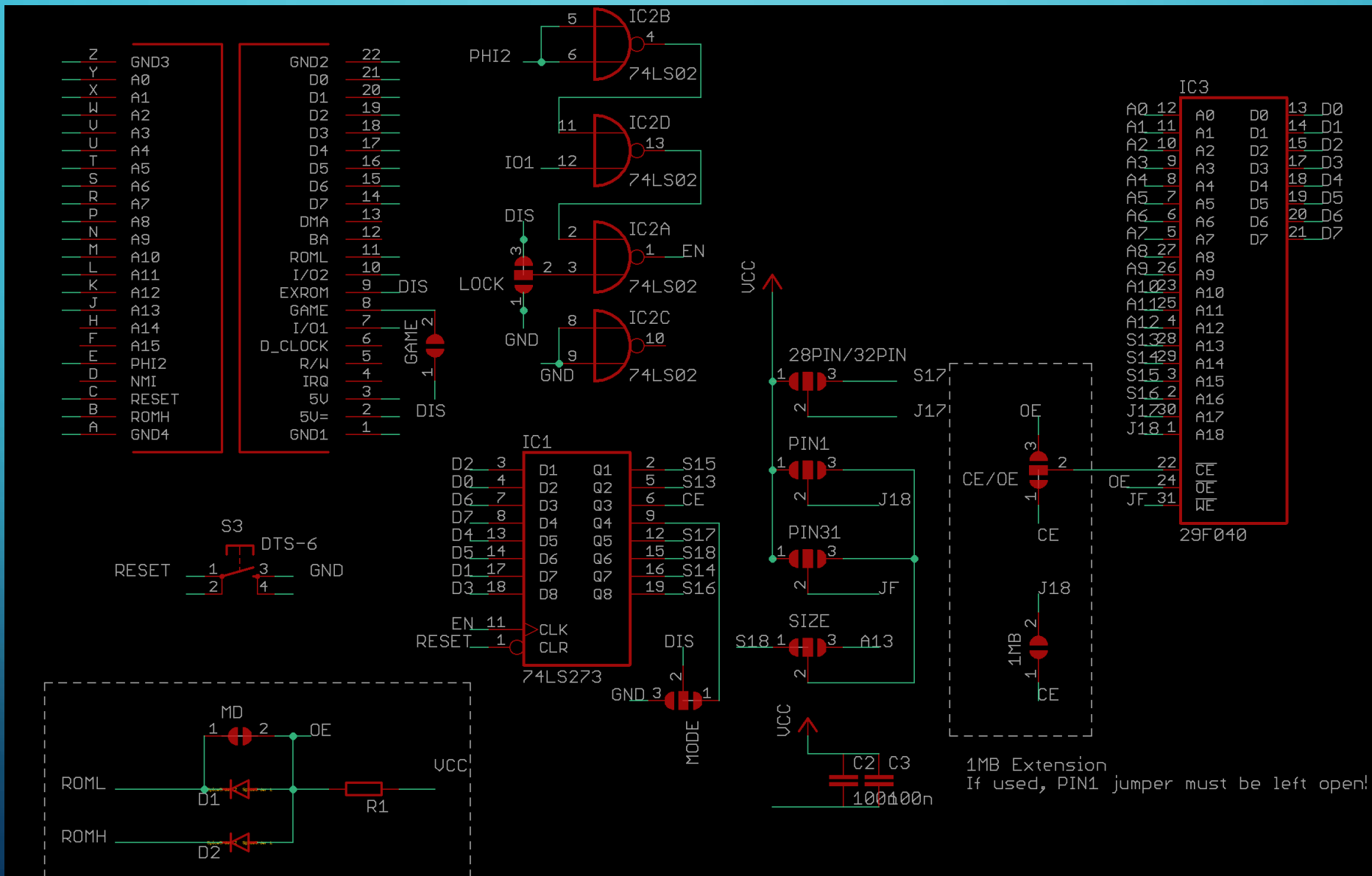
# MAGIC DESK COMPATIBLE CARTRIDGE



# MAGIC DESK COMPATIBLE CARTRIDGE

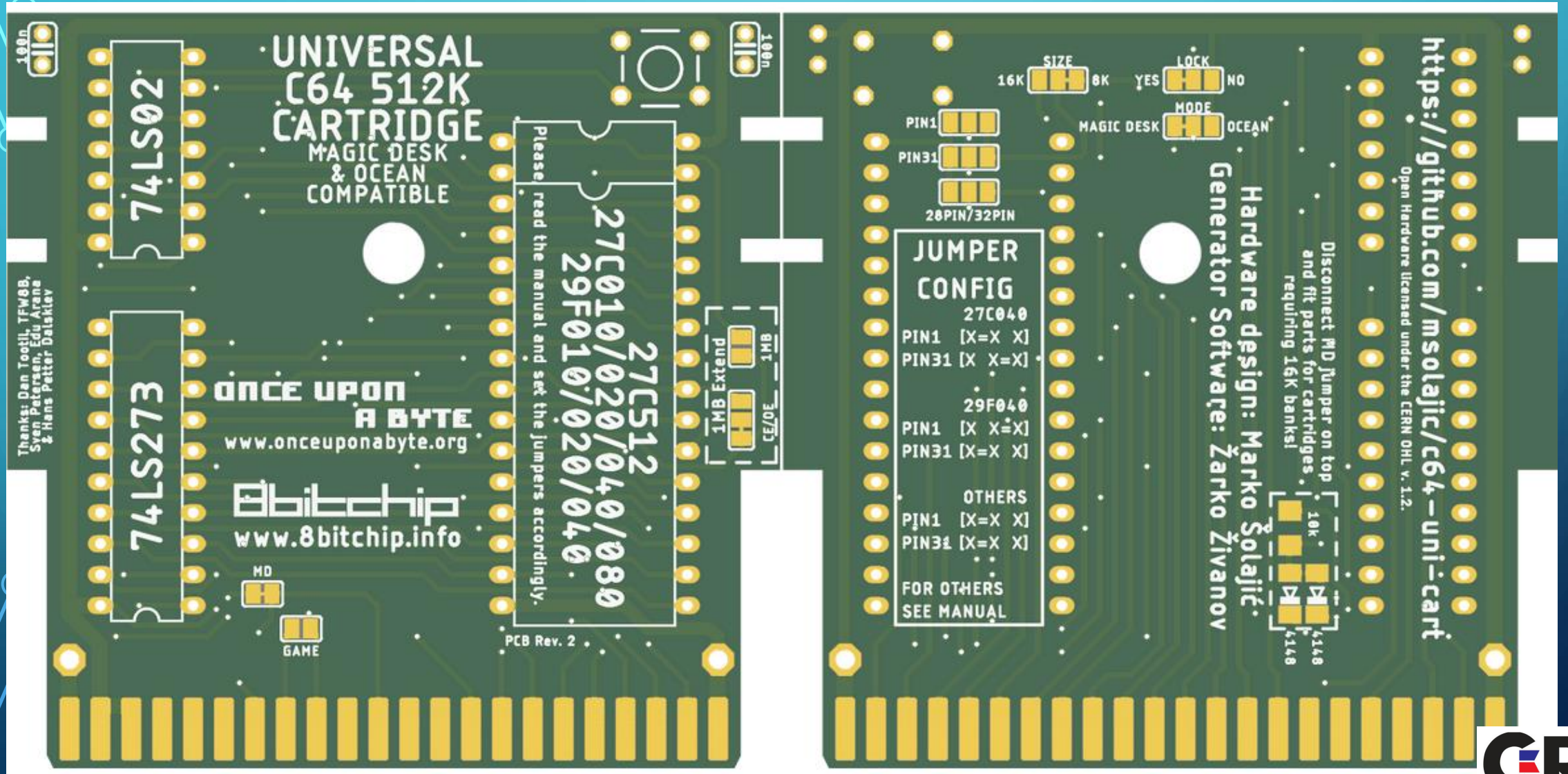


UNIVERSAL MAGIC DESK AND OCEAN  
COMPATIBLE CARTRIDGE

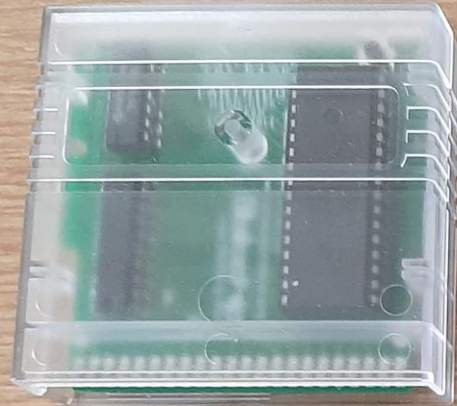


Circuit to be used if there is a need for 16k images.  
Used in conjunction with GAME jumper

