

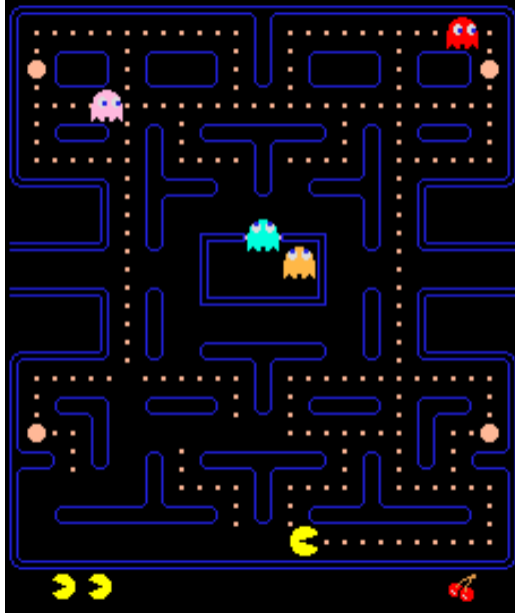
Sprite Graphics

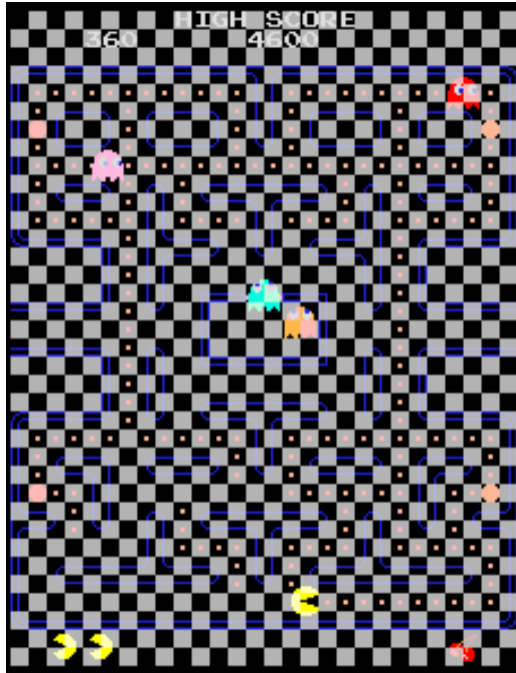
Stephen A. Edwards

Columbia University

Spring 2023

360 HIGH SCORE 4600





MARIO
000700

0 x 01

WORLD
8-1

TIME
