

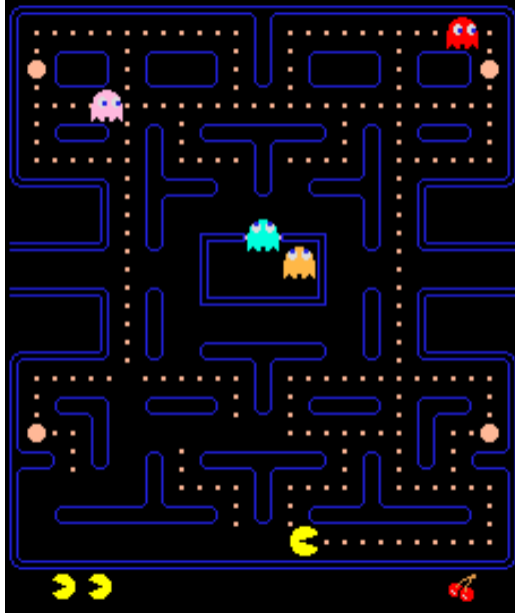
# Sprite Graphics

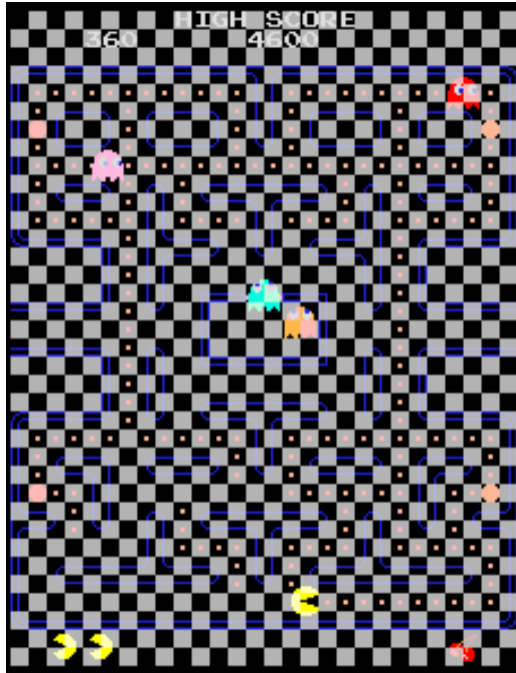
Stephen A. Edwards

Columbia University

Spring 2024

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

