DIY Nintendo GAMEBOY Classic Flash Cartridge.

PROCEDURES:

Please Read through this entire document before you commence soldering.

You can use the accompanying Instructional Videos I have made, along with this PDF Document for the best chances of success. YouTube VIDEO LINK Below:

**PART #1 of 5:**

http://youtu.be/KzrYFI0aHVo

# Need some help? Join the GAMEBOY ELECTRONICS Group:

http://groups.yahoo.com/group/GAMEBOY_Electronics/

STEP #1:
The first step is to de-solder the original ROM chip from the Game Cartridge PCB. If you don't have access to a Special De-soldering Iron, the best way to remove the existing solder from the ROM pins is to use Rosin FLUX solution and copper Wire Solder wick. This is available at almost any Electronics Component store or even Radio Shack.

Coat the Copper Wire wick with Rosin Flux solution. When this wick then comes into contact with heated molten solder, it will chemically bond the solder to the Copper Wire wick. Just like metal to a magnet. It will literally suck away the Solder from the IC's PINs.
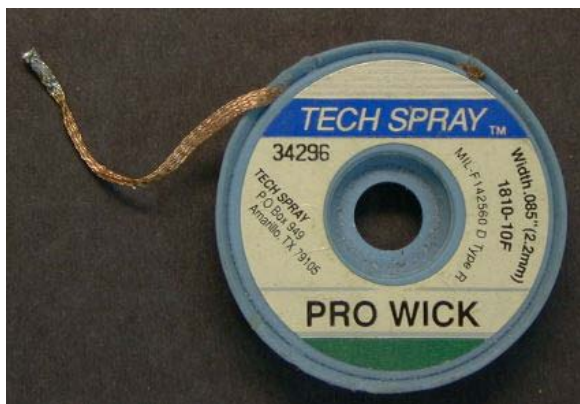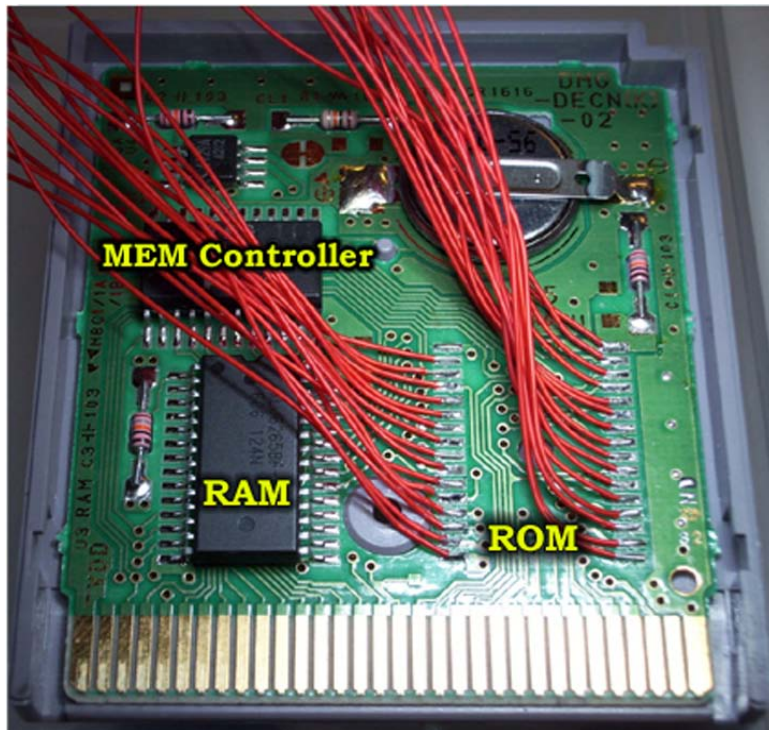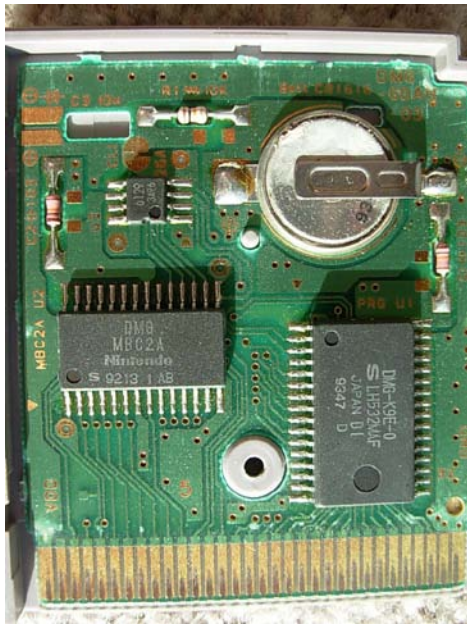
The Above images are Gamboy cartridges with onboard RAM and a Battery backup. The cartridge on the bottom is "YOSHI's BLOCKBALL" which has an **"MBC1"** memory bank controller chip.