UNIVERSAL MAGIC DESK AND OCEAN  
COMPATIBLE CARTRIDGE



# UNIVERSAL MAGIC DESK AND OCEAN COMPATIBLE CARTRIDGE



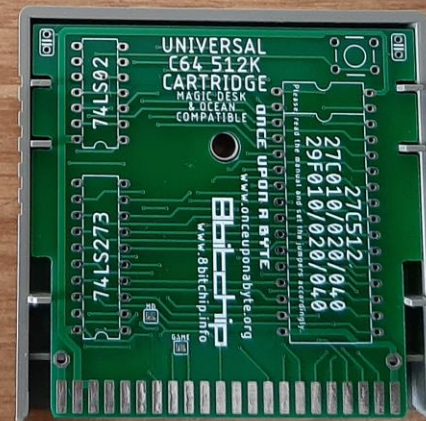
Original Commodore cartridge



KRADEX/MASZCZYK enclosure



3D printed enclosure

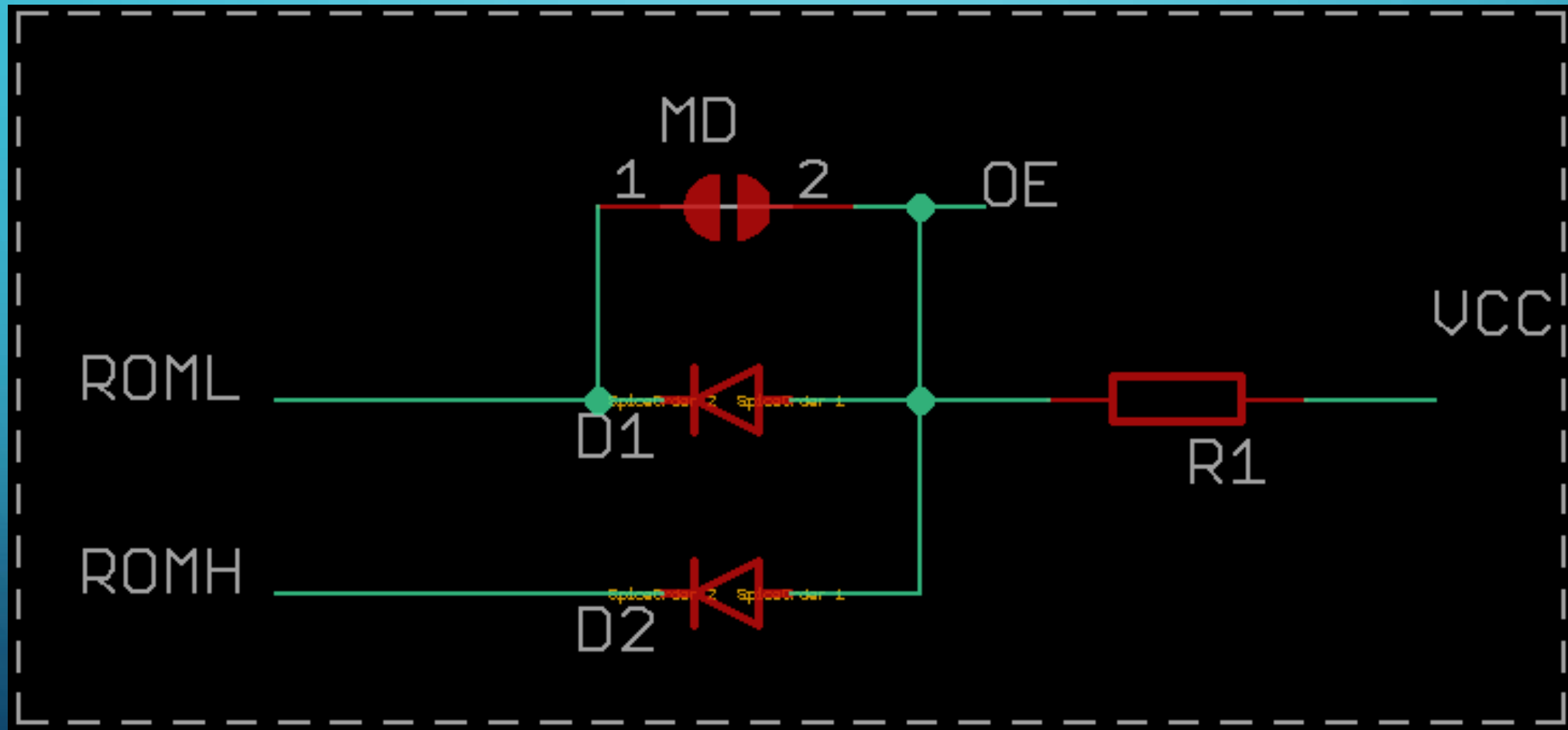


TFW8B "Stumpy" Cartridge Case

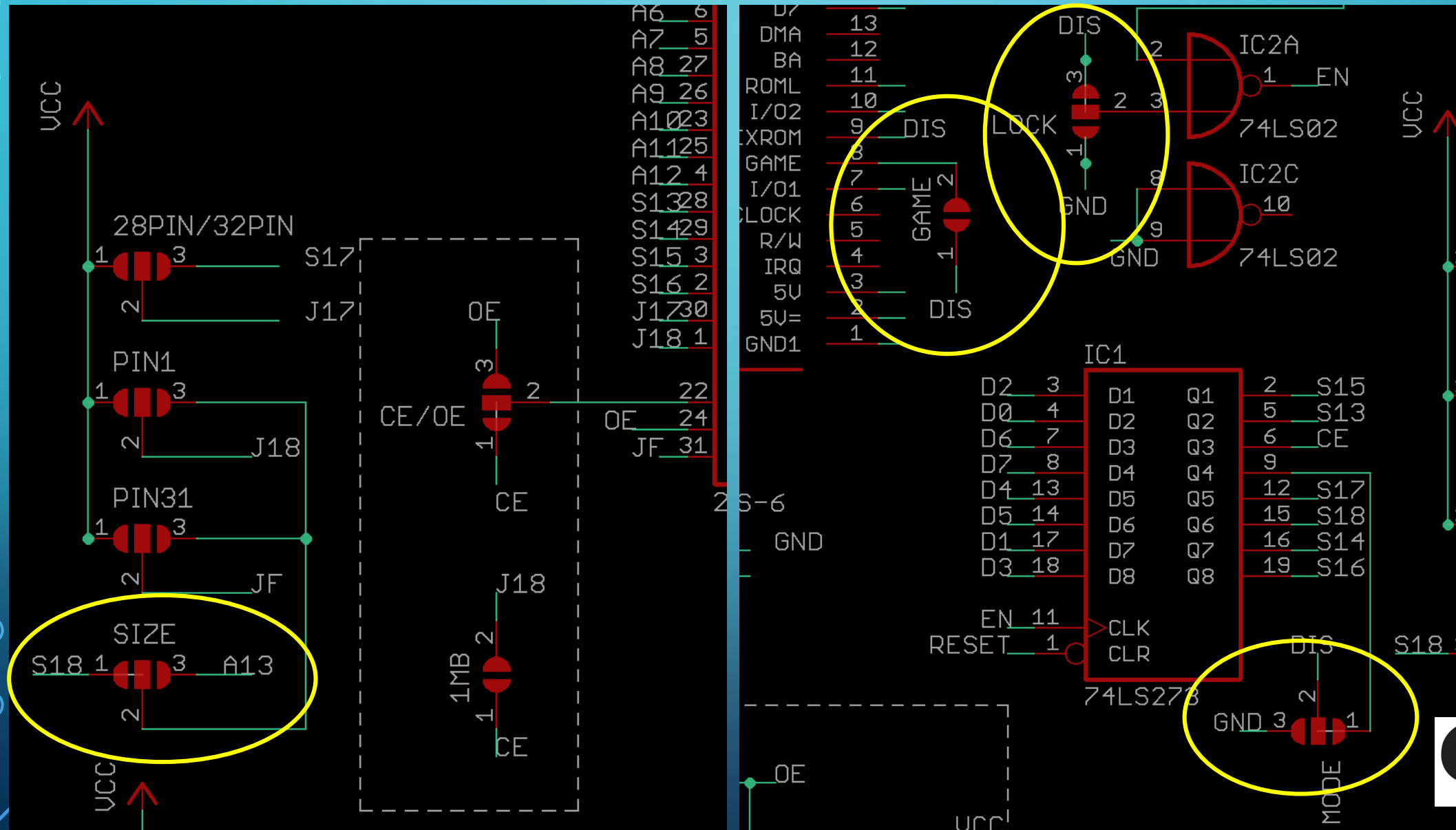
# UNIVERSAL MAGIC DESK AND OCEAN COMPATIBLE CARTRIDGE

- **Can be configured as Magic Desk or Ocean cartridge**
- **Locking of the register can be enabled or disabled**
- **Can be temporarily hidden from the memory map**
- **Can use both 8k and 16k configurations**
  - **Either as two same banks of data in both windows**
  - **Or as two different banks of data**
- **Some games converted for EasyFlash  
can be patched to work with the cartridge**

