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Nintendo

CIRCUIT BENDING

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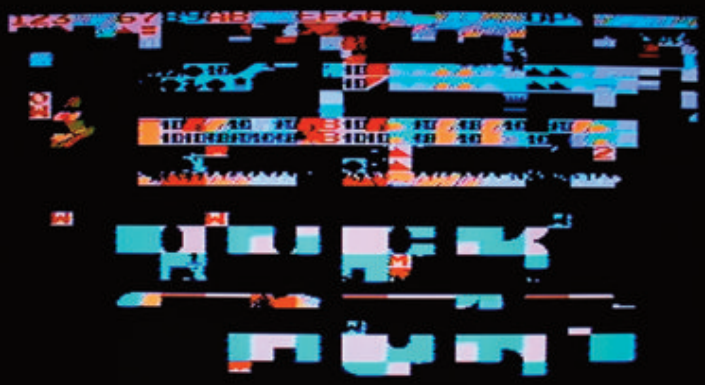

NINTENDO NES

CIRCUIT BENDING - MODIFICATIONS

TUTORIAL

BY

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CIRCUIT BENDING MODIFICATIONS

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CIRCUIT BENDING
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1-INTRODUCTION

Tutorial

This tutorial offers step by step to mods and circuit bend your Nintendo Nes. This tutorial is also available in French and in an interactive version on my site:
http://bitcrusher.free.fr/index-eng.php?page=tutones

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CIRCUIT BENDING
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FIRST STEP

1-Part List :

-Nintendo Nes
-RCA femal socket ---------->
-2x47 ohms resistor
-2xswitch on/on
-Electrical cable
-2 knob 100 ohms log
-2 capacitor 1uF 50v
-2x6,35 mono jack socket 6,35
-1x6,35 stereo jack socket 6,35
-1 knob 2,2k ohms lin

-Screwdriver
-Soldering Iron
-Dremel

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FIRST STEP

Nintendo NES disassembly

Step 01/10

-turn the NES back and unscrew the six screws

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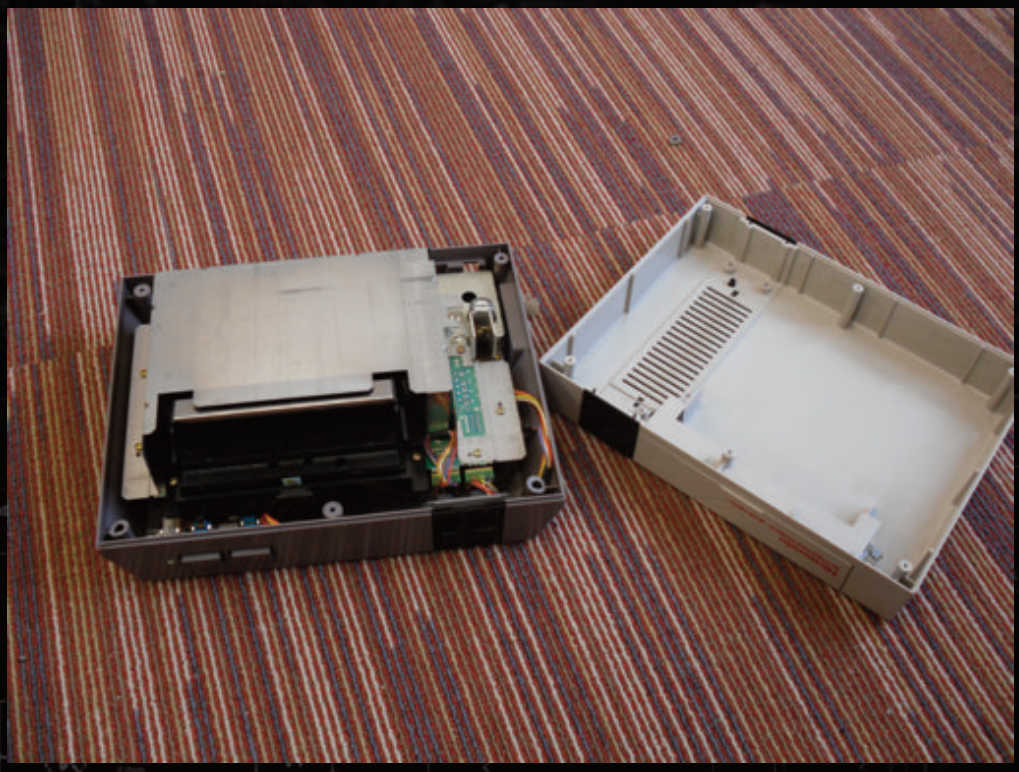
FIRST STEP

Nintendo NES disassembly

Step 02/10



-> In a perfect world, you should get this

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CIRCUIT BENDING
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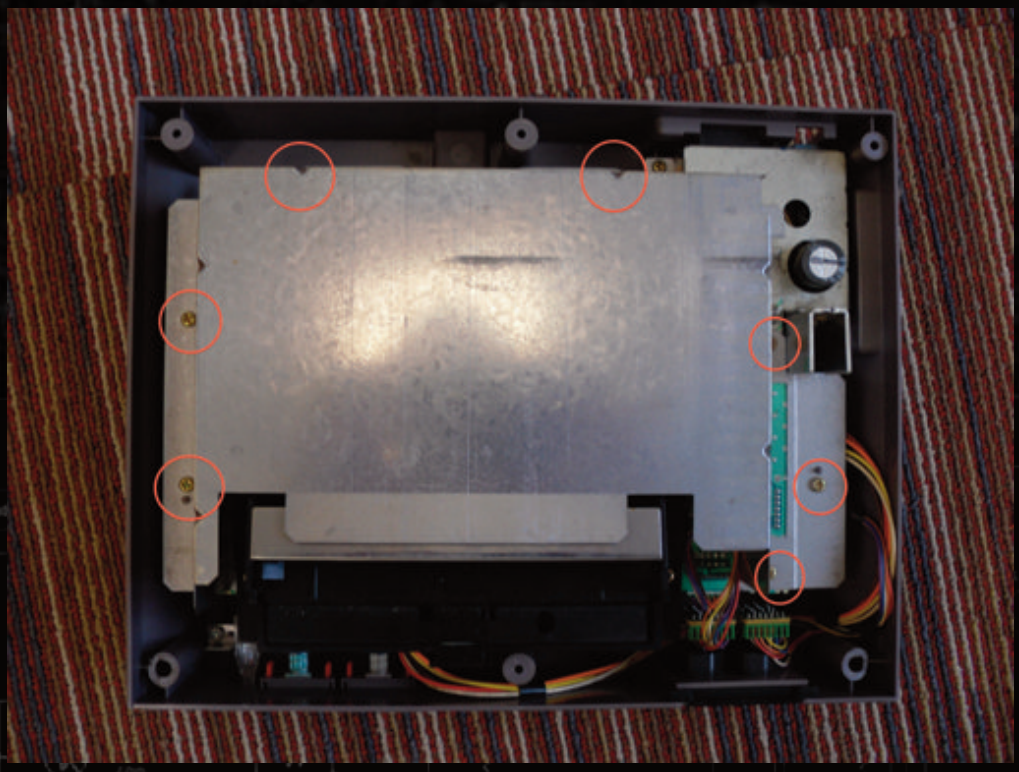
FIRST STEP

Nintendo NES disassembly

Step 03/10



-Unscrew the 7 screws from the metal cover

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CIRCUIT BENDING
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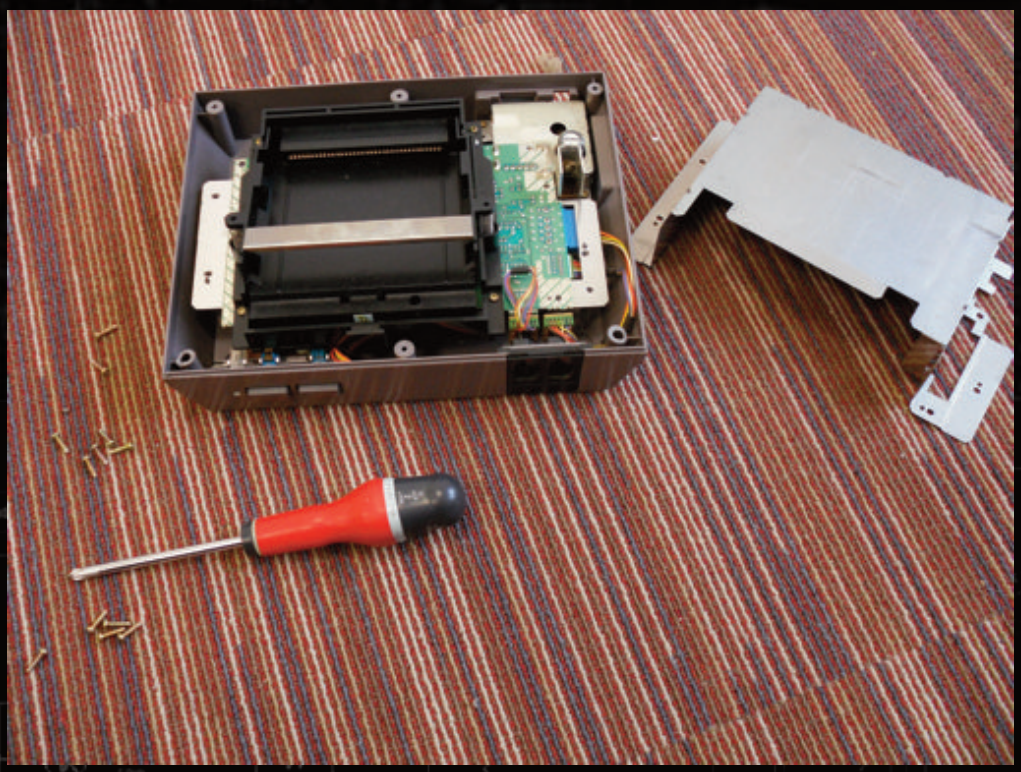
FIRST STEP

Nintendo NES disassembly

Step 04/10



-> In a perfect world, you should get this

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CIRCUIT BENDING
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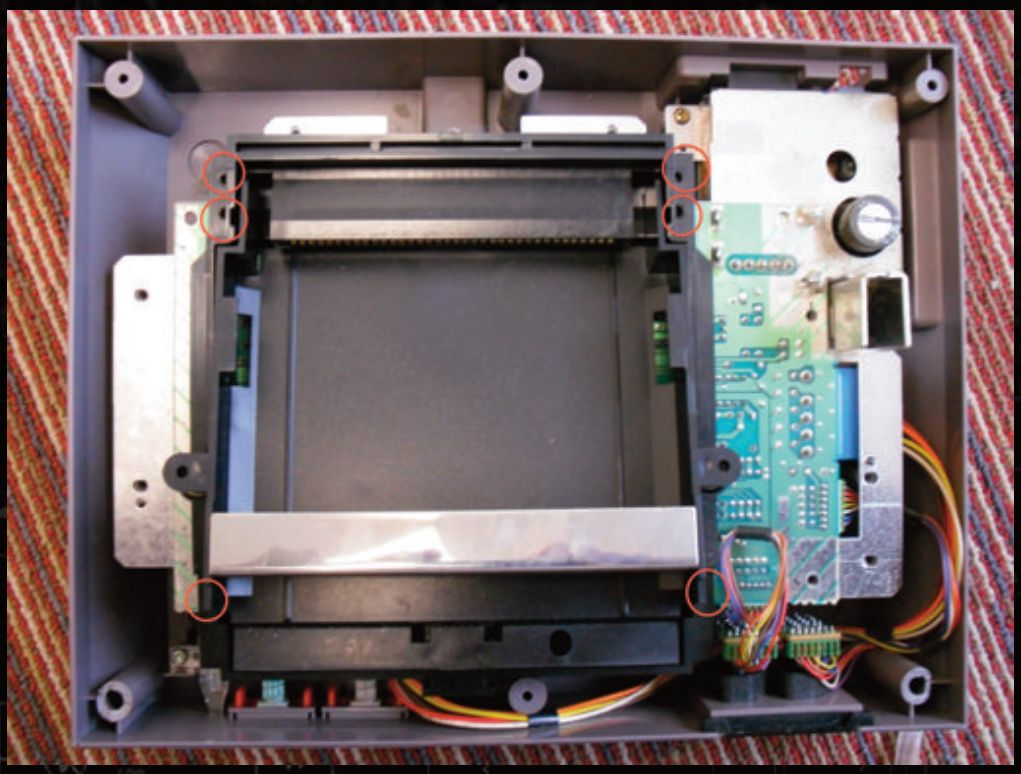
FIRST STEP

Nintendo NES disassembly

Step 05/10



-Unscrew the 6 screws of the cartridge holder
-There are two screw that do not have the same length, identify them for futur reassembly.