A similar cartridge is "ZELDA DX" and this cart is recommended for this project.

The key difference is that the "ZELDA DX" cart uses an **"MBC5"** Memory controller chip which supports almost all games for the Gamboy & Gameboy color, compared to the "MBC1" chip. In the above image, You can see the 30 AWG wires soldered to the Cartridge ROM contacts. These wires will then connect to your PLCC socket or your ZIF socket depending on which FLASH chip package you choose to use.

The Cartridge ROM Chips are all Surface-mount components and are very small. It is recommended that you use a Magnifying lamp or better yet, a Dissecting Microscope to perform all of your soldering work.
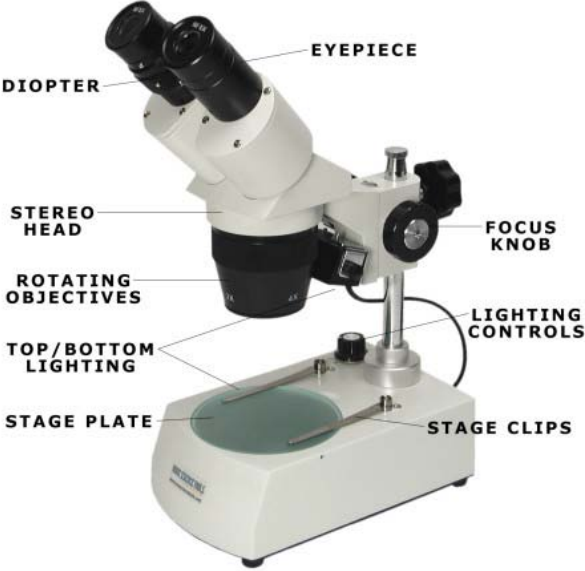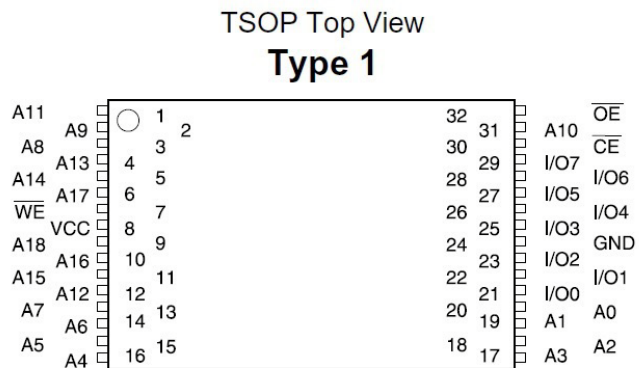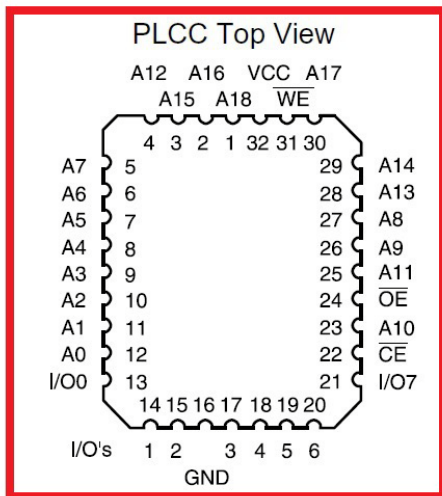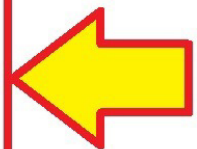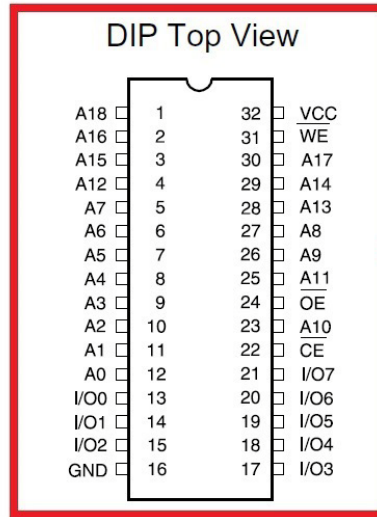
STEP #2:

Solder a 32-PIN PLCC **"BURN-IN TEST"** Socket from PLASTRONICS, along with a 47K ohm Resistor to the Cartridge PCB ROM contacts; as shown in the Wiring diagram on the next pages further below.

