



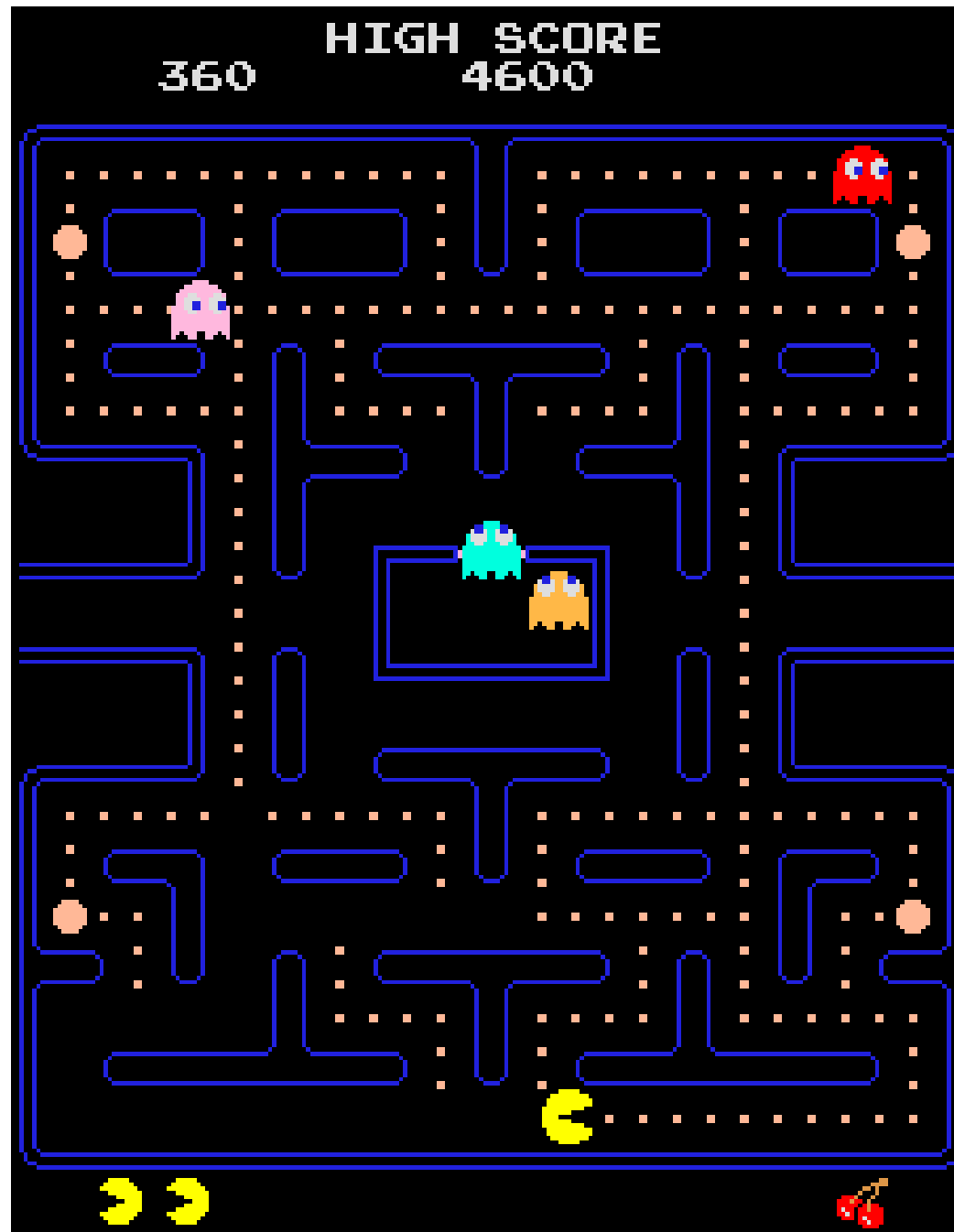
# Sprite Graphics

