

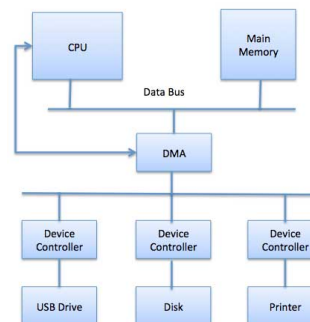
# Architecture and Processing of the SNES

Konrad McClure



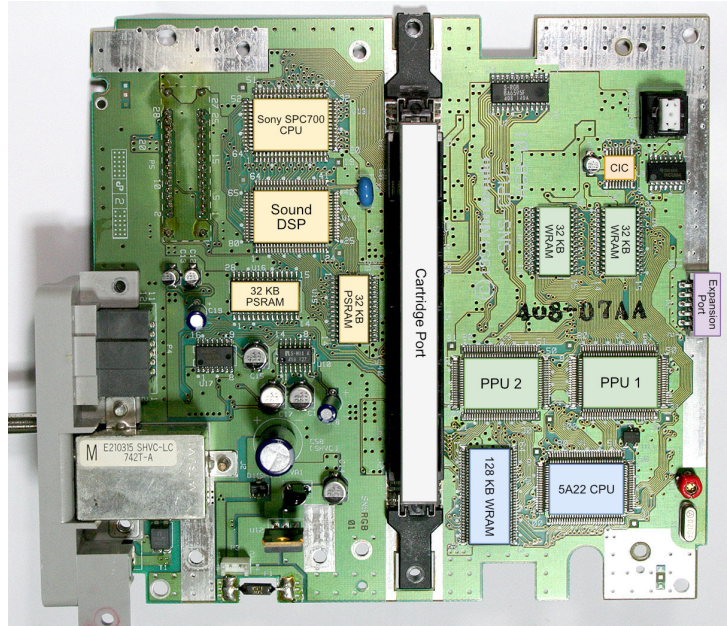
## Ricoh 5A22 Processor

- 65816 ISA instruction set
  - 256 instructions (8-bit opcode)
- 16-bit registers
- ~2.86 MHz Clock Speed
- 2 DMAs
  - General Purpose DMA
  - Horizontal DMA
- 2 Address busses
  - 24-bit address "A bus"
  - 8-bit data "B bus"