The ATMEL 32 Pin PLCC and the 32 Pin DIP package version of the flash chips work exactly the same. So it is simply up to you which chip and socket you wish to use. **DIP or PLCC.**

Wiring of the socket pins for the DIP version of the chip will be exactly the same as in the diagram for the PLCC version. Simply match up the same pin names for either the PLCC or the DIP version and you are good to go. So pick which chip package works for you.

Pin Configurations

Pin Name	Function
A0 - A18	Addresses
$\overline{CE}$	Chip Enable
$\overline{OE}$	Output Enable
$\overline{WE}$	Write Enable
I/O0 - I/O7	Data Inputs/Outputs

DIP Top View

A18	1	32	VCC
A16	2	31	$\overline{WE}$
A15	3	30	A17
A12	4	29	A14
A7	5	28	A13
A6	6	27	A8
A5	7	26	A9
A4	8	25	A11
A3	9	24	$\overline{OE}$
A2	10	23	A10
A1	11	22	$\overline{CE}$
A0	12	21	I/O7
I/O0	13	20	I/O6
I/O1	14	19	I/O5
I/O2	15	18	I/O4
GND	16	17	I/O3

PLCC Top View

A12 A16 VCC A17
A15 A18 $\overline{WE}$

4 3 2 1 32 31 30

A7	5	29	A14
A6	6	28	A13
A5	7	27	A8
A4	8	26	A9
A3	9	25	A11
A2	10	24	$\overline{OE}$
A1	11	23	A10
A0	12	22	$\overline{CE}$
I/O0	13	21	I/O7

14 15 16 17 18 19 20

I/O's   1 2   3 4 5 6

GND

TSOP Top View

Type 1

A11
A9   1 2
A8
A13   3
A14   5
A17   6
$\overline{WE}$ 7
VCC   8
A18   9
A16   10
A15   11
A12   12
A7   13
A6   14
A5   15
A4   16

32 31 A10 $\overline{OE}$
30 29 I/O7 $\overline{CE}$
28 27 I/O5   I/O6
26 25 I/O3   I/O4
24 23 I/O2   GND
22 21 I/O0   I/O1
20 19 A1   A0
18 17 A3   A2