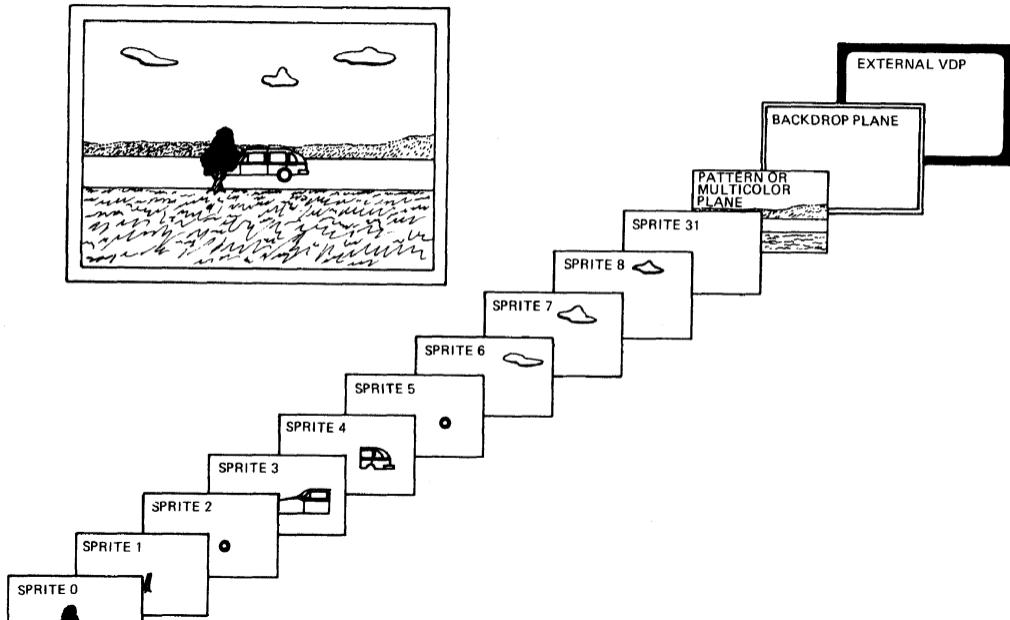
TUNNELS



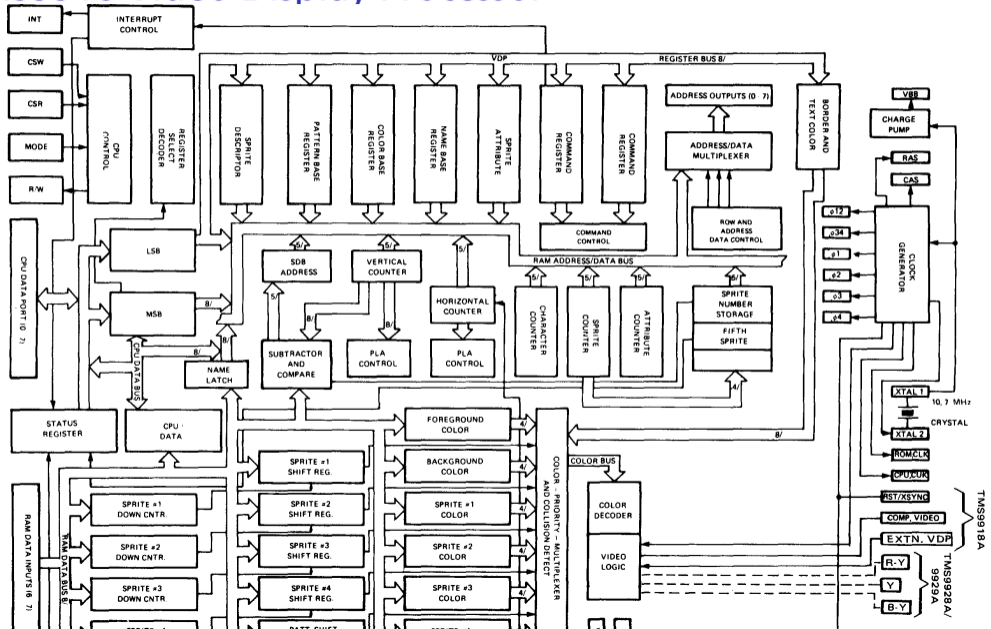
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TEXAS INSTRUMENTS