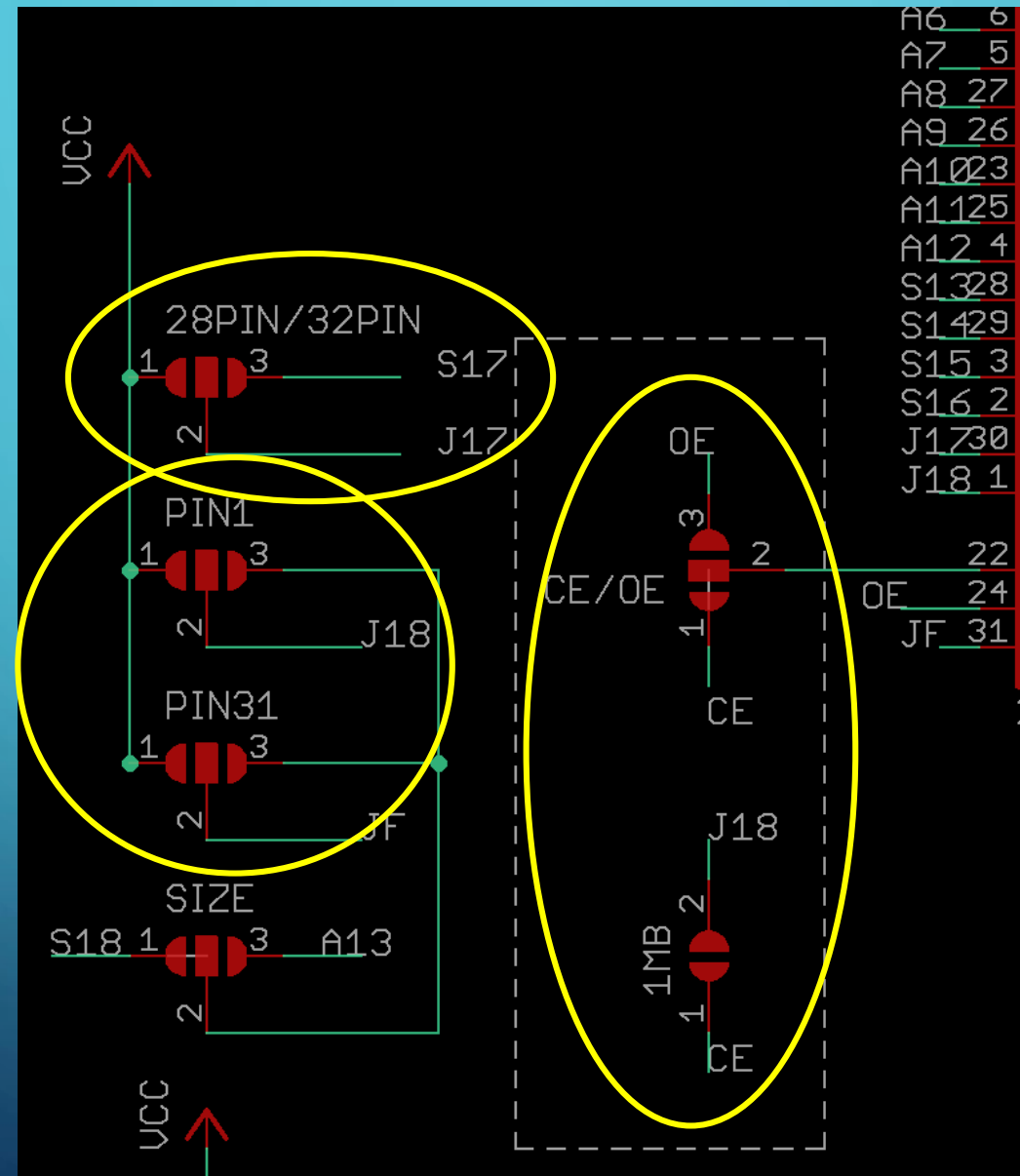
# UNIVERSAL MAGIC DESK AND OCEAN COMPATIBLE CARTRIDGE



# UNIVERSAL MAGIC DESK AND OCEAN COMPATIBLE CARTRIDGE



# UNIVERSAL MAGIC DESK AND OCEAN COMPATIBLE CARTRIDGE



# UNIVERSAL MAGIC DESK AND OCEAN COMPATIBLE CARTRIDGE

**Why are all these options needed:**

- **To be completely compatible with Magic Desk**
- **Ocean cartridges come in two distinct variants**
  - **The 128Kb and 512Kb type of cart have 8Kb banks,  
banked in at \$8000-\$9FFF.**
  - **The 256Kb type of cart have 32 8Kb banks,  
16 at \$8000-\$9FFF, 16 at \$A000-\$BFFF**
- **EasyFlash is even more complicated...**

# UNIVERSAL MAGIC DESK AND OCEAN COMPATIBLE CARTRIDGE

## EasyFlash vs Magic Desk & Ocean

- **Regular 16K mode or Ultimax mode, initializes in Ultimax**
- **1MB total**
- **Two registers on board, first for bank selection, second for enable / disable, mode selection, LED etc.**
- **On-the-fly programming using eAPI, to save game progress on the cartridge**
- **Patching games requires 6502 ASM knowledge**
- **C64debugger and Regenerator are your friends!**