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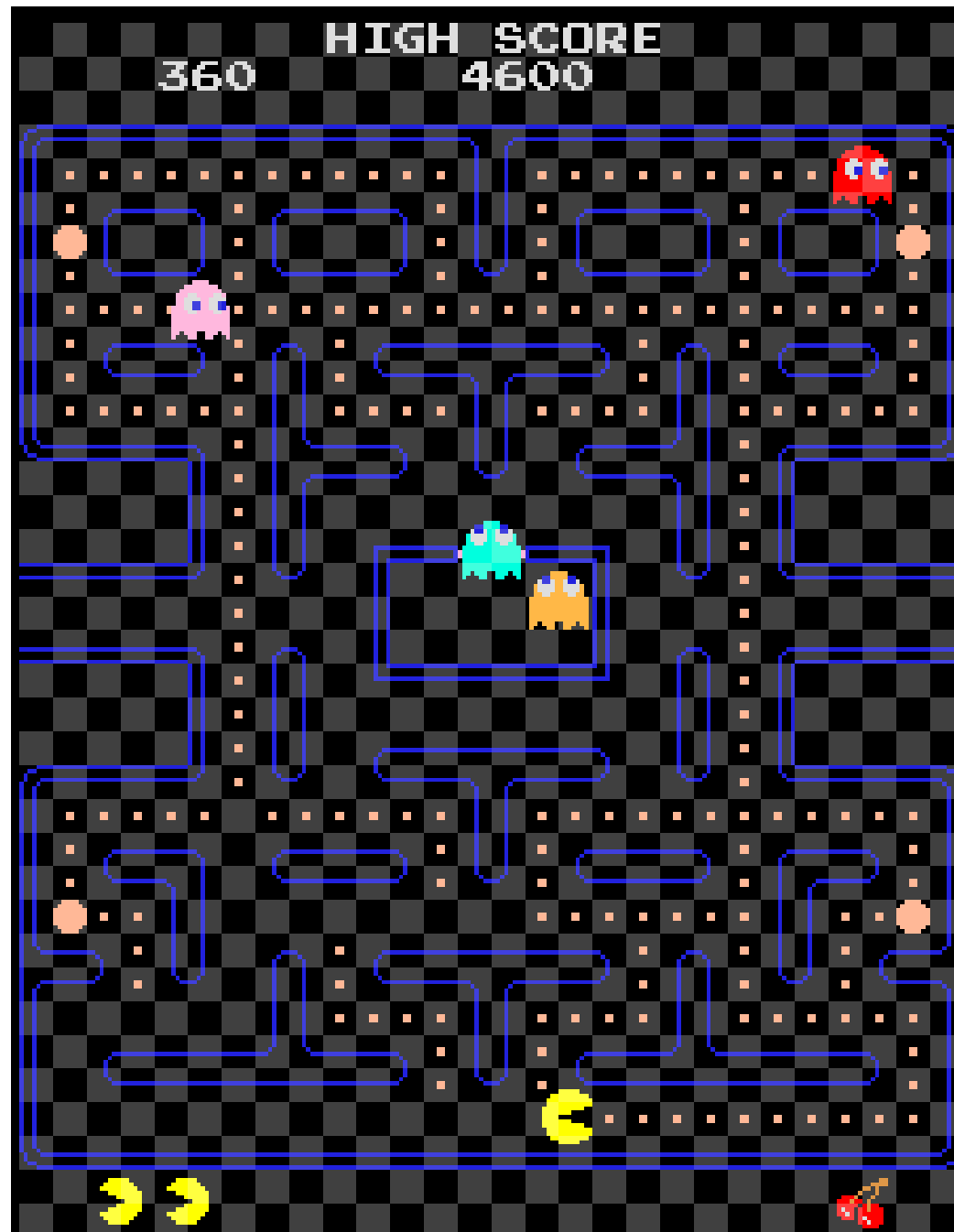
Columbia University