ATMEL

It is highly reccomended that you use either the **PLCC 32-PIN TEST-BURN-IN socket** or the **DIP 32-PIN ZIF socket**, depending on the Flash chip packacge you choose to use for this project. PLCC or the DIP, either version will work and these are recomended over the cheeper plastic ROM sockets, especially if you are going to be removing the chip frequently for programming. The sockets below are recomended.
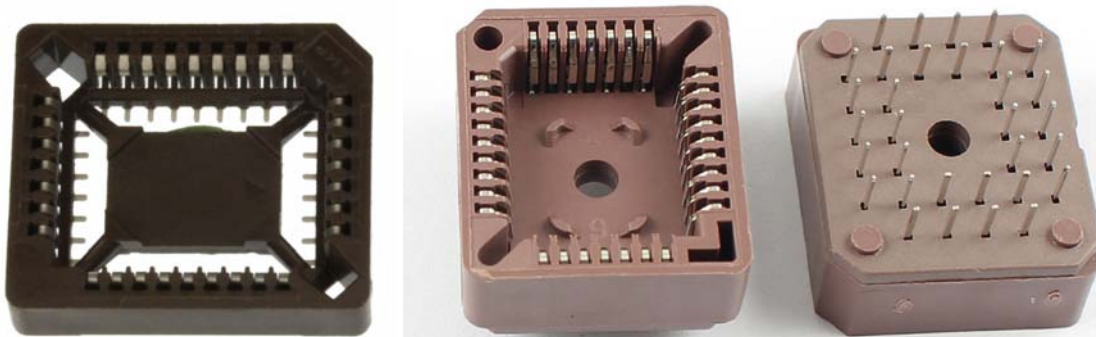
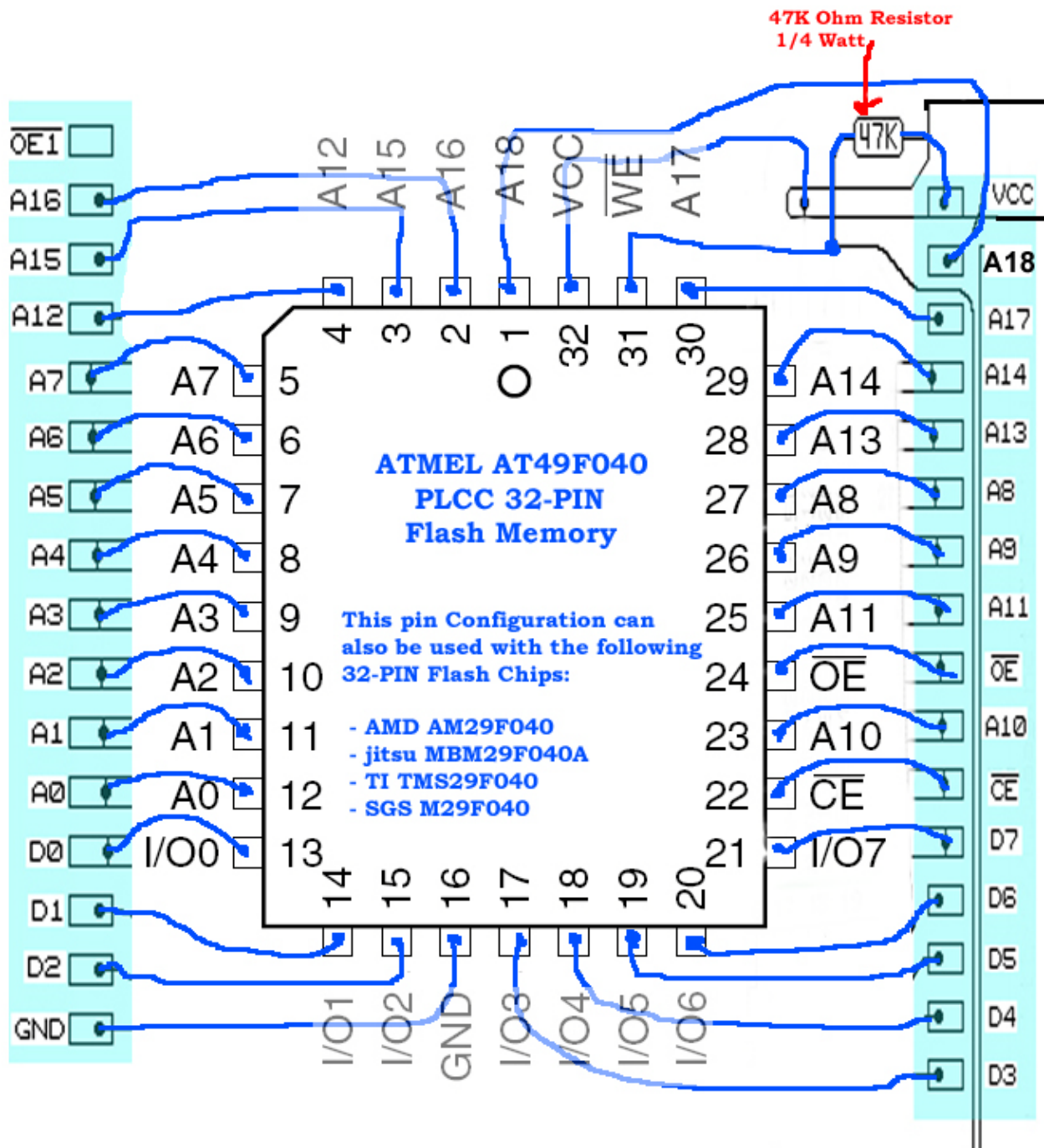LEFT: PLCC 32-PIN BURN IN TEST SOCKET by PLASTRONICS:
RIGHT: DIP 32-PIN ZIF SOCKET
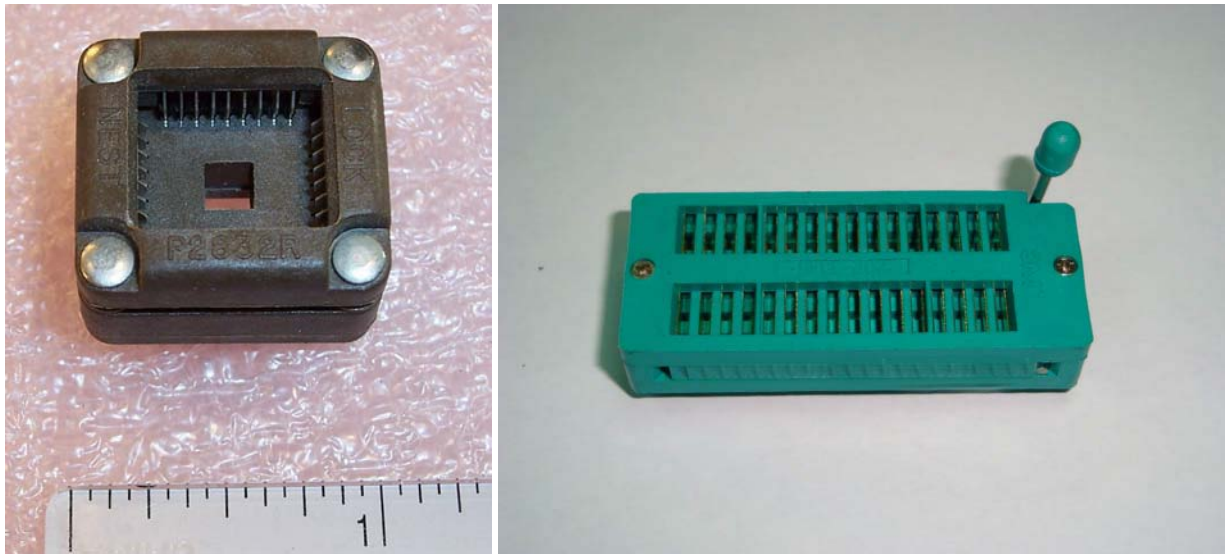
   Ebay or Digikey will carry these....ebay is probobly cheaper.