# UNIVERSAL MAGIC DESK AND OCEAN COMPATIBLE CARTRIDGE

**EasyFlash games with available patches:**

- **Creatures 2**
- **Mayhem in Monsterland**
- **Prince of Persia**

**Instructions on how to patch games will be published on  
<https://blog.8bitchip.info>**

# UNIVERSAL MAGIC DESK AND OCEAN COMPATIBLE CARTRIDGE

## Magic Desk Cartridge Generator

- **Written by Žarko Živanov**
- **Menu code in 6502 Assembly, written in KickAssembler**
- **Generator code in Python**
- **8 menus and maximum of 256 programs**
- **Generates cartridges up to 1MB**
- **Emulated in VICE**
- **Enhancements and bugfixes by Jim Drew**
- **Other generators also available: Astercart, DDI...**

# UNIVERSAL MAGIC DESK AND OCEAN COMPATIBLE CARTRIDGE

## Essential Tools (F1)

1	Diskmenu 1541
2	Menu Load 1541
3	SuperLoader 3.1
4	FB1K 1.1
5	File Browser 1.6 + Sjload
6	SDBrowse 697
7	SCT2D 2.0
8	DraBrowse-Copy 1.0e
9	Turbo 250 LDP
0	Club Turbo 3.10
a	Cassette Azimuth
b	HeadAlign 1.1
c	Tape Head Calibration 1.8
d	Monitor 49152
e	Dir Master 8.4
f	Fast Tester 2.6
g	Validator 1.1
h	Format II
i	Zseq
j	Joystick-Paddle Tester