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CIRCUIT BENDING

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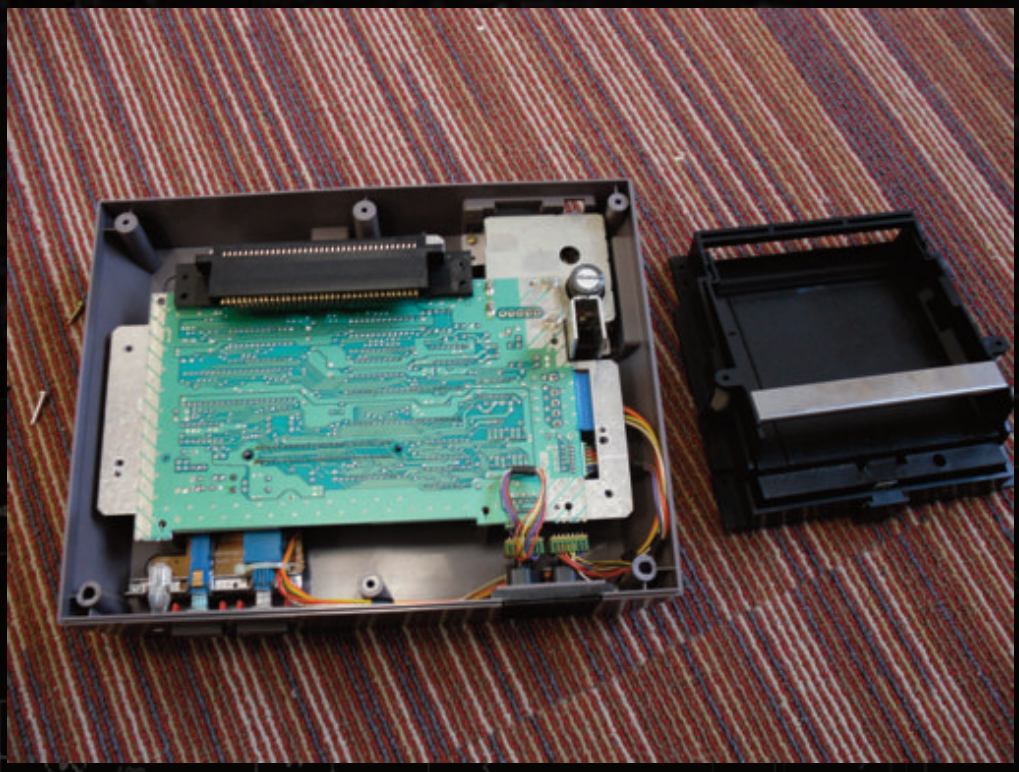
FIRST STEP

Nintendo NES disassembly

Step 06/10



-> In a perfect world, you should get this

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CIRCUIT BENDING
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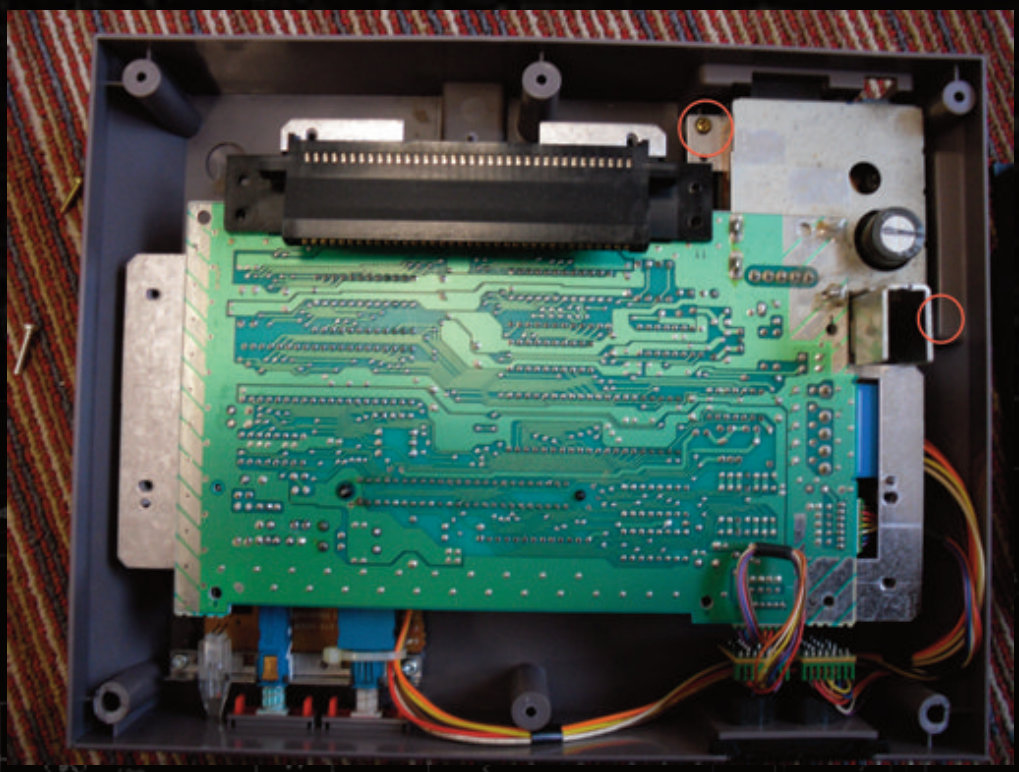
FIRST STEP

Nintendo NES disassembly

Step 07/10

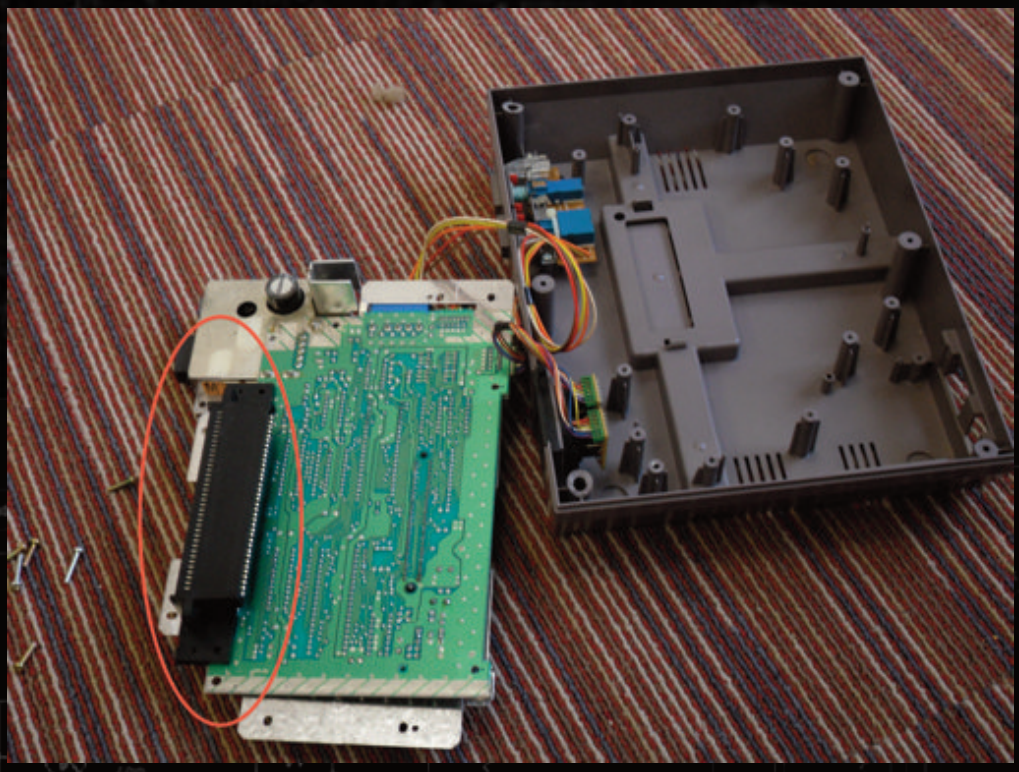


-Unscrew the two last screws
-Take Gently the circuit board (note that is attached to the NES by cables)

FIRST STEP

Nintendo NES disassembly

Step 08/10



-> In a perfect world, you should get this

-Take this opportunity to gently remove the car-tridge holder.

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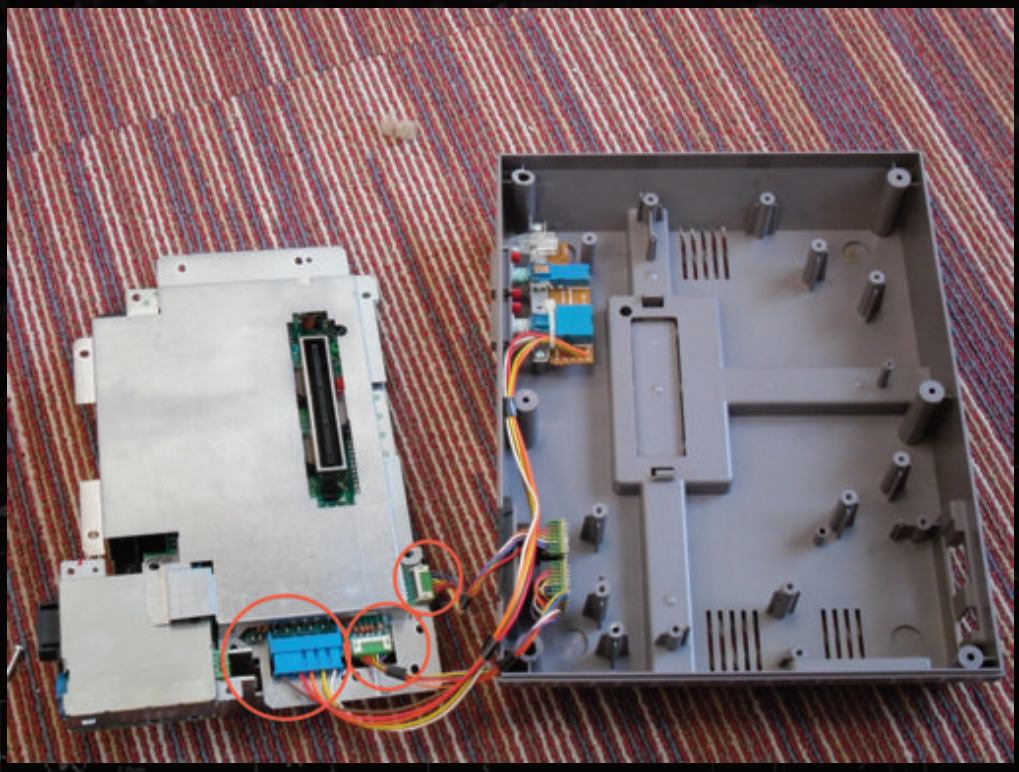
FIRST STEP

