Hacking the DesTest MAX-Switch

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Hacking the DesTest MAX-Switch Board

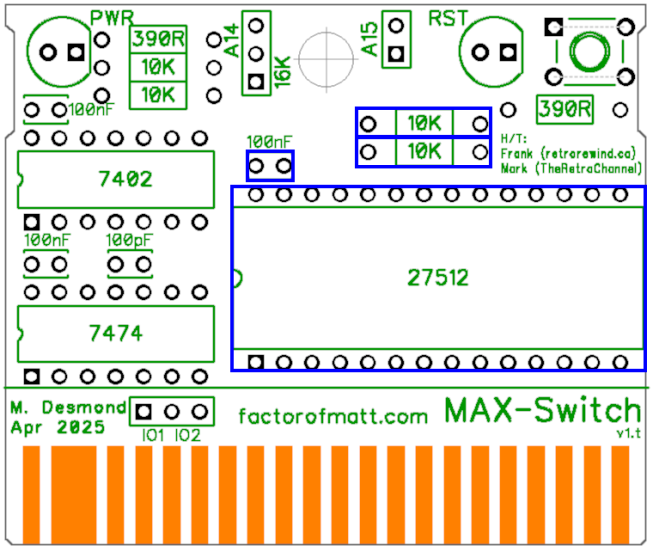
So you've found yourself in possession of several DesTest MAX-Switch PCBs but only really need one 'Switch cartridge and you're wondering what to do with the spare boards…

We've got you covered! By ignoring the instructions, not installing a few components and adding a few jumper wires, your otherwise-unused 'switch boards can be used as standard C64 cartridges.

For the moment, these are all hacks that don't require cutting traces or otherwise soldering in creative ways. Future hacks that support other configurations are under investigation.

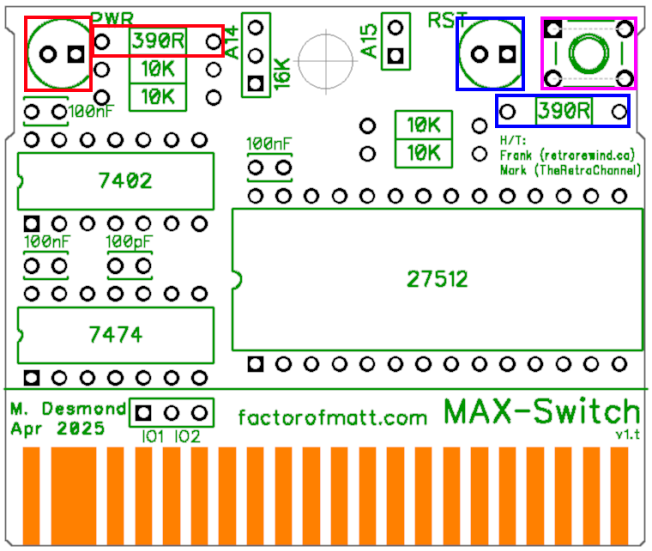
Getting Started

All hacks require starting with the same 4 components: two 10K resistors, a 100nF capacitor and a 28-pin socket for the PROM.



Power LED and Reset Switch/LED

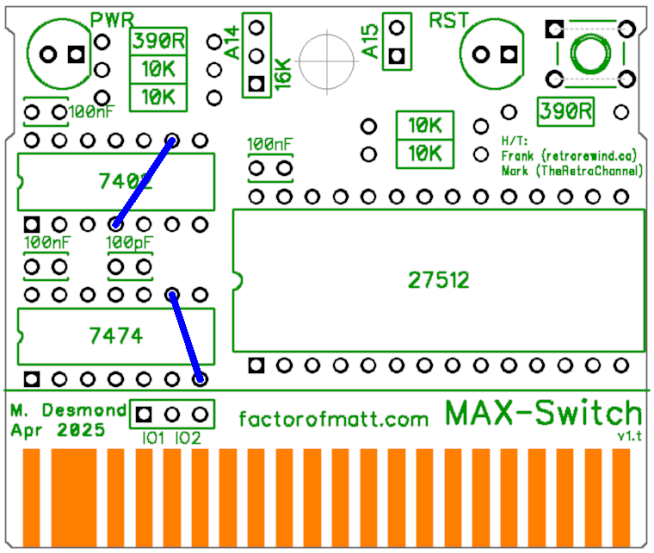
Should you wish to include the power-LED, reset-switch and reset-LED, they may be included by installing the the components as shown:



Power-LED components Reset-LED components Reset-switch component

Standard 8K /EXROM Cartridge

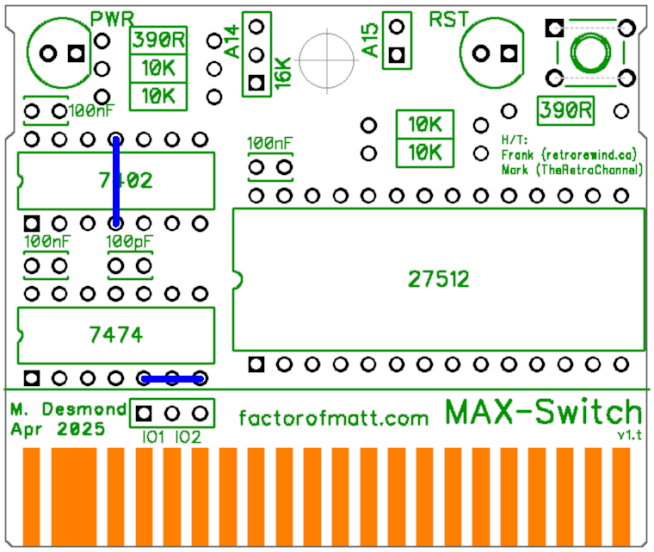
Two jumper-wires need to be installed to have the ‘Switch card operate as a standard 8K /EXROM cartridge. The wires are placed as shown below:



- In this configuration, the 8K ROM image is enabled at $8000 (/ROML) and the /EXROM signal is set to 0. This is the standard configuration for most games and utilities.
- This configuration expects a 2764 or equivalent PROM.
- Larger PROMs (up to a 27512 or equivalent) may be used to create a simple Multi-cartridge utilizing the A14 and A15 jumpers to choose images. See the Simple Multi-Cartridge section for details.

Standard 8K /GAME (MAX) Cartridge

Two jumper-wires need to be installed to have the ‘Switch card operate as a standard 8K /GAME (MAX mode) cartridge. The wires are placed as shown below:



Notes:

- The wire jumping pins 5 & 7 on the 7474 chip outline should not touch pin 6.
- In this configuration, the 8K ROM image is enabled at $E000 (/ROMH) and the /GAME signal is set to 0. This is configuration is used for certain ‘dead-test’ utilities and certain games.
- This configuration expects a 2764 or equivalent PROM.
- Larger PROMs (up to a 27512 or equivalent) may be used to create a simple Multi-cartridge utilizing the A14 and A15 jumpers to choose images. See the Simple Multi-Cartridge section for details.

Simple Multi-Cartridge

With a suitably-sized PROM, the simple hacks above may both support up to 4 PROM images instead of just one. The A14 and A15 jumpers are used to select which of the 4 images is used. Unfortunately, only half of the PROM can be used for multiple 8K images (every other 8K is inaccessible).

2764 (or equivalent) PROM

This size of PROM holds exactly 8K and as such the A14 and A15 jumpers have no effect.

27128 (or equivalent) PROM

This size of PROM holds 16K (two 8K blocks) though only one is accessible to the 'Switch cartridge. Such a device may be used and it is recommended that the first 8K ($0000-$1FFF) and second 8K ($2000-$3FFF) are both programmed with the same 8K image. The A14 and A15 jumpers have no effect. There isn't much point in using a 27128 unless you only require a single image but don't have 2764 to hand.

27256 (or equivalent) PROM

This size of PROM holds 32K (four 8K blocks) though only two will be accessible to the 'Switch cartridge. A14 May be used to select between the two images:

A14	PROM programming address offset		Image #
	/EXROM Hack	/GAME Hack	
On	$0000-$1FFF	(not accessible)	1
	(not accessible)	$2000-$3FFF	1
Off	$4000-$5FFF	(not accessible)	2
	(not accessible)	$6000-$7FFF	2

It is recommended that the first and second 8K are both programmed with the first 8K image and the third and fourth 8K are both programmed with the second 8K image.

27512 (or equivalent) PROM

This size of PROM holds 64K (eight 8K blocks) though only four will be accessible to the ‘Switch cartridge. A15 and A14 May be used to select between the four images:

A15	A14	PROM programming address offset		Image #
		/EXROM Hack	/GAME Hack	
On	On	$0000-$1FFF	(not accessible)	1
		(not accessible)	$2000-$3FFF	1
On	Off	$4000-$5FFF	(not accessible)	2
		(not accessible)	$6000-$7FFF	2
Off	On	$8000-$9FFF	(not accessible)	3
		(not accessible)	$A000-$BFFF	3
Off	Off	$C000-$DFFF	(not accessible)	4
		(not accessible)	$E000-$FFFF	4

It is recommended that the first and second 8K are both programmed with the first 8K image, the third and fourth 8K are both programmed with the second 8K image and so on for all 8K blocks.

What to Program on your Hacked Cartridges?

While there’s no shortage of C64 cartridge images available on the Web to chose from, why not try these?

Bradley’s BASIC (8K, /EXROM)

This project adds most of the BASIC 4.0 disk-related commands to your ‘64. Additionally it contains a useful DOS-wedge (compatible with the JiffyDOS and SuperSnapshot wedges).

Download your copy here: **`https://factorofmatt.com/bradleys-basic`**

DesTest Mini (8K, /GAME)

This simple project represents the smallest, simplest way to determine if at least the CPU in your ‘64 is capable of executing code. This code can operate and flash an LED on the cassette-port with only 6 of the ICs (on an assy 250407 board) installed.

Download your copy here: **`https://github.com/FactorOfMatt/DesTestMini`**