(Shift)CRSR: Scroll, Fn/Ret: Menu select

# QUESTIONS?

# THANK YOU!

**[blog.8bitchip.info](http://blog.8bitchip.info)**

**[www.onceuponabyte.org](http://www.onceuponabyte.org)**

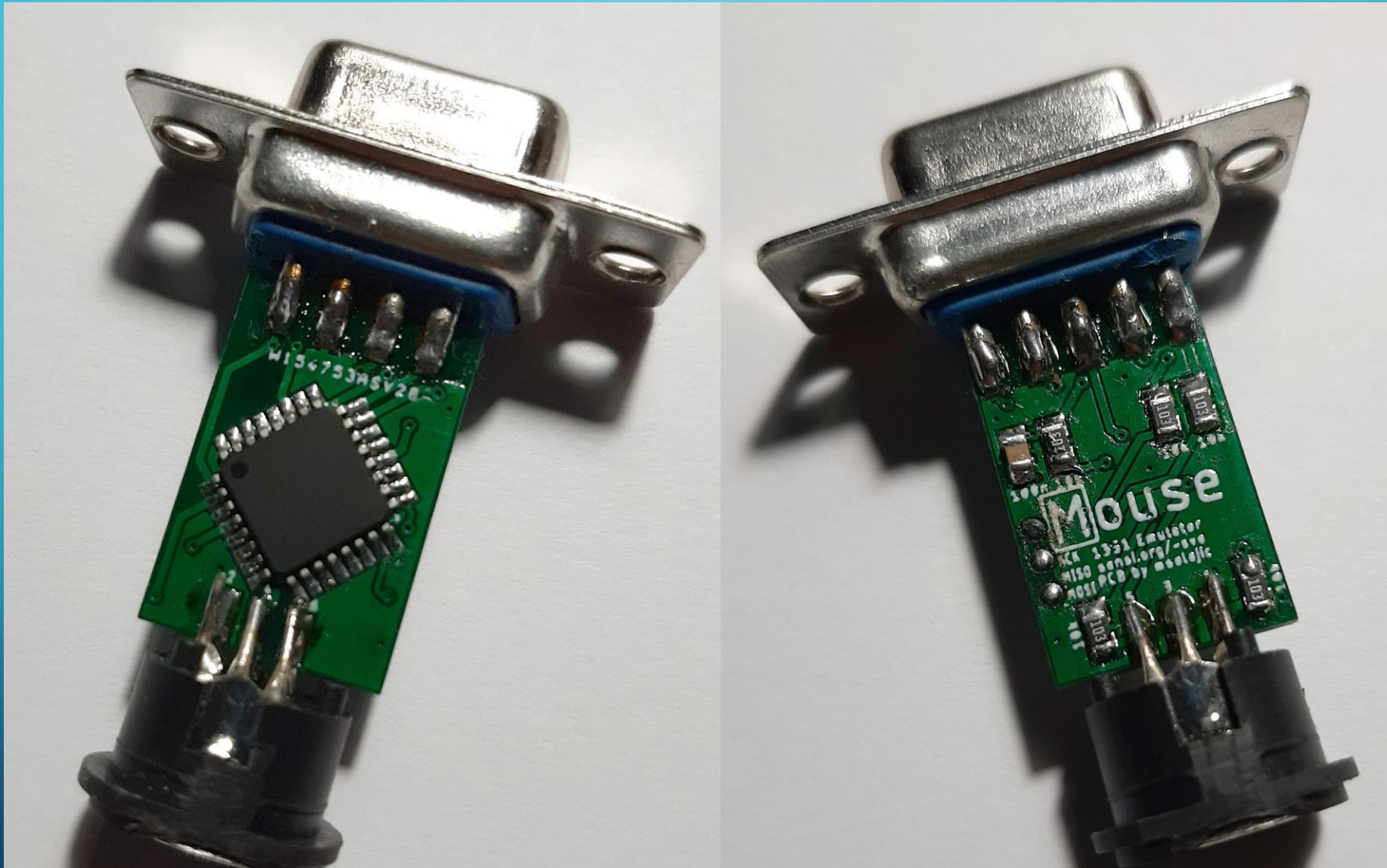
**[github.com/msolajic](https://github.com/msolajic)**

**[bitbucket.org/zzarko/magic-desk-cartridge-generator](https://bitbucket.org/zzarko/magic-desk-cartridge-generator)**

**Twitter: @msolajic**



# SURPRISE RELEASE FOR CRX 2020



**PS/2 1351 emulator, based on [http://sensi.org/~svo/\[m\]ouse/](http://sensi.org/~svo/[m]ouse/)  
Release in 10 minutes on [https://github.com/msolajic/mouse\\_pcb](https://github.com/msolajic/mouse_pcb)**