Nintendo NES disassembly

Step 09/10

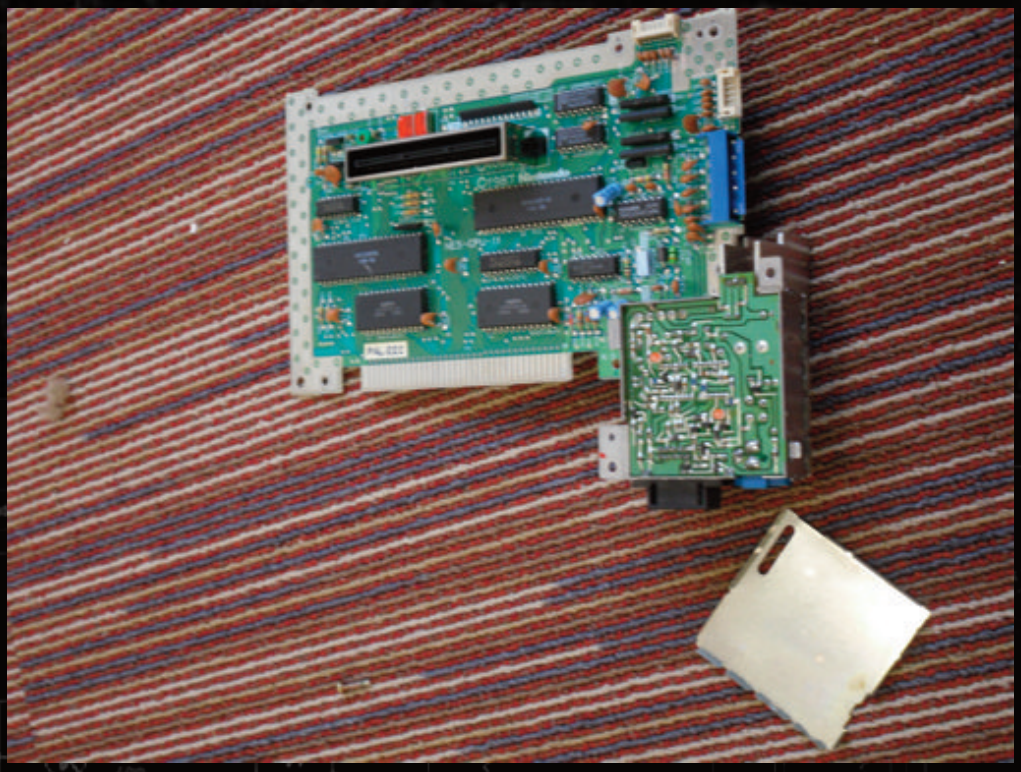


-Turn back the circuit
-Carefully remove the 3 cable connector.
-Carefully remove the metal covers

FIRST STEP

Nintendo NES disassembly

Step 10/10



-> In a perfect world, you should get this

-> Here is the NES is disassembly!

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CIRCUIT BENDING
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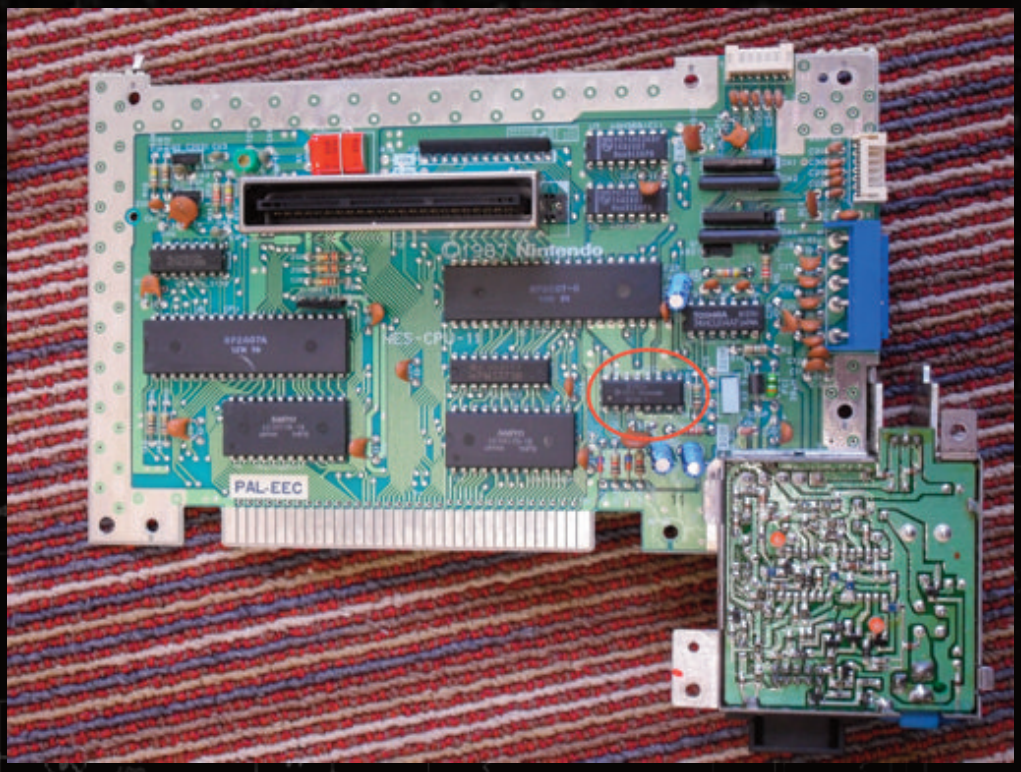
3-LOCKOUT CHIP

What is LockOut Chip ?

Step 01/04

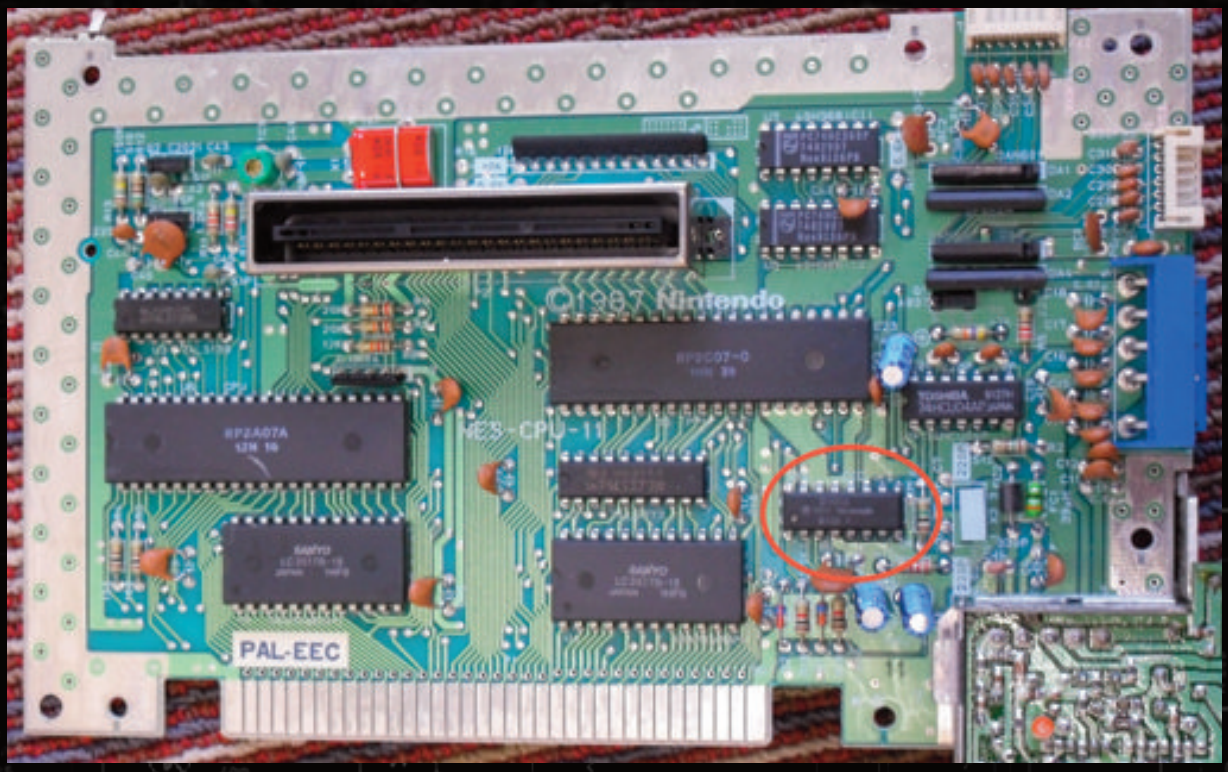


This is a security chip implemented by Nintendo to prevent play with imported games: impossible to play on a European NES games with Japanese or American. The problem if you want to use MIDINES with an europeen NES, you can't.

3-LOCKOUT CHIP

Identify and desactivate

Step 02/04



-The chip is identified in the circuit by "U10 CIC," and is usually write on top "3195A" (France, Europe) or sometimes "3193A" (U.S.) or "3197A" or "3196A" (Hong Kong).

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3-LOCKOUT CHIP

Identify and desactivate

Step 03/04

-To disable the chip, you must discoinnect the PIN No. 4 of the chip : unsolder it or, more straight forward, cut with a cutter, or destroying it with a Dremel. (mini drill)

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CIRCUIT BENDING
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3-LOCKOUT CHIP

Step 04/04

-I chose the most violent: a little bit of Dremel: here is the result, not very clean, but effective!

-> And here is your NES without area restriction!