WARNING:
If you are going to use the cheaper plastic ROM PLCC sockets, as shown in the videos....be very careful not to damage the PINS when removing the PLCC chips, the plastic is very delicate and are easily damaged. **This is why the PLCC BURN-IN Sockets or ZIF sockets above are recomended.**


Download the Component datasheet for your DIP format flash chip from www.alldatasheet.com

47K Ohm Resistor
1/4 Watt

ATMEL AT49F040
PLCC 32-PIN
Flash Memory

This pin Configuration can
also be used with the following
32-PIN Flash Chips:

- AMD AM29F040
- jitsu MBM29F040A
- TI TMS29F040
- SGS M29F040

The PLCC socket will fit through a square hole at the top side of the cartridge that you must cut open.

It is recommended to use 26 AWG wire or better yet, to use 30 AWG insulated wire.
This will allow you to close the cartridge regardless of all the wiring work.
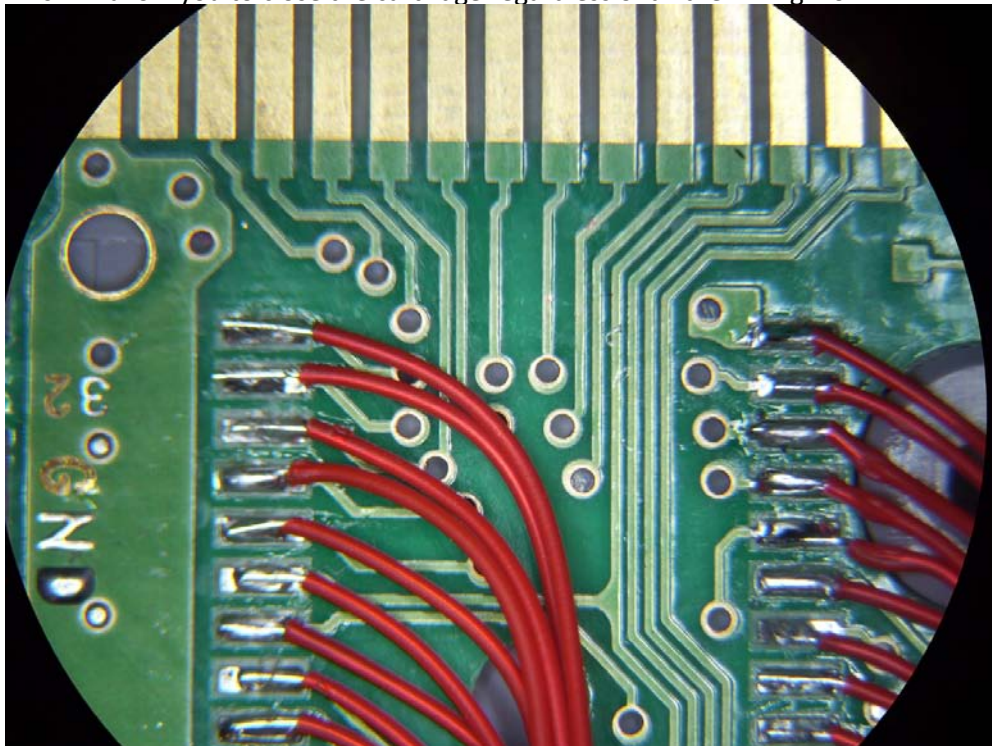
Use Rosin Flux solution and apply a small coat to each contact. Then pre-solder all connections with a very small amount of solder before connecting your wires.
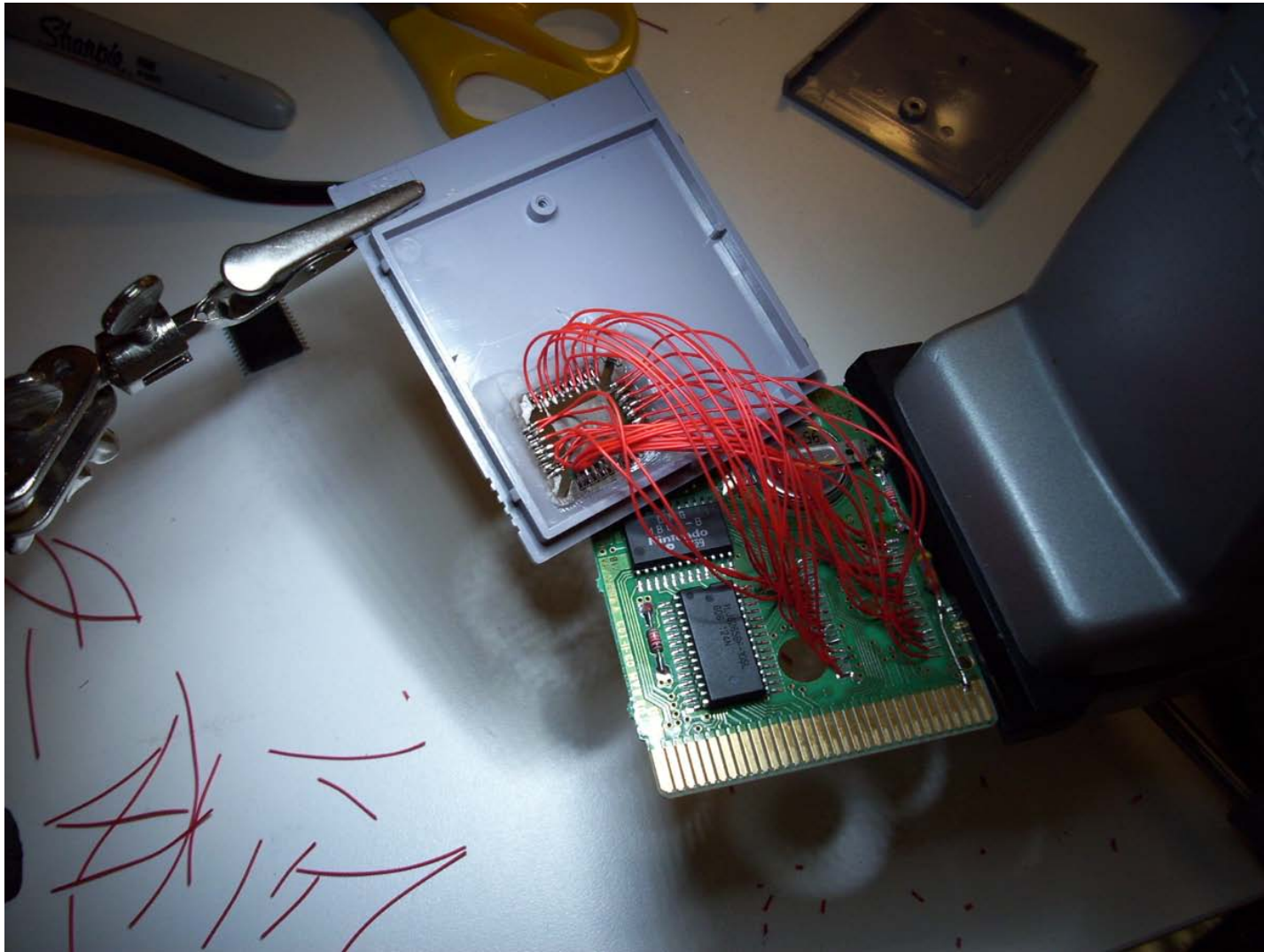
If you pre TIN your wire leads in the same manner, this will greatly improve your soldering work. Just be careful not to get to close to the adjacent contacts, a solder blob can be a pain to remove, especially if you run out of Flux and Copper wire wick.