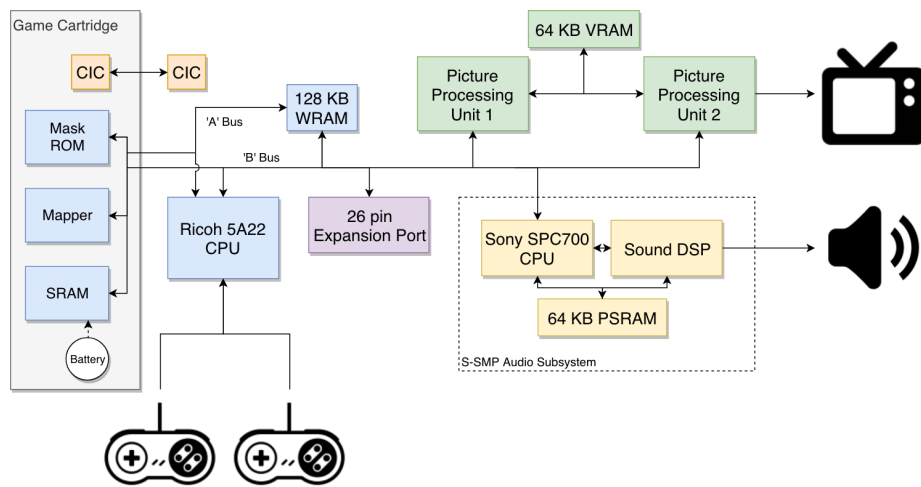


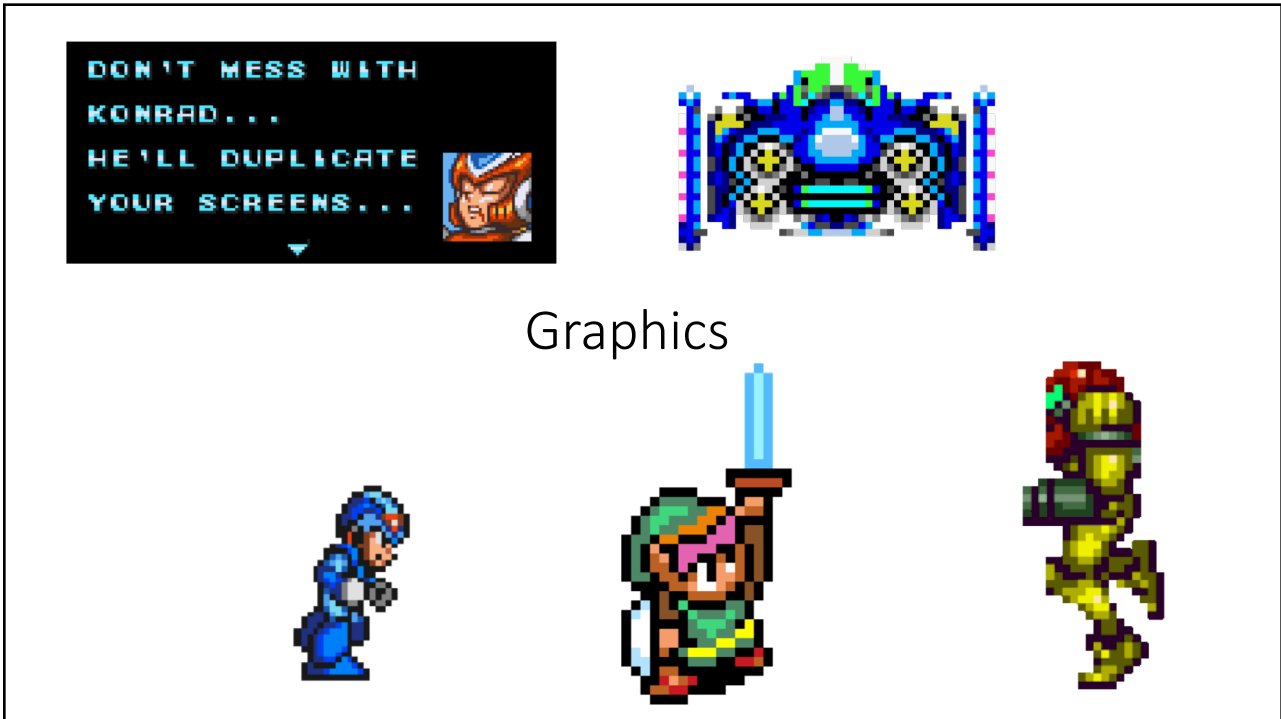
# Hardware Layout

- 5A22 CPU
  - 128KB Work RAM
- 2 Picture Processing Units
  - 2 32KB Video RAM
- SPC700 CPU
  - Sound DSP
  - 2 32KB PSRAM
- Checking Integrated Circuit
  - "Lock" and "Key"



# Datapath





### Graphics – CRT Screens

60 Frame/Sec 16.6ms each frame	
Drawing to Display 14.2ms	V-Blank 2.4ms
224 Scanlines 63.5 $\mu$ s each line	
Sweep 47.8 $\mu$ s	H-Blank 15.7 $\mu$ s

The diagram shows a rectangular area representing a CRT screen. It is filled with horizontal grey lines representing scanlines. A white diagonal line starts from the top-left corner and curves towards the bottom-right corner, representing the electron beam's path. The lines are more densely packed in the center and more spread out towards the top and bottom edges.