242

0 0



NINTENDO



3RD
1:24:00



TIME
0:13:15

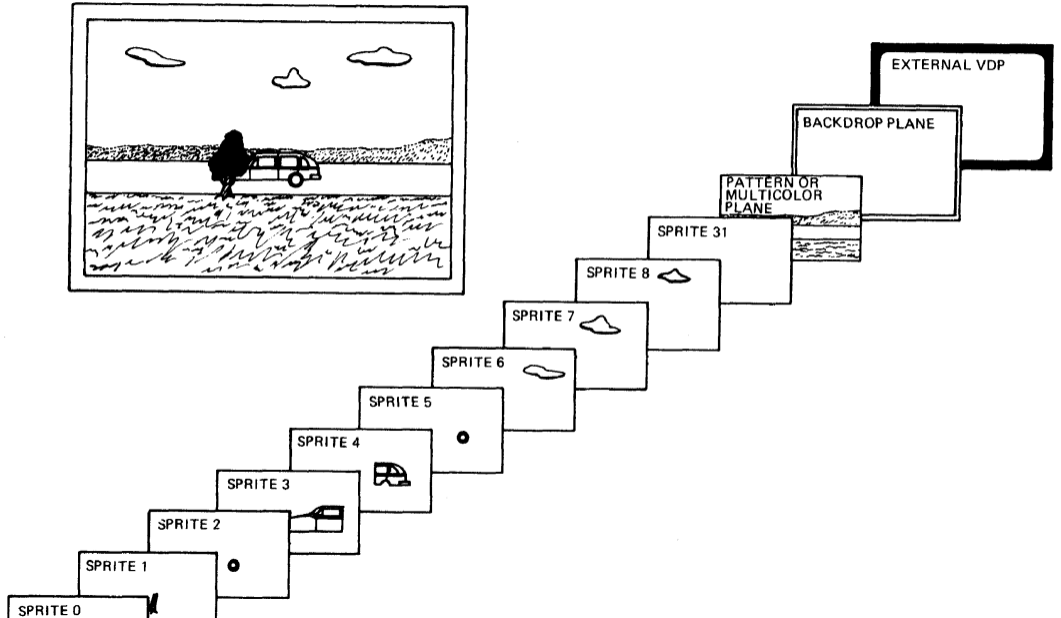
TUNNELS



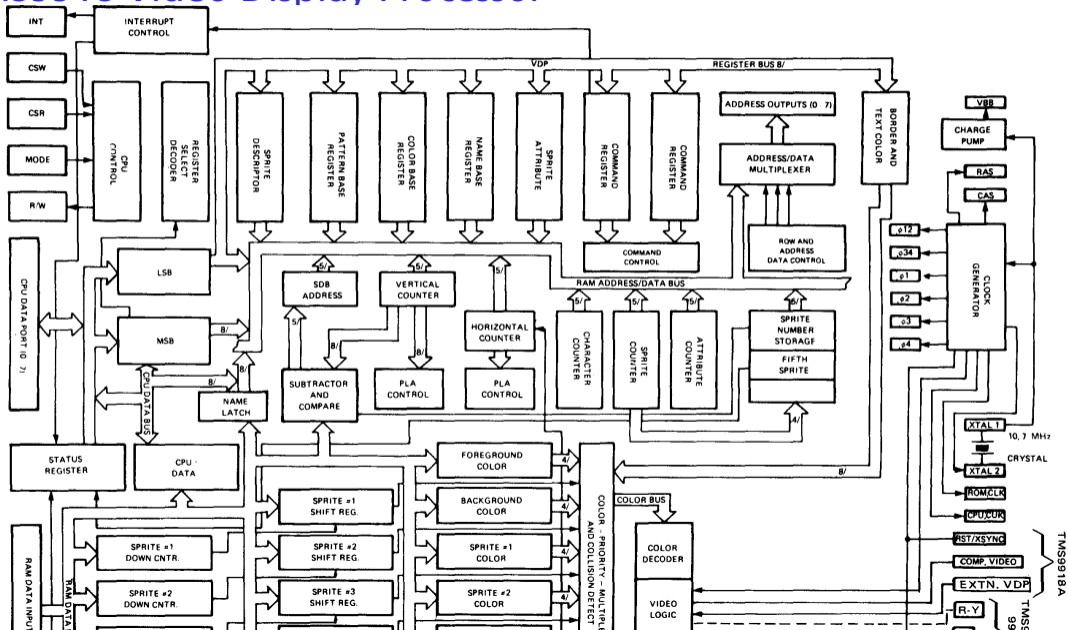
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TEXAS INSTRUMENTS

