

NES Programming

Mike Moss

Graphical Capabilities/Limitations

- Screen
 - 256x240 Resolution
 - Horizontal Scanlines (240)

Graphical Capabilities/Limitations

- Sprites
 - 8x8 and 8x16
 - 8x16 are two memory locations.
 - All sprites must be aligned to the same memory size, so 8x8 sprites take up a 8x16 position.
 - Max of 64 sprites on the screen at one time.
 - More causes flickering.
 - Max of 8 sprites per scanline.

Graphical Capabilities/Limitations

- Colors

- 4 colors per sprite (technically 3, the fourth is transparent).
- Store up to 48-color palettes.
- Max of 50 colors total.
- 25 colors max per scaline.
 - Note, each sprite can have up to 3 colors.
 - $8*3=24$, which is the max-1.

Tools

- **Emulator**
 - fceu - Nintendo Emulator
- **Assembler**
 - xa - Don't use this...
 - tasm - Don't use this...
 - nesasm - Nintendo assembler.
- **Graphic Tools**
 - Palette Generator - Not really needed...
 - yy-chr - You will need this...

Programming

Lets program!

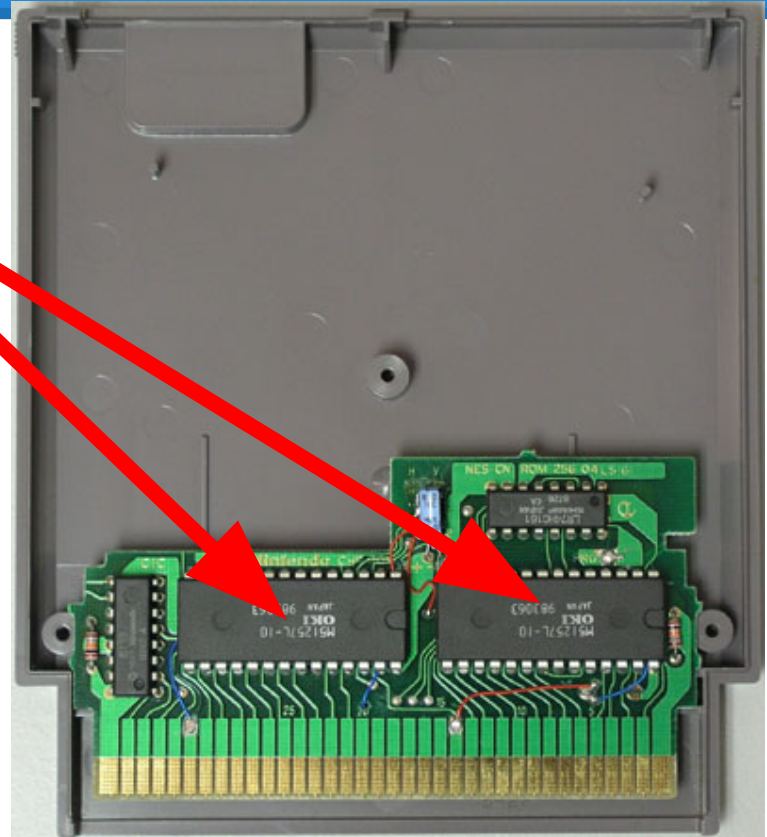
Using Programs on a Real Nintendo

- Inside a cartridge.



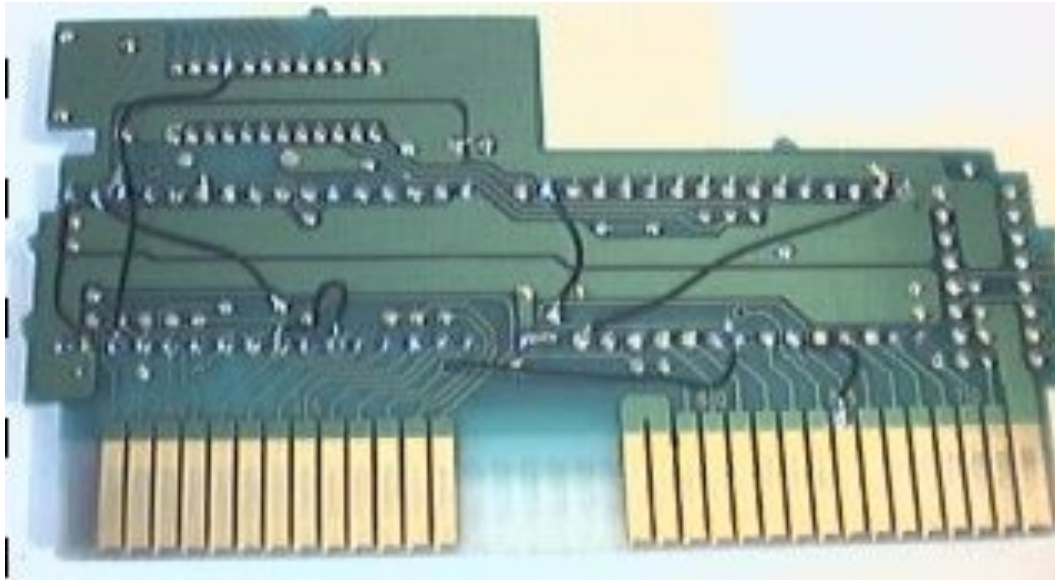
Using Programs on a Real Nintendo

- Unsolder these.
- Solder in sockets.



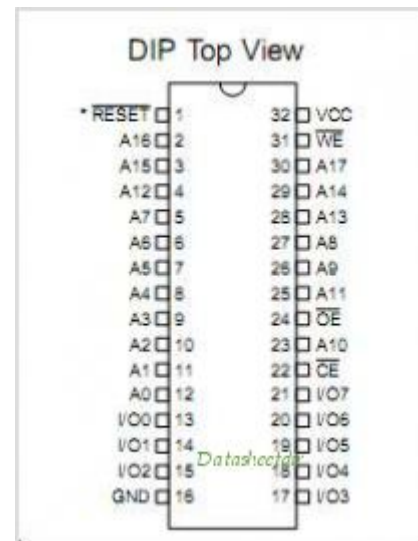
Using Programs on a Real Nintendo

- Change some of the traces.



Using Programs on a Real Nintendo

- Buy two AT49F002 chips.



Using Programs on a Real Nintendo

- Buy a universal EEPROM programmer.



Using Programs on a Real Nintendo

- Process *.nes file through [ReadNES](#).
- Upload program data to one chip.
- Upload resources to other chip.

Questions?

Sources

- <https://helloacm.com/tutorial-1-c-programming-for-6502-8-bit-cpu/>
- <http://www.cc65.org/doc/funcref-84.html>
- <http://anton.maurovic.com/posts/nintendo-nes-gamedev-part-1-setting-up/>
- <http://atariage.com/forums/topic/154232-cc65-link-error/>
- <http://forums.nesdev.com/viewtopic.php?t=8493&start=30>
- <http://skilldrick.github.io/easy6502/>
- <http://patater.com/gbaguy/nesasm.htm>
- http://wiki.nesdev.com/w/index.php/PPU_registers
- <http://wayofthepixel.net/index.php?topic=10784.5>
- <http://fms.komkon.org/EMUL8/NES.html>
- http://wiki.nesdev.com/w/index.php/PPU_palettes
- <http://callanbrown.com/index.php/basic-nes-reproduction>
- http://www.raphnet.net/electronique/nes_cart/nes_cart_en.php
- <http://www.kevinsewyn.com/ReadNES/>