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CIRCUIT BENDING
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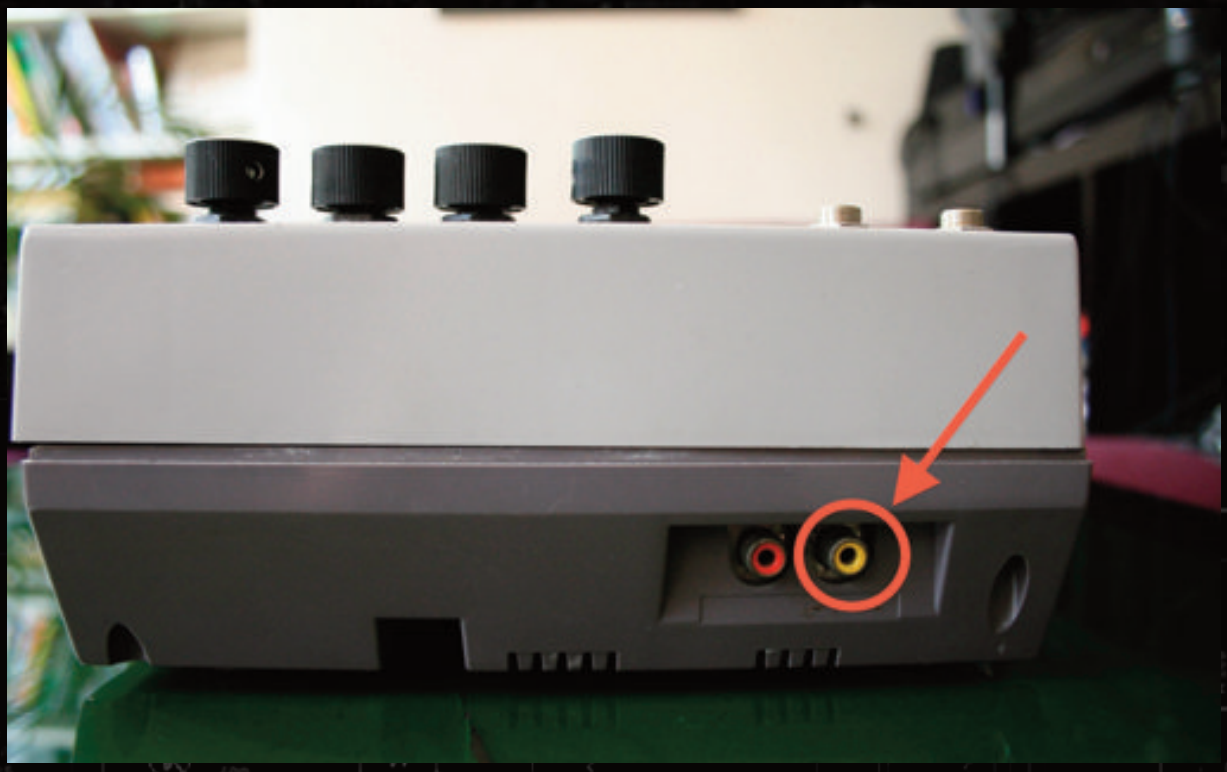
4-VIDEO OUTPUT

Composite Video Output

Step 01/06



Why add a composite video output on your NES? because the original NES has only one RGB output, suddenly impossible to connect to a computer screen, TV, projector ... The composite output allows it! (note that some European NES has a composite video output)

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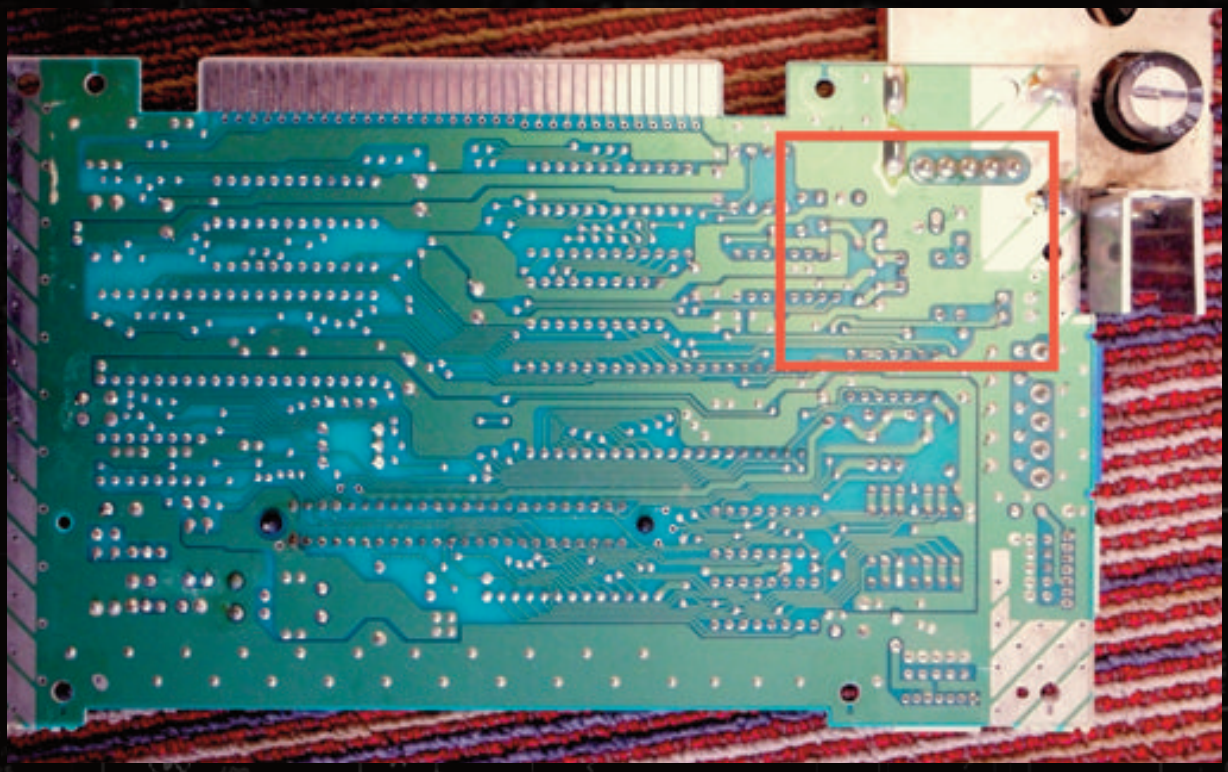
CIRCUIT BENDING
BIT CRUSHER

4-VIDEO OUTPUT

Composite Video Output

Step 02/06



It happens here, zoom and explanation on the next page

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CIRCUIT BENDING
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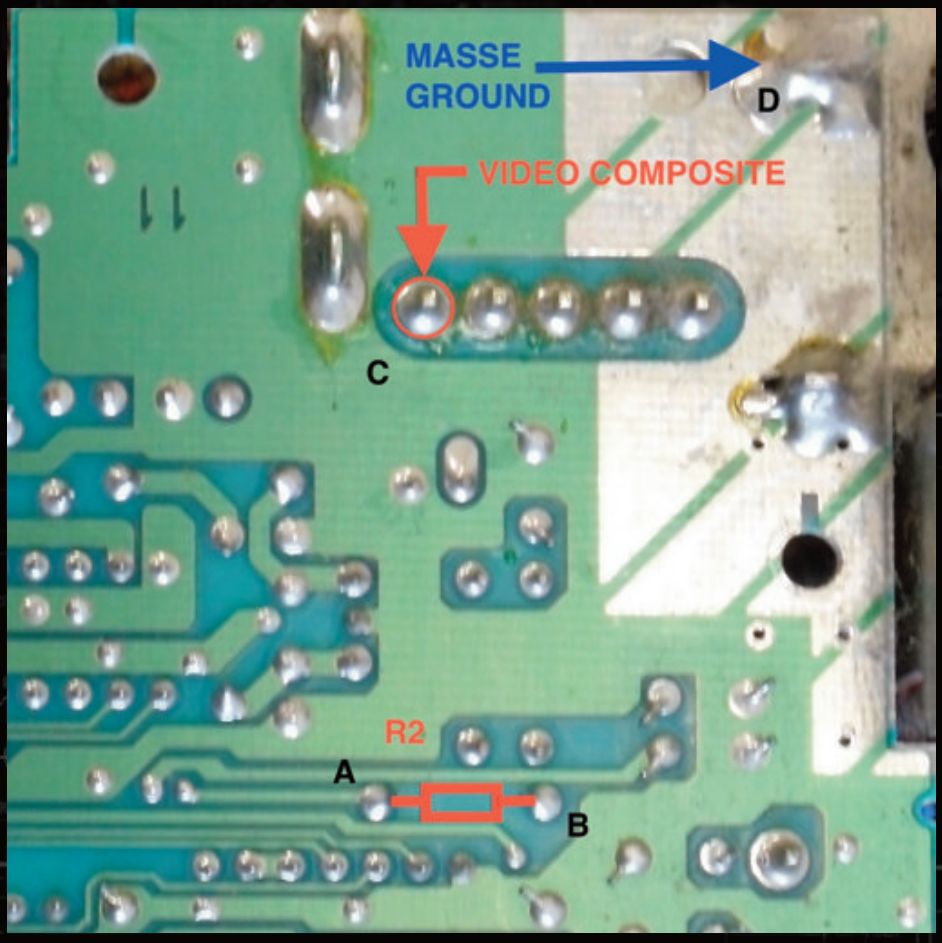
4-VIDEO OUTPUT

Composite Video Output

Step 03/06



-Unsolder-R2 (between points A and B)
-Put aside-it will eventually reservir
(if you break it, don't panic you can replace it with a resistance of 140 ohms.)

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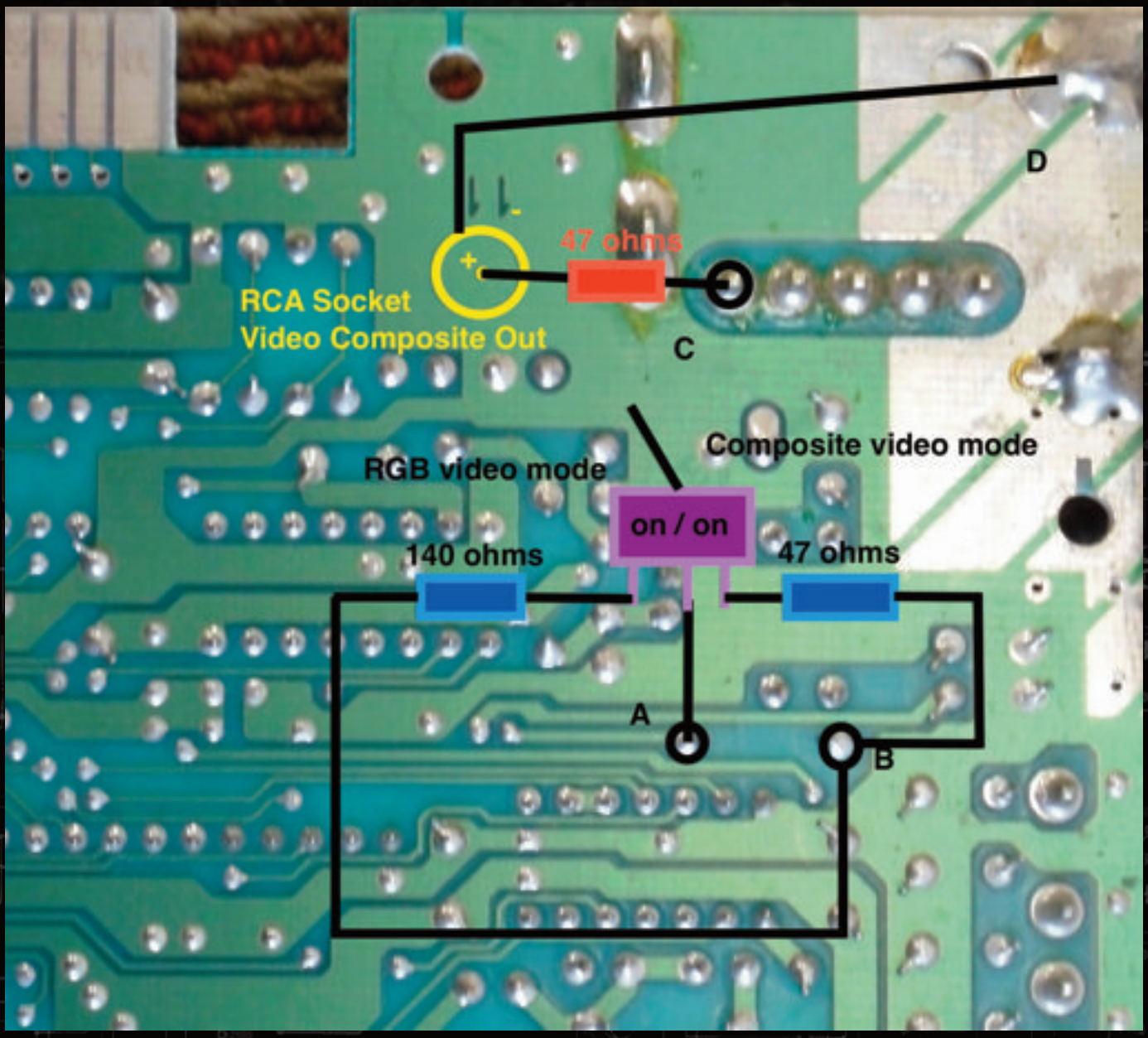
4-VIDEO OUTPUT