STEP #3:
Program your FLASH Chip with the ROM file you wish to load, using a Universal Programmer like the "WILLEM PROGRAMMER".
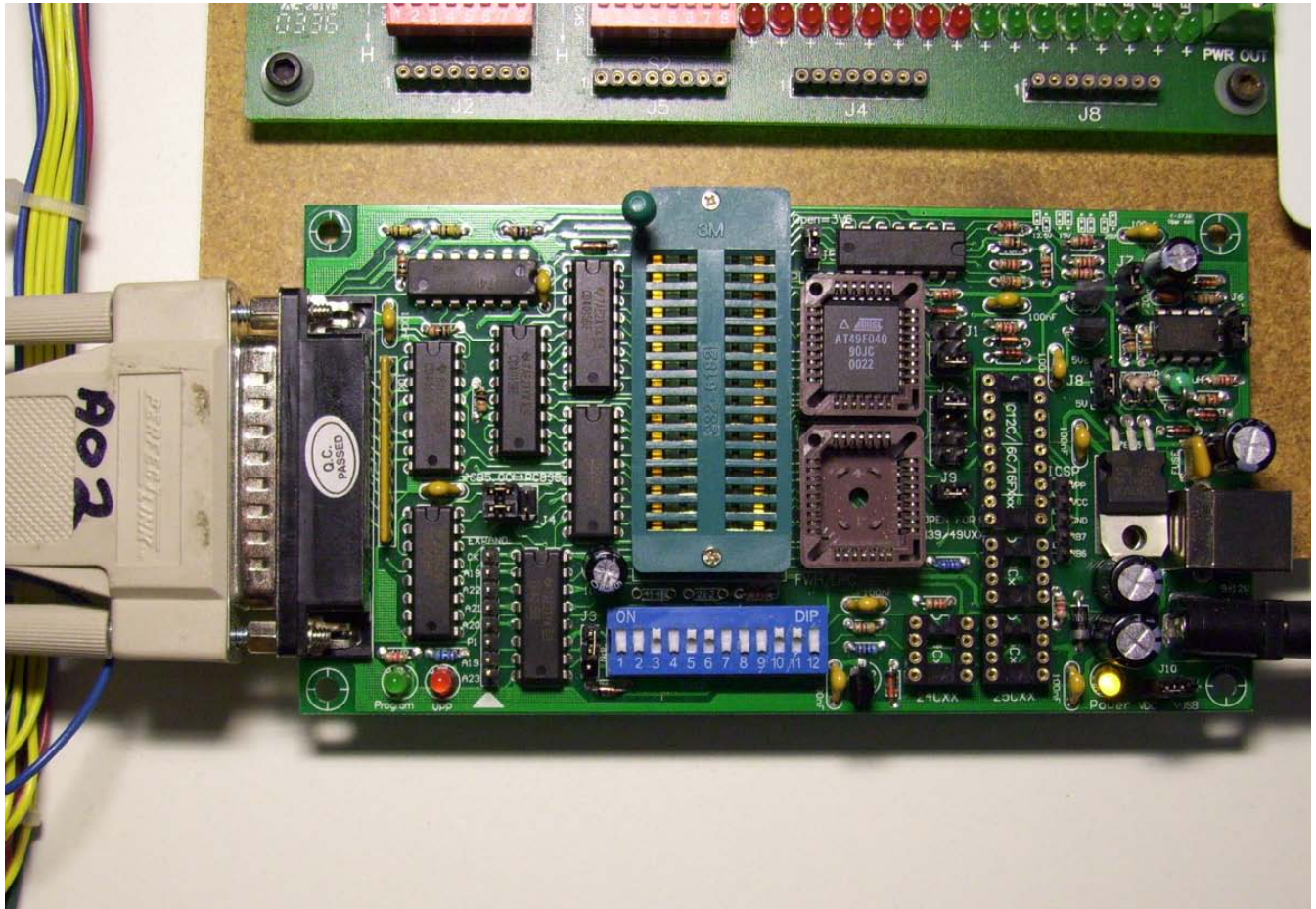
You can get these on Ebay. Or if you're a real Do it yourselfer, you can build your own Cartridge Docking style Programmer. (But this is a whole other project entirely and will not be discussed here.)