Spring 2011

# Sprite Graphics: Pac-Man



# Sprite Graphics: Pac-Man Tiles



# Sprite Graphics: Super Mario Bros



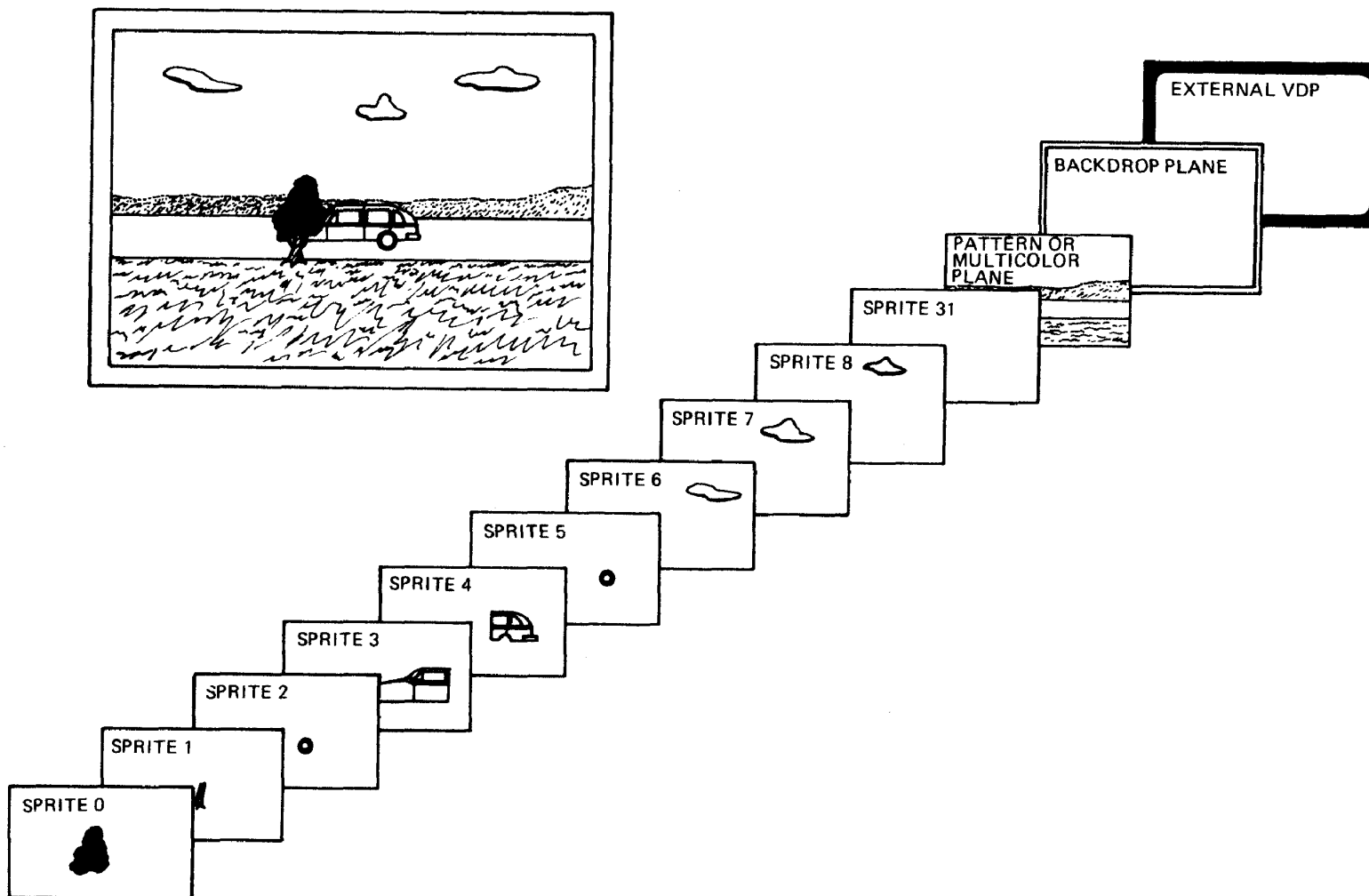