Composite Video Output

Step 04/06



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CIRCUIT BENDING
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4-VIDEO OUTPUT

Composite Video Output

Step 05/06

-Connect the middle point of the switch to the point A

-Solder left connection of the switch with resistance R2 (140 ohm that was previously unsoldered to step # 3) then connect to point B

-Solder right connection of the switch with 47 ohm resistor and connect to point B

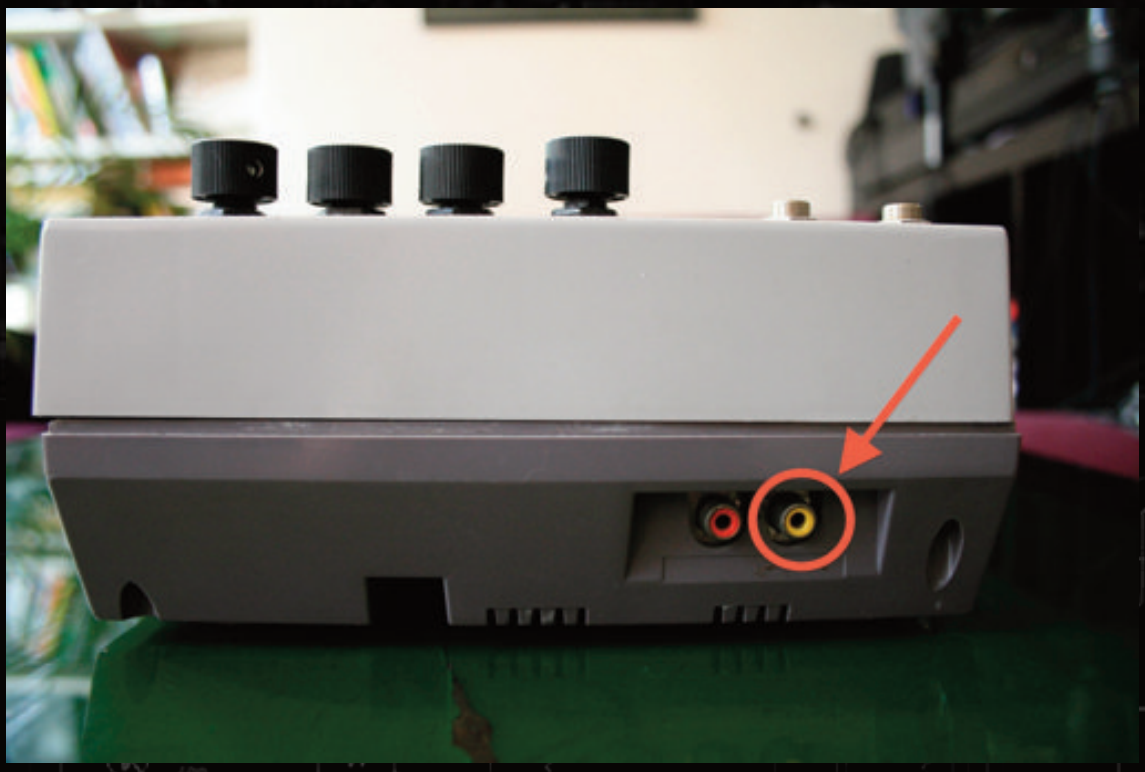
Solder the second resistance 47 ohms to point C and connect it to the positive connection of the RCA

-Solder RCA negative connection to Point D (ground).

4-VIDEO OUTPUT

Composite Video Output

Step 06/06



Here you have now your composite video output. The interuptor can choose the video output impedance of the NES and avoid having a gray image. There is a position where you are in composite output and another position when you are in RGB output.

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CIRCUIT BENDING
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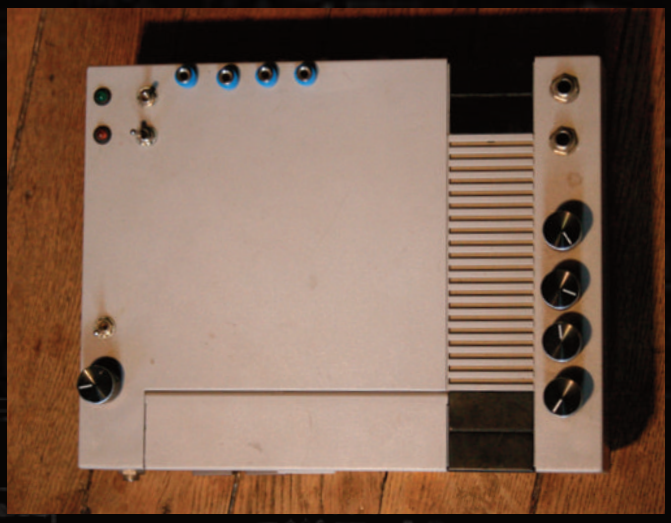
5-AUDIO MODS

Audio Mods

Step 01/06



The sound of the original Nintendo NES is mono although its sound chip is stereo! Nintendo for economical reasons put together the two channels! This modification re-link the sound into 2 channels: one side of the noise osc + TRI + channel wav (rhythm + bass often) and the other channel for osc Pulse. We will take the opportunity to install two separated outputs, plus a stereo headphone socket, as well as the volumes of the two channels.

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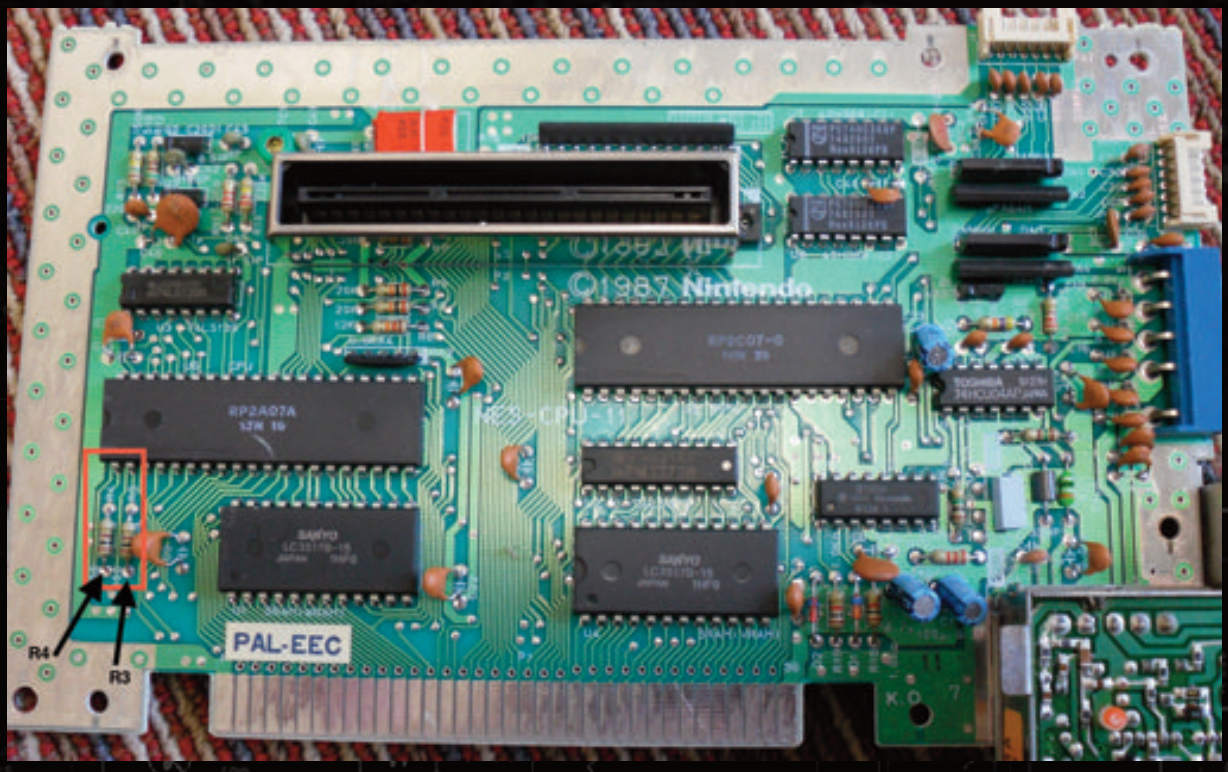
5-AUDIO MODS

Audio Mods

Step 02/06



->Locate the two-résitances R4 and R3, which represent the two channels of the NES.

-The pulse-R4 =

-Noise-R3 =, sorting, wav

-> Unsolder them!

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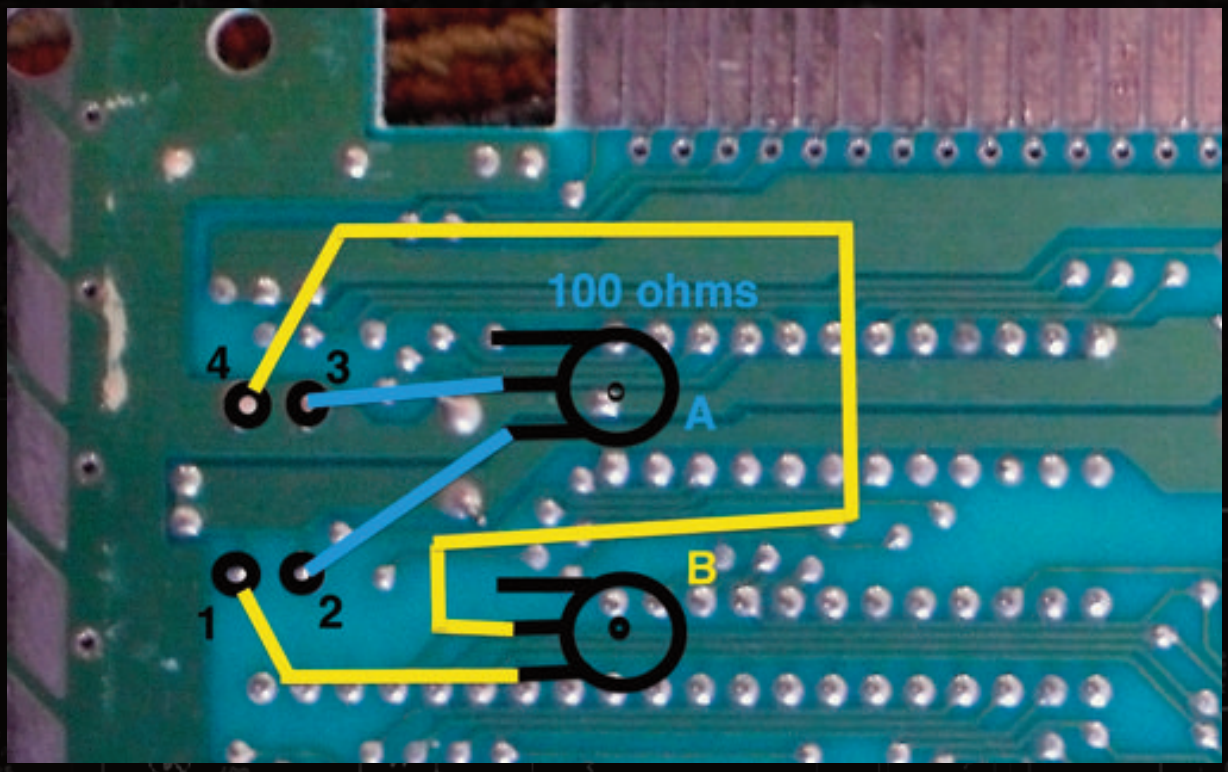
5-AUDIO MODS