When you program the FLASH chip, in your software settings...under the **"DEVICE SELECT"** option, make sure you use the exact model number of the flash chip you are using.

Otherwise the .rom or .gb image file will not program to the chip correctly. As a result when you run the game, all you'll get is a grey box scrolling down the screen instead of the all mighty NINTENDO logo.
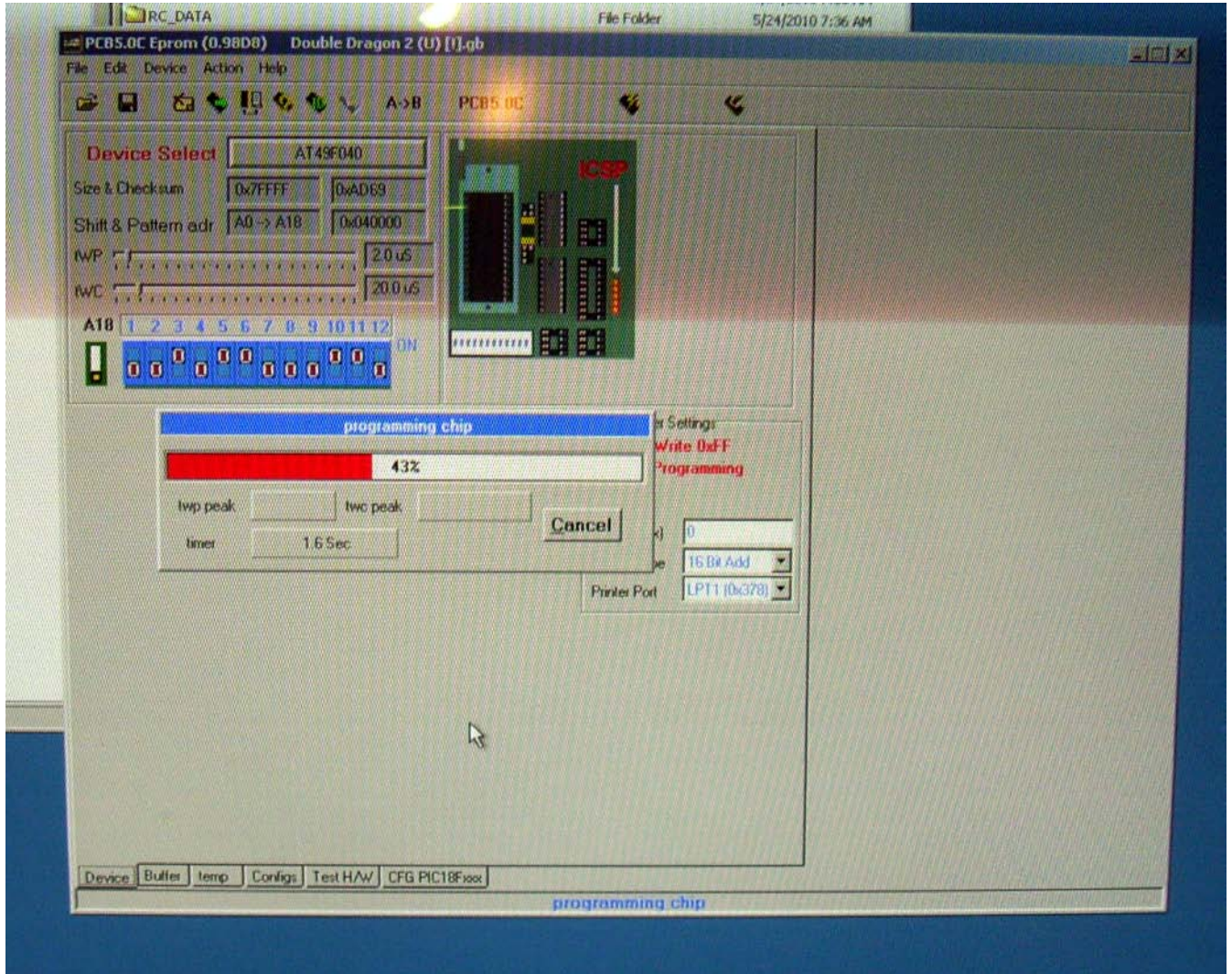
That's it Folks!
ENJOY.

Kind Regards,
 -Gerry O'Brien
http://www.digital-circuitry.com

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