TMS9918 Video Display Processor

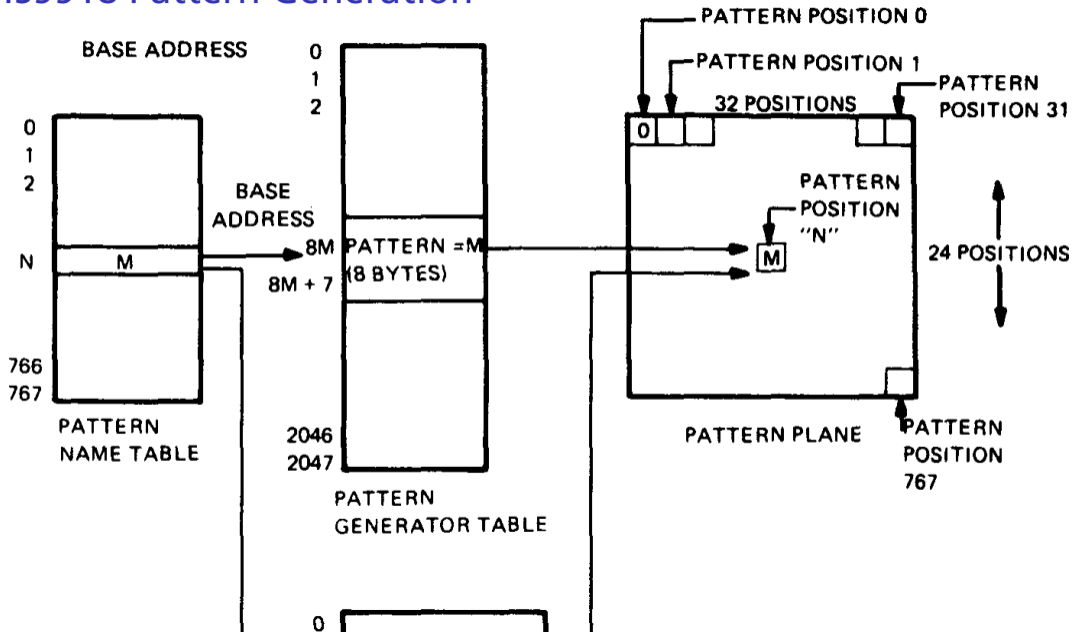


TMS9918 Video Display Processor

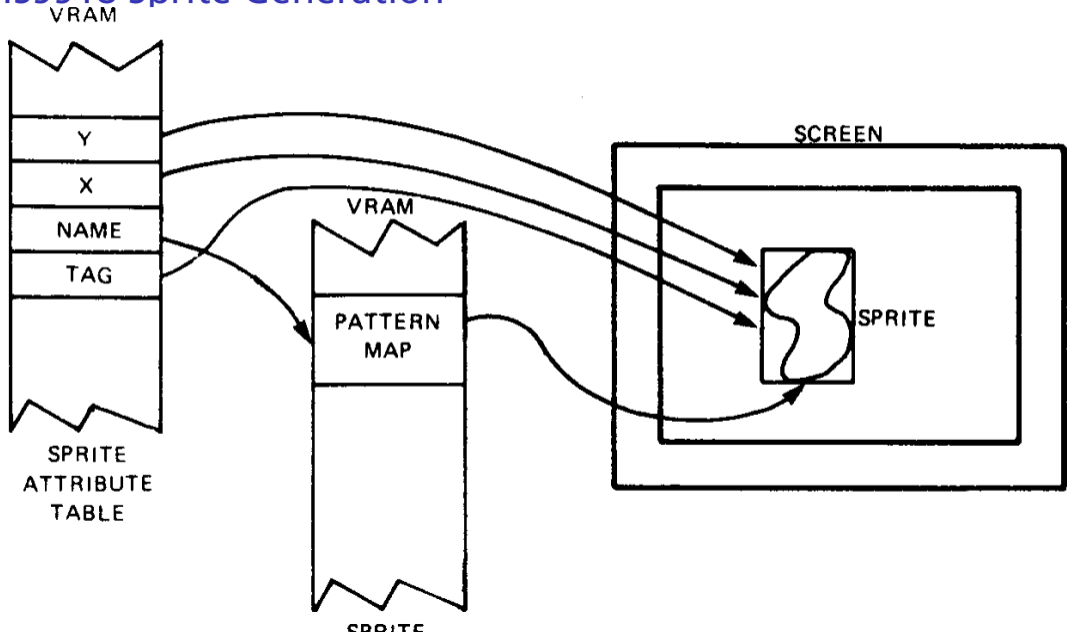


TMS9918A

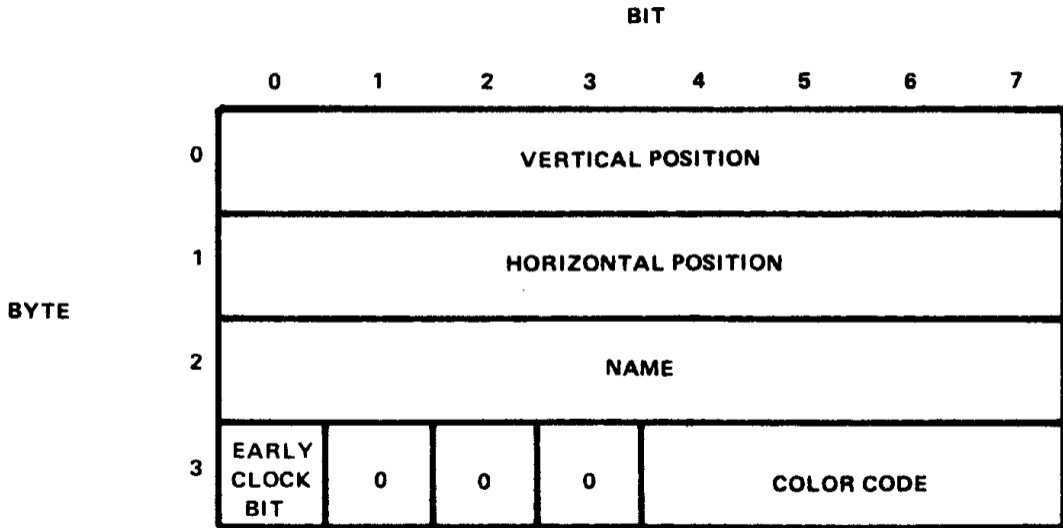
TMS9918 Pattern Generation



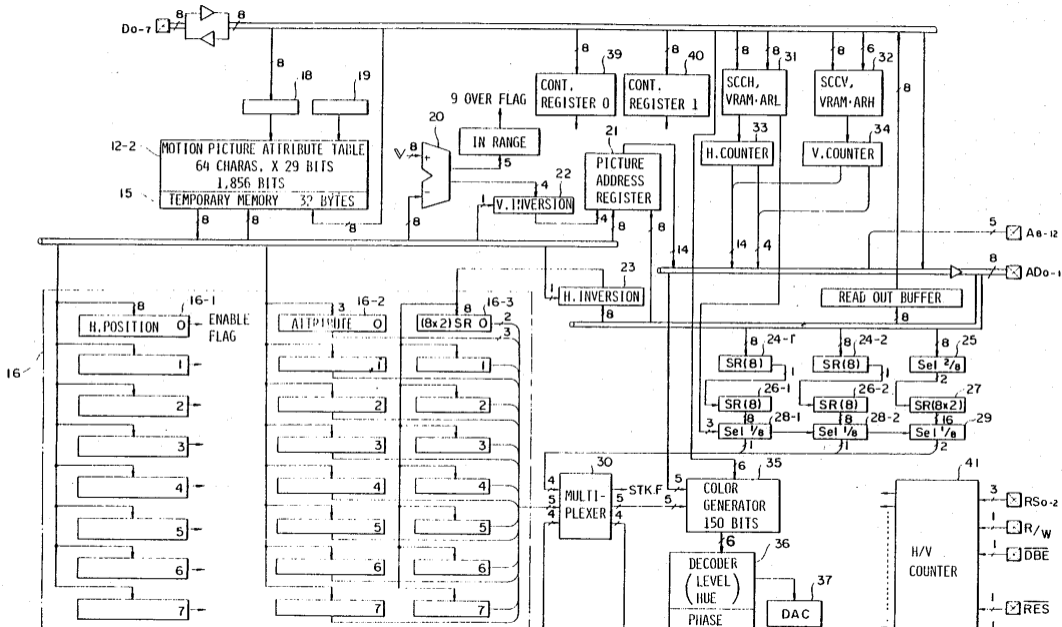
TMS9918 Sprite Generation



TMS9918 Sprite Attribute Table Entry



Nintendo NES/Famicom



Basic Operation

For each line,

- ▶ Fetch color palette
- ▶ Fetch tiles
- ▶ Fetch tile bitmaps
- ▶ Read sprite location data for 64 sprites
- ▶ Save and prioritize up to 8 visible sprites

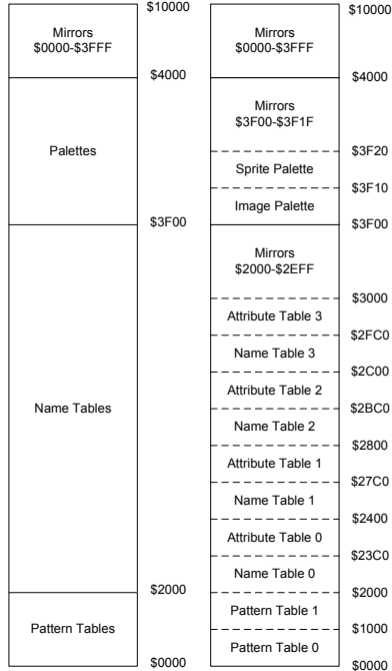
Video RAM Memory Map

Palettes: Groups of 16 colors selected from ≈ 60

Name Table: Tile numbers

Attribute Table: Extra tile color information

Pattern Table: Tile bitmaps



A Sprite Attribute Table Entry

64 sprites max; 8 per line max

7								0							
Y coordinate															
Tile (bitmap) number															
Vertical Flip		Horizontal Flip		Priority		0	0	0	b3		b2		color bits		
X coordinate															

Tiles are 2×8 bytes each. First 8 are bitmaps of LSB color value, next 8 are next color bit.

References

Steven Collins. Computer Graphics during the 8-bit Computer Game Era. Siggraph Newsletter, 32(2) May 1998.

NES Development <http://nesdev.parodius.com>

NES Palette Generator http://nesdev.parodius.com/kevin_palette.txt

Nintendo Entertainment System Documentation v. 0.40.

http://db.gamefaqs.com/console/nes/file/nes_tech.txt

Patrick Diskin, *Nintendo Entertainment System Documentation*, Version 1.0, August 2004,
<http://nesdev.parodius.com/NESDoc.pdf>

Ueda et al. TV Game System Having Reduced Memory Needs. United States Patent #4,824,106.
April 25, 1989.