Channel controle volume

Step 03/06

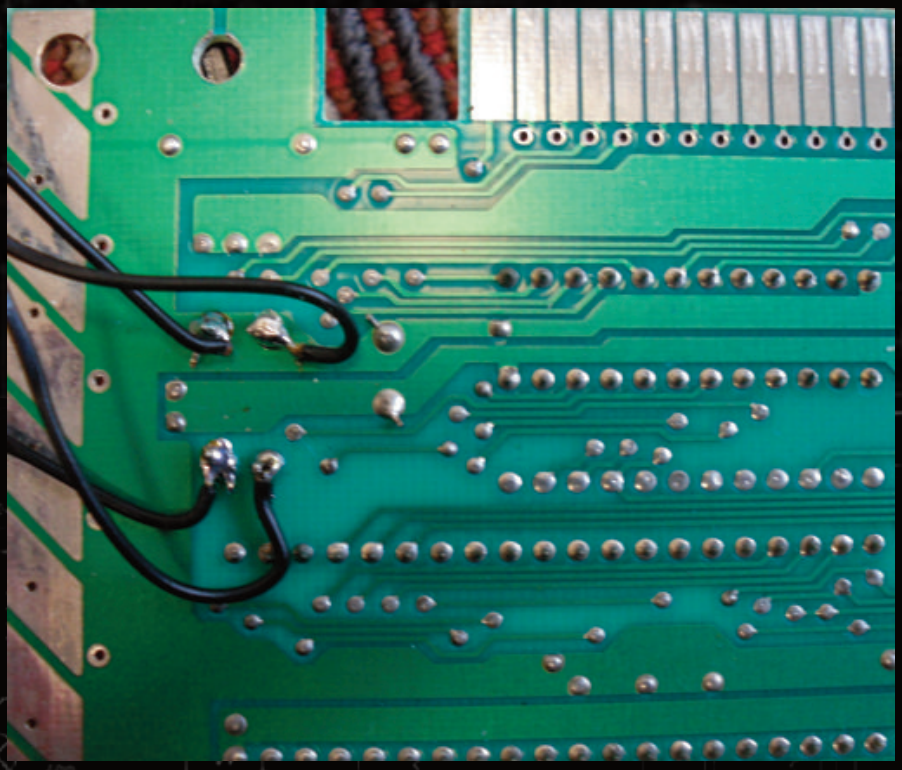


-Turn back the circuit, replace resitor you just unsolder with two 100 ohm knob

5-AUDIO MODS

Channel controle volume

Step 03/06



-> View of the 4 wire used to be connected with two potentiometers 100 ohms.

5-AUDIO MODS

Channel controle volume

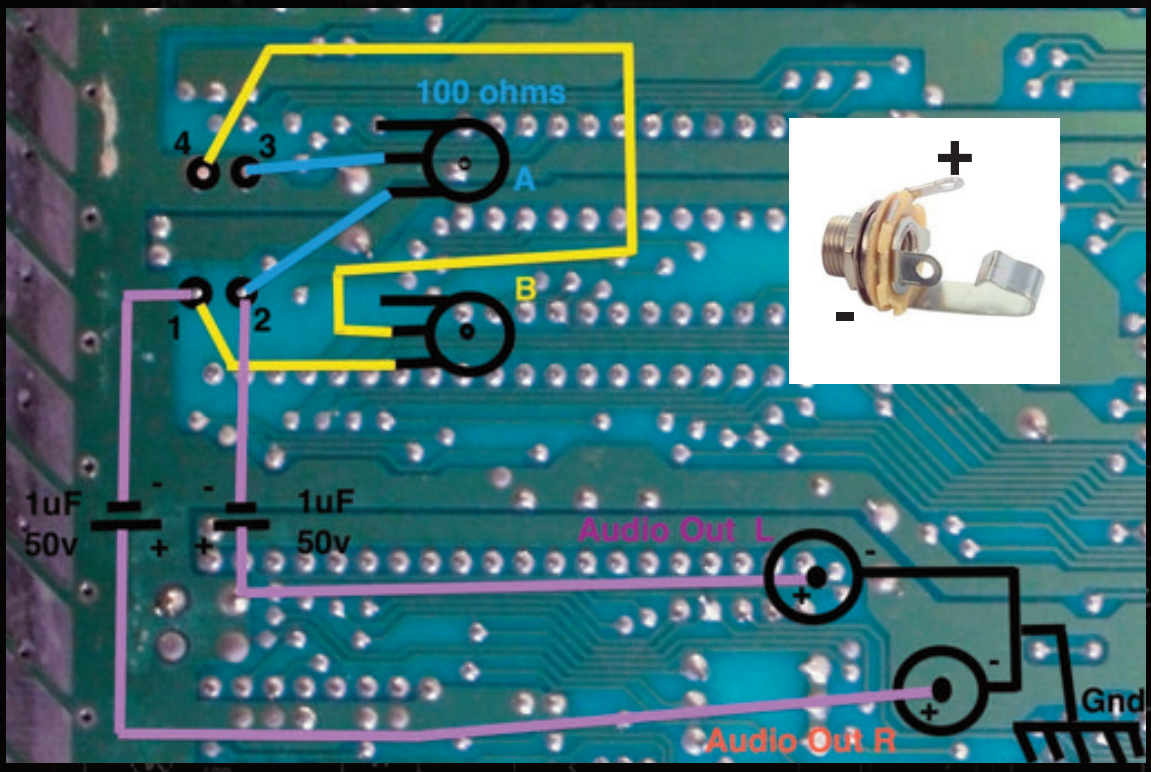
Step 03/06

->overview of the position of the knobs volume of individual tracks, as well as two female jacks 6.35 will be used to separate outputs.

5-AUDIO MODS

Individual Output

Step 04/06



-Solder from point 2 the negative leg of the capacitor 1uF (respect polarity)

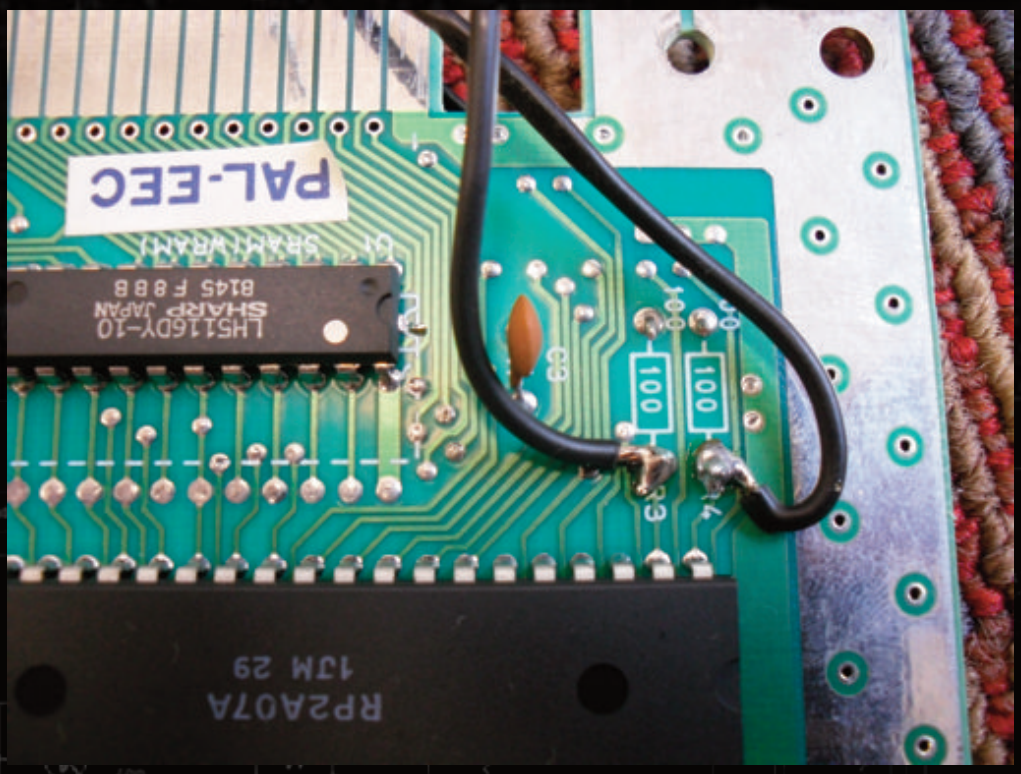
-Connect the positive side of capacitor direcetement on the positive leg of the 6,35 jack AudioOut L, connect the negative leg to the ground.Repeat operation starting from point 1

NB : Ground = Point D from step “Video output”

5-AUDIO MODS

Individual Output

Step 04/06



-> Design: I chose to resolder two new wire on the other side of the circuit.

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5-AUDIO MODS

Individual Output

Step 04/06

-> Overview under the hood, layout wire, pay attention to fix itself, it will facilitate reassembly of the NES

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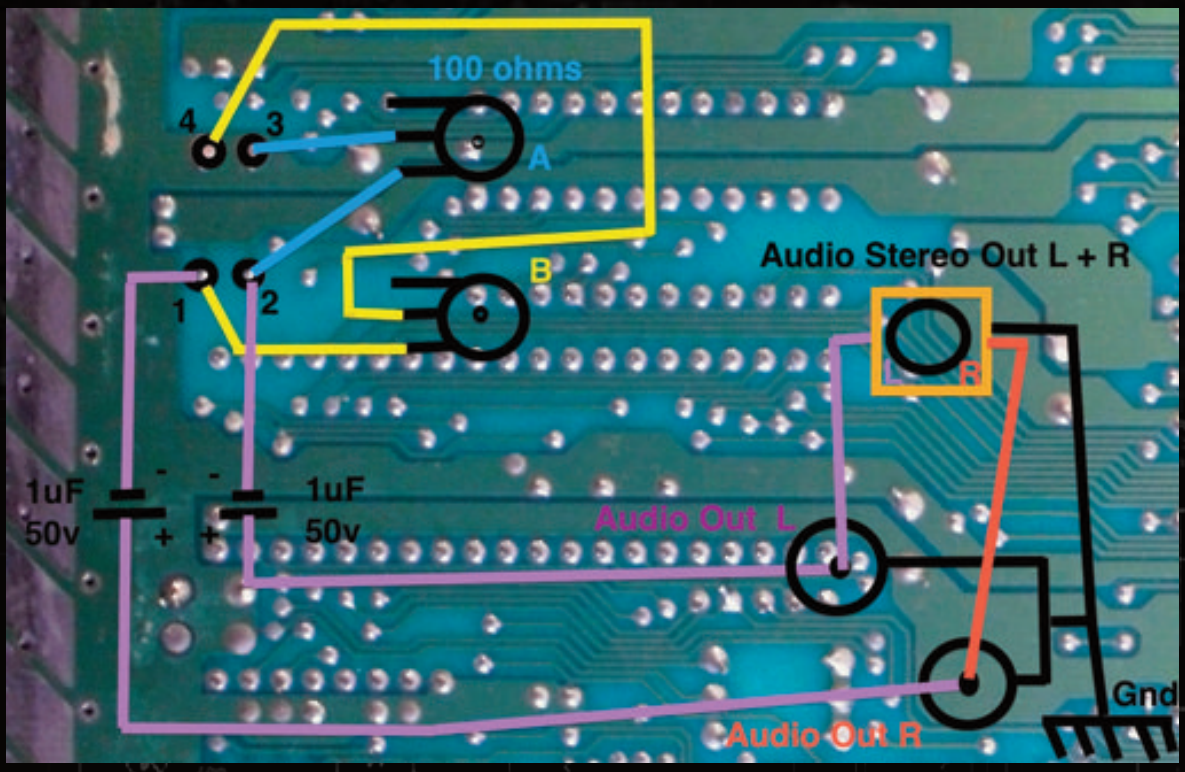
5-AUDIO MODS

Headphone Output

Step 05/06



-Install Stereo 6,35 Jack in parallele of the separate outputs, do not forget to connect the ground to the negative leg of the stereo Jack.