# TMS9918 Video Display Processor

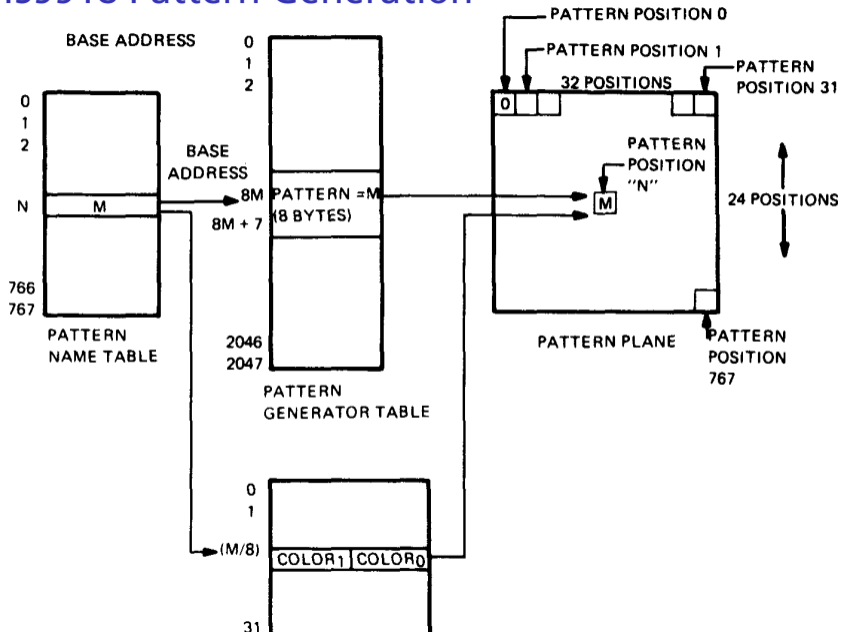


# TMS9918 Video Display Processor

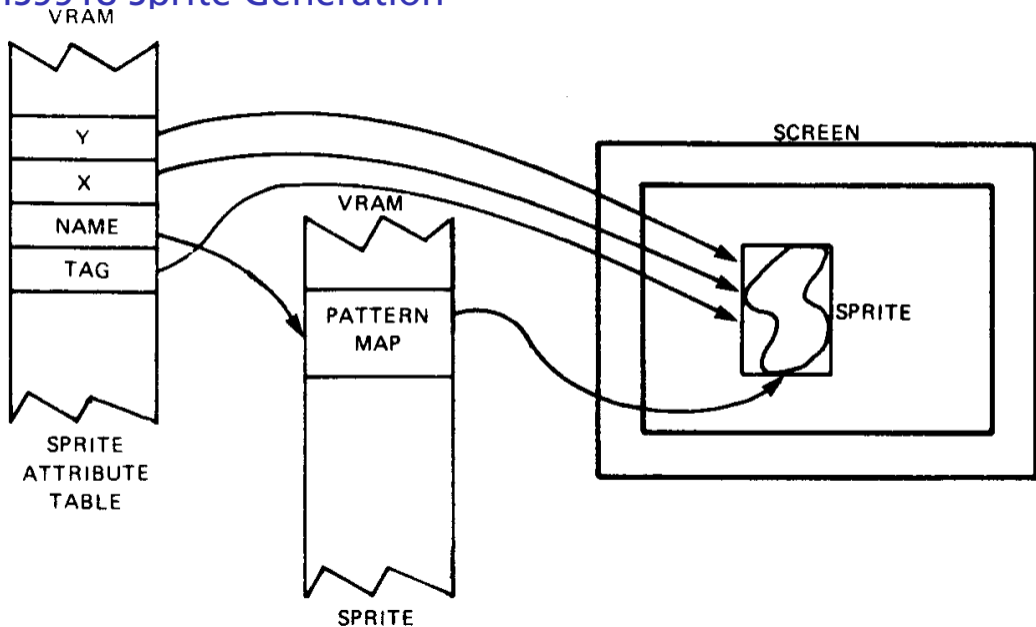




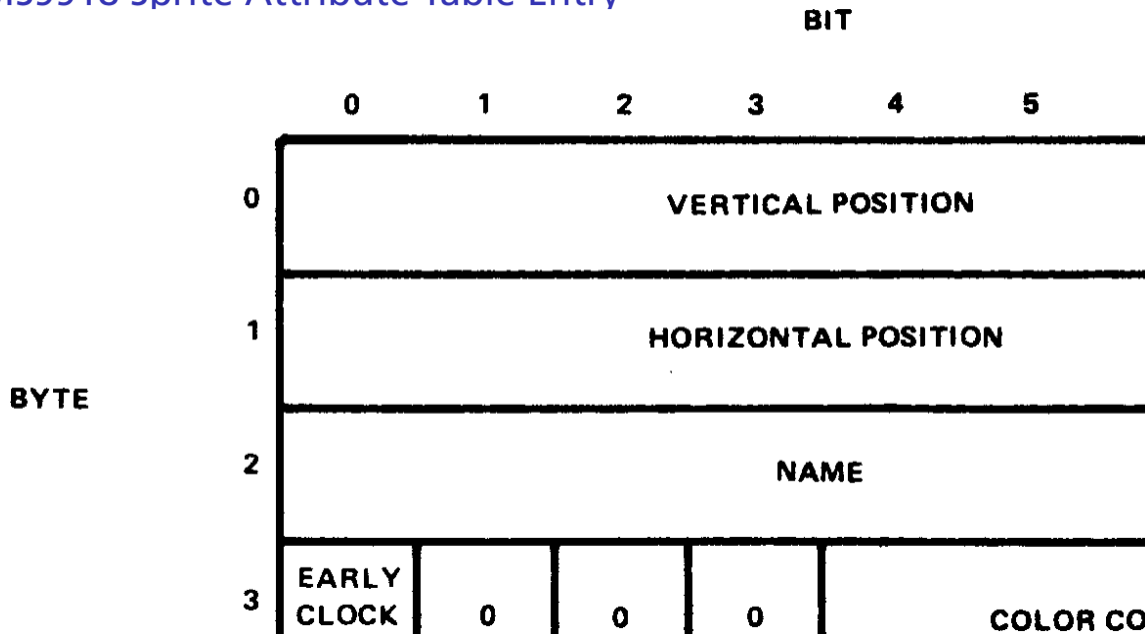
# TMS9918 Pattern Generation



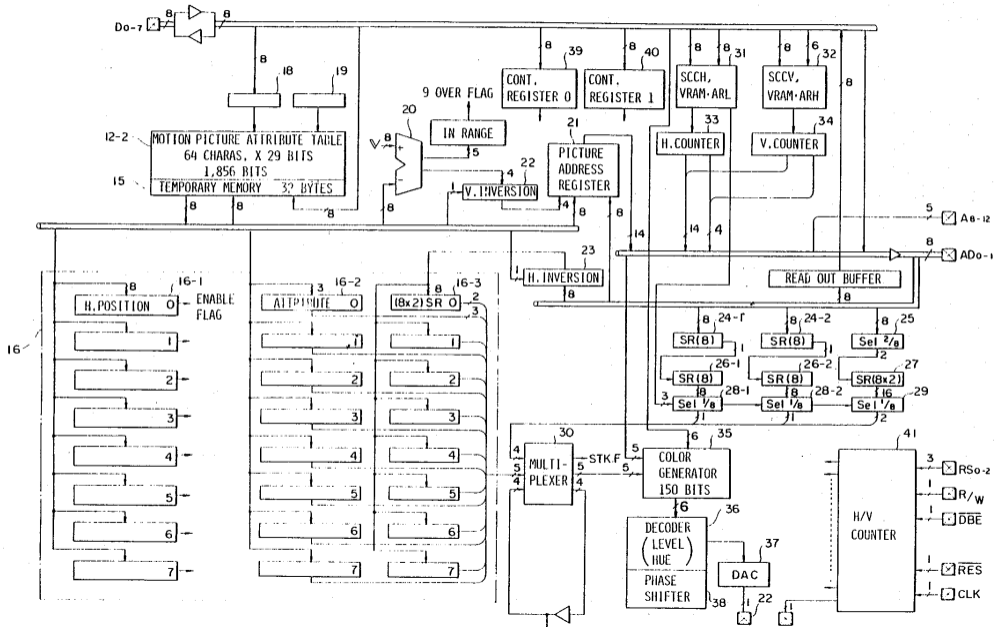
# TMS9918 Sprite Generation



# 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

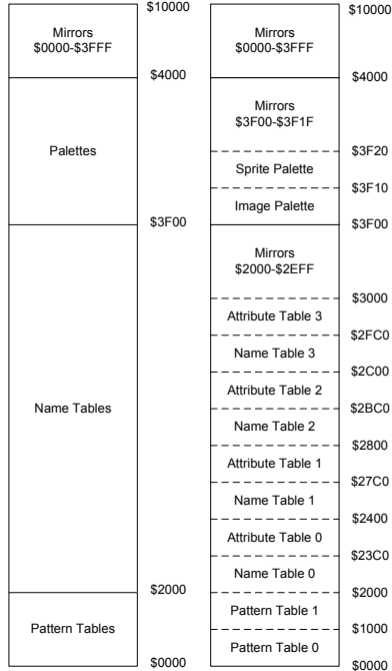
# Video RAM Memory Map

Palettes: Groups of 16 colors selected from  $\approx 60$

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  $2 \times 8$  bytes each. First 8 are bitmaps of LSB color value, next 8 are next color bit.

## References

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NES Palette Generator [http://nesdev.parodius.com/kevin\\_palette.txt](http://nesdev.parodius.com/kevin_palette.txt)

Nintendo Entertainment System Documentation v. 0.40.

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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.