# Graphics



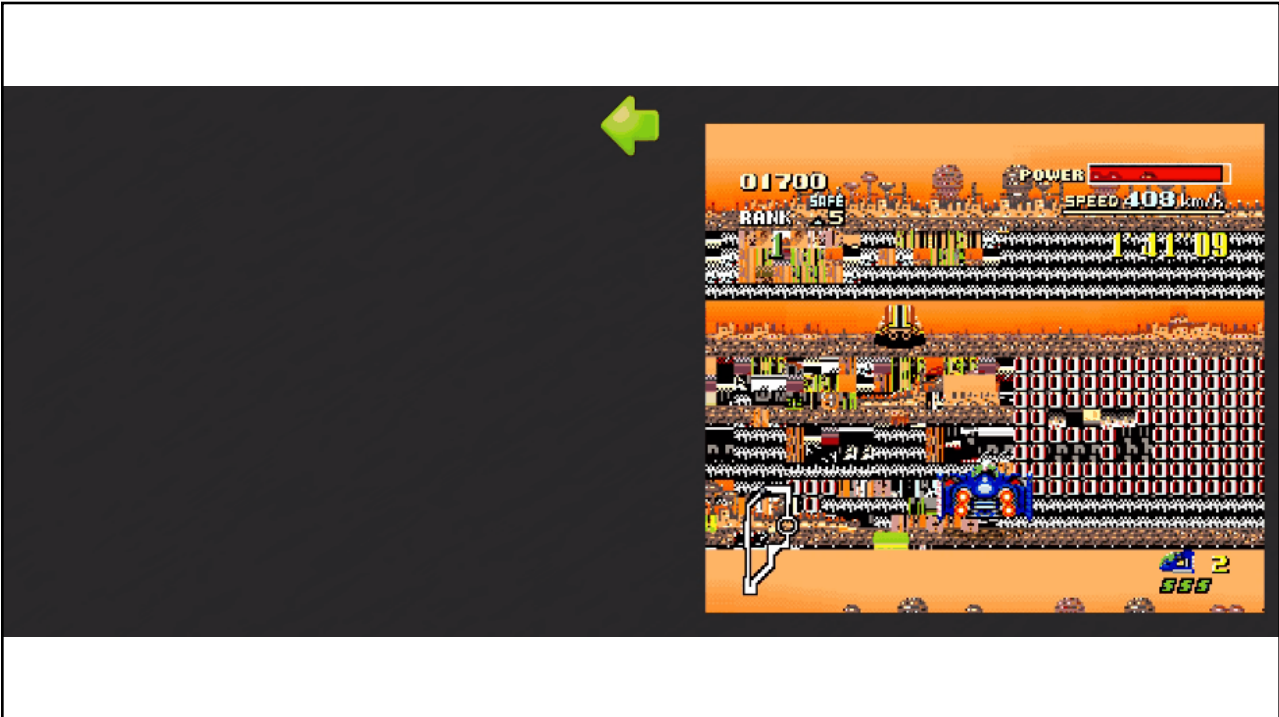
# Graphics - Background Modes

Mode	Backgrounds	Characters	Mosaic	Windowing	Color Math	Offset	Direct Color	Interface	High Res
0	2 2 2 2	8x8 16x16							pseudo H512
1	4 4 2	8x8 16x16							pseudo H512
2	4 4	8x8 16x16							pseudo H512
3	8 4	8x8 16x16							pseudo H512
4	8 2	8x8 16x16							pseudo H512
5	4 2	16x8 16x16							True H512
6	4	16x8 16x16							True H512

## Graphics – MODE 7

- Single 8bpp background layer
- Linear Algebra Magic







## Bibliography

- HMA/DMA: <https://wiki.superfamicom.org/grog's-guide-to-dma-and-hdma-on-the-snes>
- Ricoh 5A22: [https://en.wikipedia.org/wiki/Ricoh\\_5A22](https://en.wikipedia.org/wiki/Ricoh_5A22)
- WDC 65C816: [https://en.wikipedia.org/wiki/WDC\\_65C816#Features](https://en.wikipedia.org/wiki/WDC_65C816#Features)
- Overall Architecture: <https://copetti.org/projects/consoles/super-nintendo/>
- 65816 Manual: <https://wiki.superfamicom.org/uploads/assembly-programming-manual-for-w65c816.pdf>
- SNES Hardware Registers: [https://en.wikibooks.org/wiki/Super\\_NES\\_Programming/SNES\\_Hardware\\_Registers](https://en.wikibooks.org/wiki/Super_NES_Programming/SNES_Hardware_Registers)
- Super NES Features Playlist: [https://www.youtube.com/playlist?list=PLHQ0utQyFw5Kkcj1JjhExH\\_lvGwfn6GV](https://www.youtube.com/playlist?list=PLHQ0utQyFw5Kkcj1JjhExH_lvGwfn6GV)

- ????: <https://youtu.be/DJKY1INJQ8Q>