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5-AUDIO MODS

Headphone Output

Step 05/06

-Overview of the Stereo output

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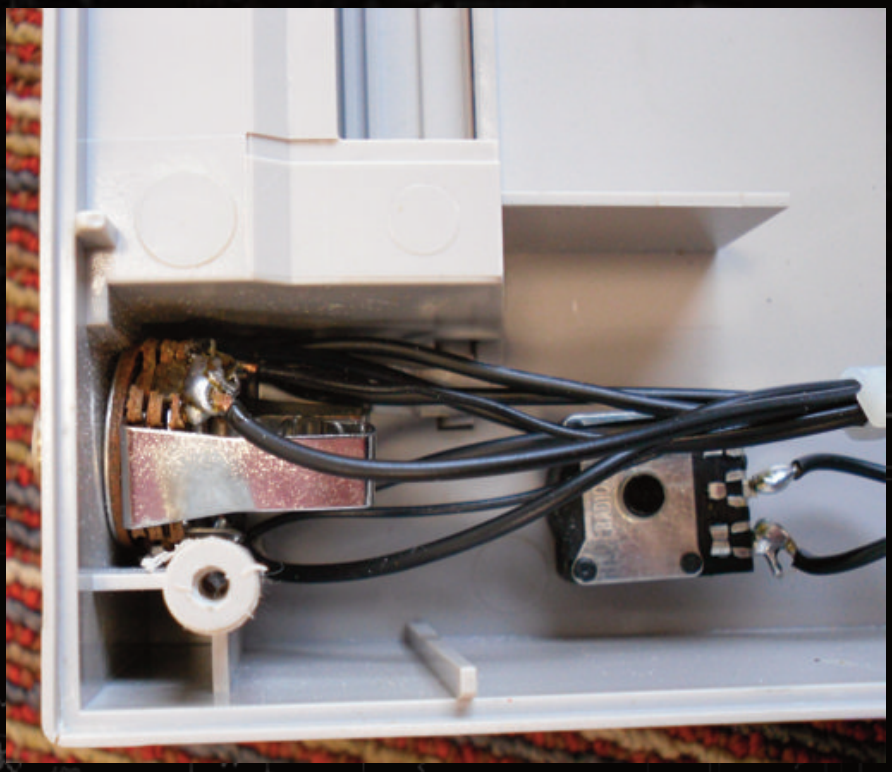
5-AUDIO MODS

Headphone Output

Step 05/06



Seen from below, the stereo jack.

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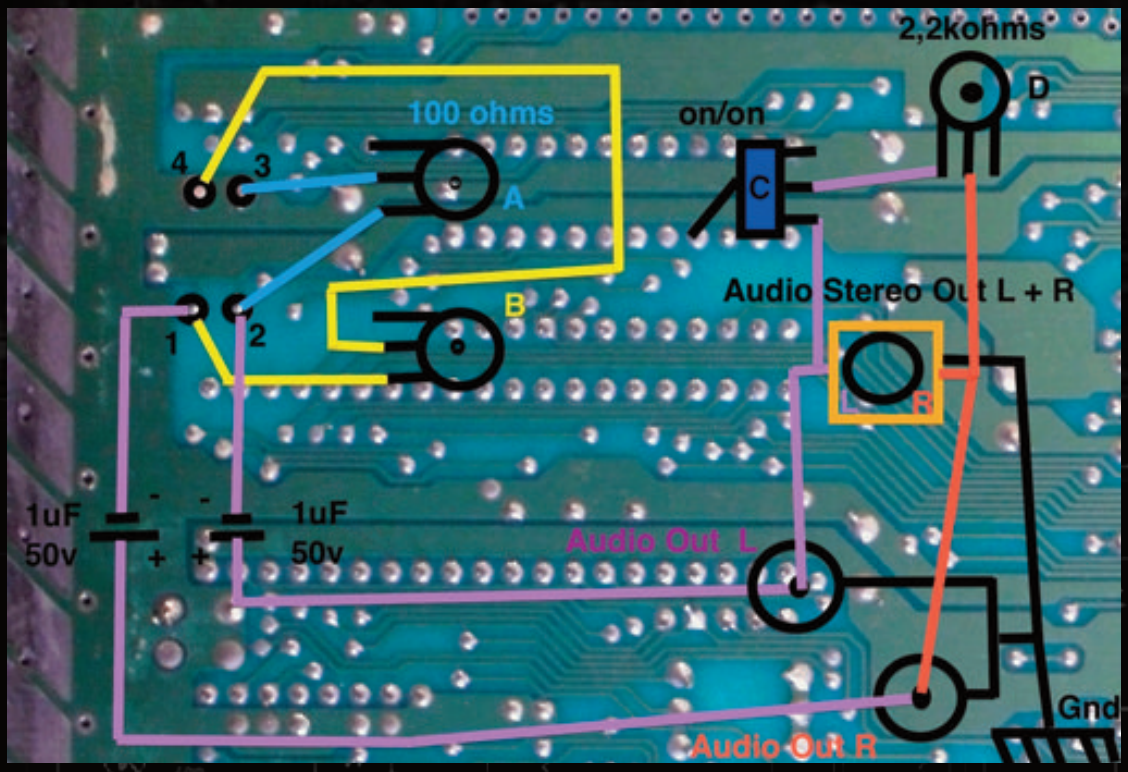
5-AUDIO MODS

Stereo balance

Step 06/06



Add in parallel the D knob 2,2 kohms and the C switch. This modification allows to set the stereo imaging of the signal thanks to the D knob you spend full stereo to full mono. The C switch allows you to enable or disable this option.

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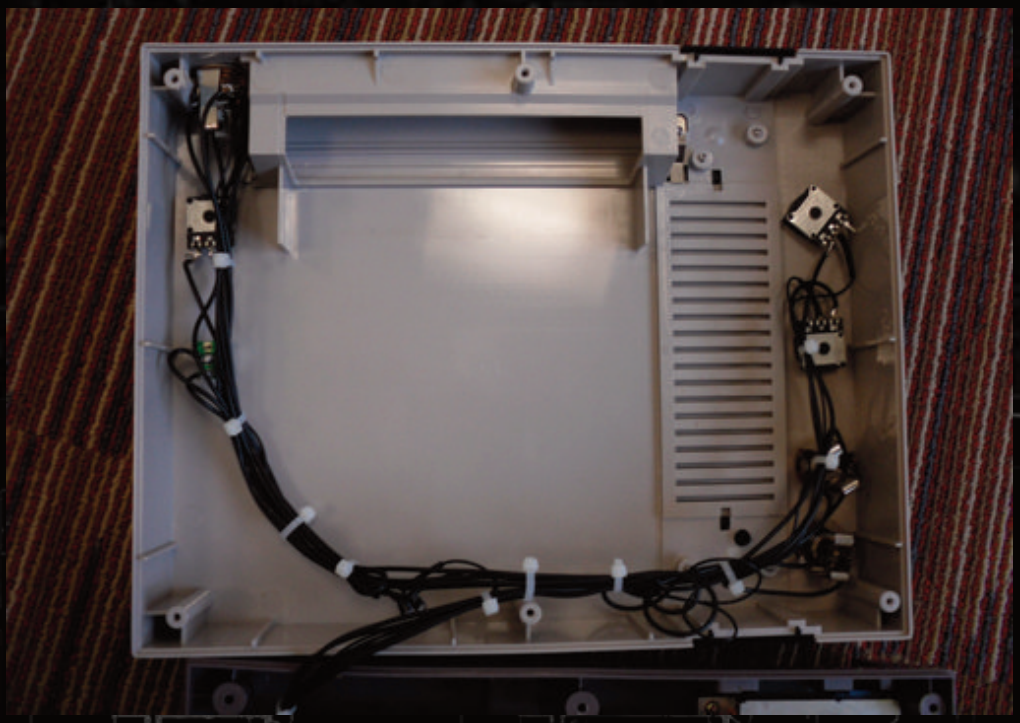
5-AUDIO MODS

Stereo balance

Step 06/06



-Wire positioning.

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CIRCUIT BENDING

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6-CIRCUIT BENDING

Video Bending

Step 01/04

The aim of video-bending is to create visual glitch with the circuit bend of the NES video chip. Here are the results we can obtain:

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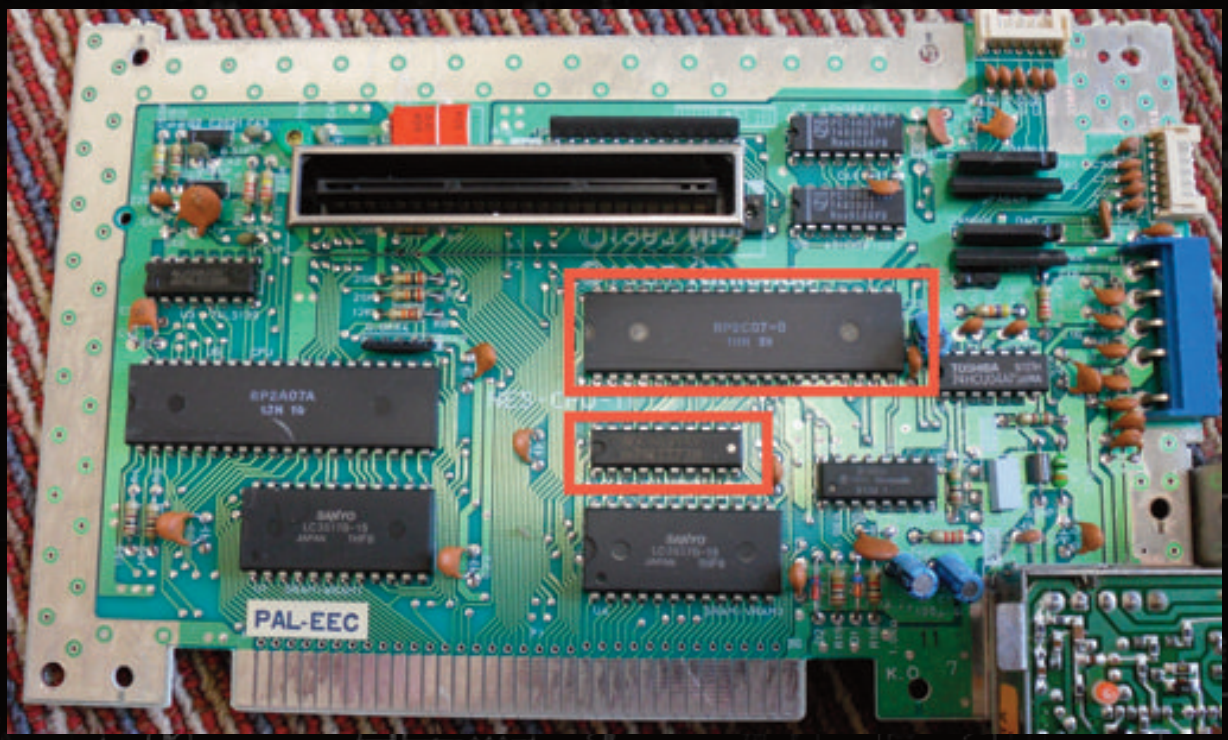
6-CIRCUIT BENDING

Video Bending

Step 01/04



-Here is the 2 target chip :
RP2C07 (on chip); U5 PPU (on circuit)
SN74LS373N (on chip); U2 74LS373 (on circuit).
sometimes this chip is named HD74LS373P

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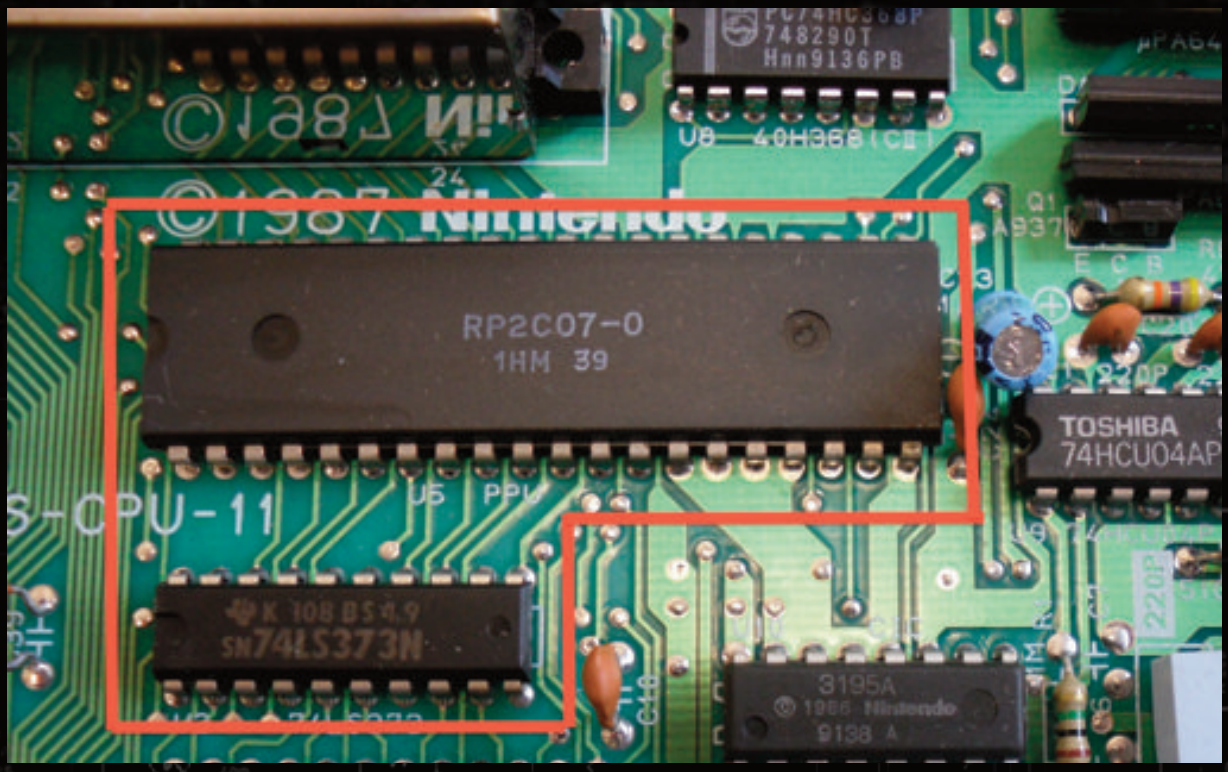
6-CIRCUIT BENDING

Video Bending

Step 02/04



For video-bend, simply connect the legs of these circuits in pairs to achieve visual glitch, some combinations are crashing the NES, others do not

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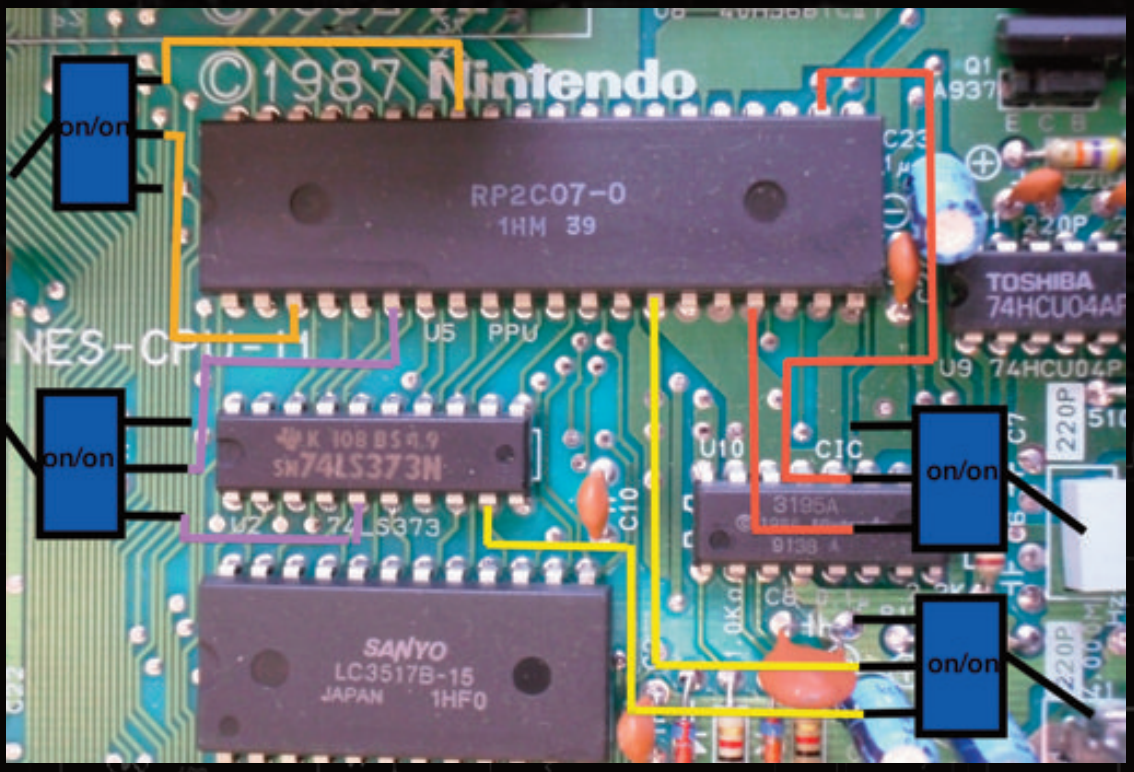
6-CIRCUIT BENDING

Video Bending

Step 03/04



-Once your Selected bend, solder a wire on each chip leg you choose.
Connect wire by pairs to a device of your choice: switch on / on, push button, or RCA jack socket

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CIRCUIT BENDING

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6-CIRCUIT BENDING

Video Bending

Step 04/04

BONUS

Restore the cartridge holder

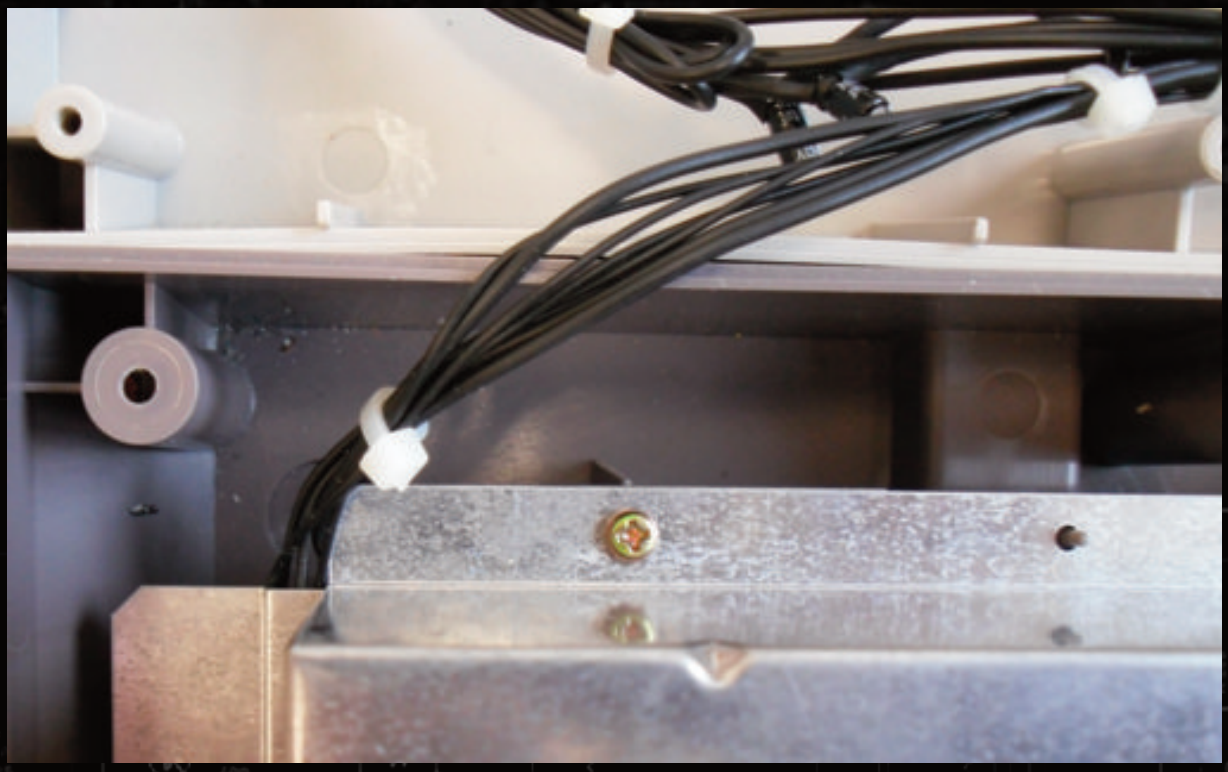
Step 01/01

-if you want to give to a 2nd youth to your NES and stop NES blinking, you can change the cartridge connector with a new one, you will find ebay, search for “NEW NINTENDO NES 72 PIN CONNECTOR “

7-CONTACT

If you have asking or request :

Bit-crusher@hotmail.com



->There is other tutorial on my website: Speak and spell, TR505, DR220, TB303

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