# Sprite Graphics: Excitebike



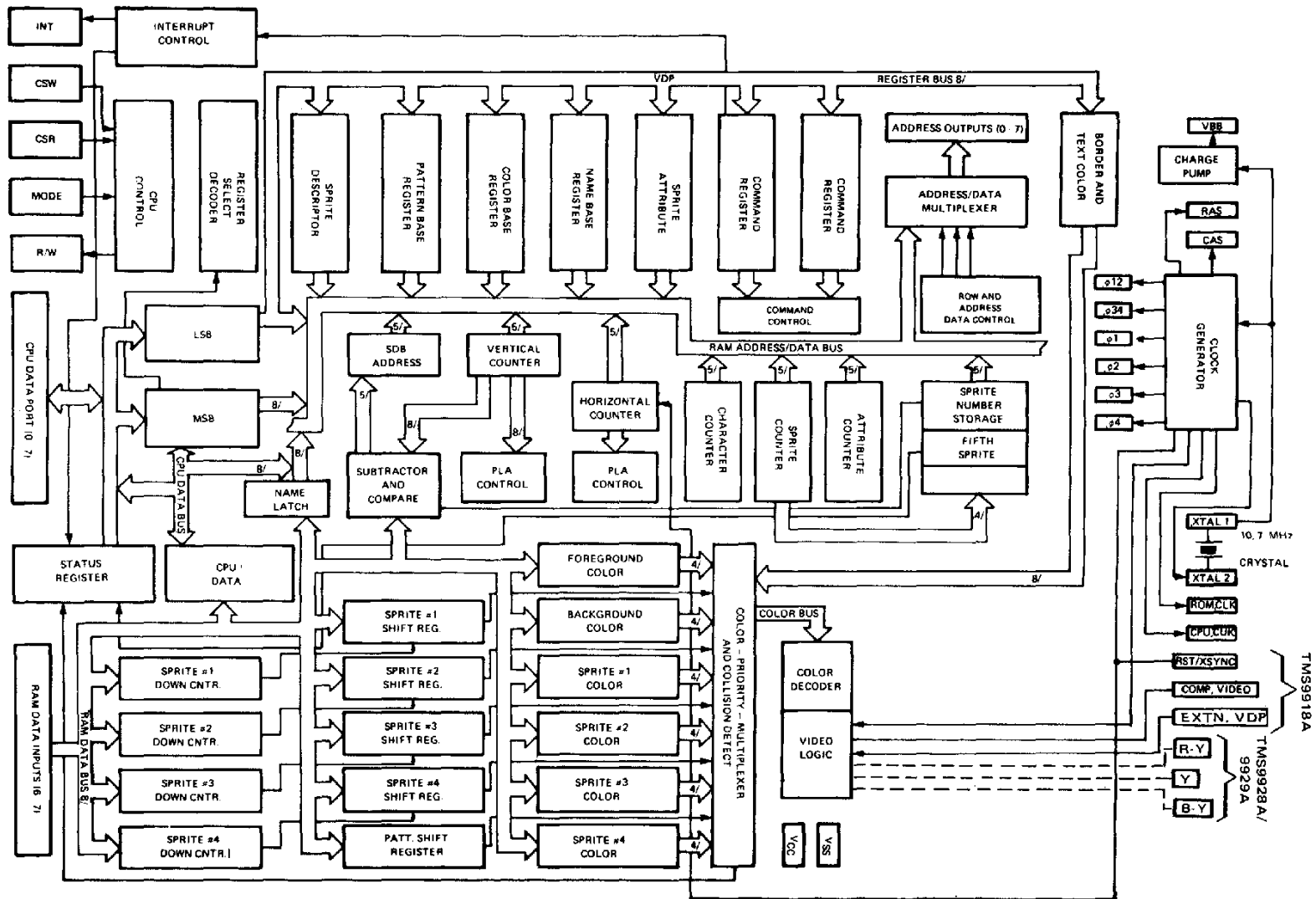
# Sprite Graphics: Tunnels of Doom



# TMS9918 Video Display Processor

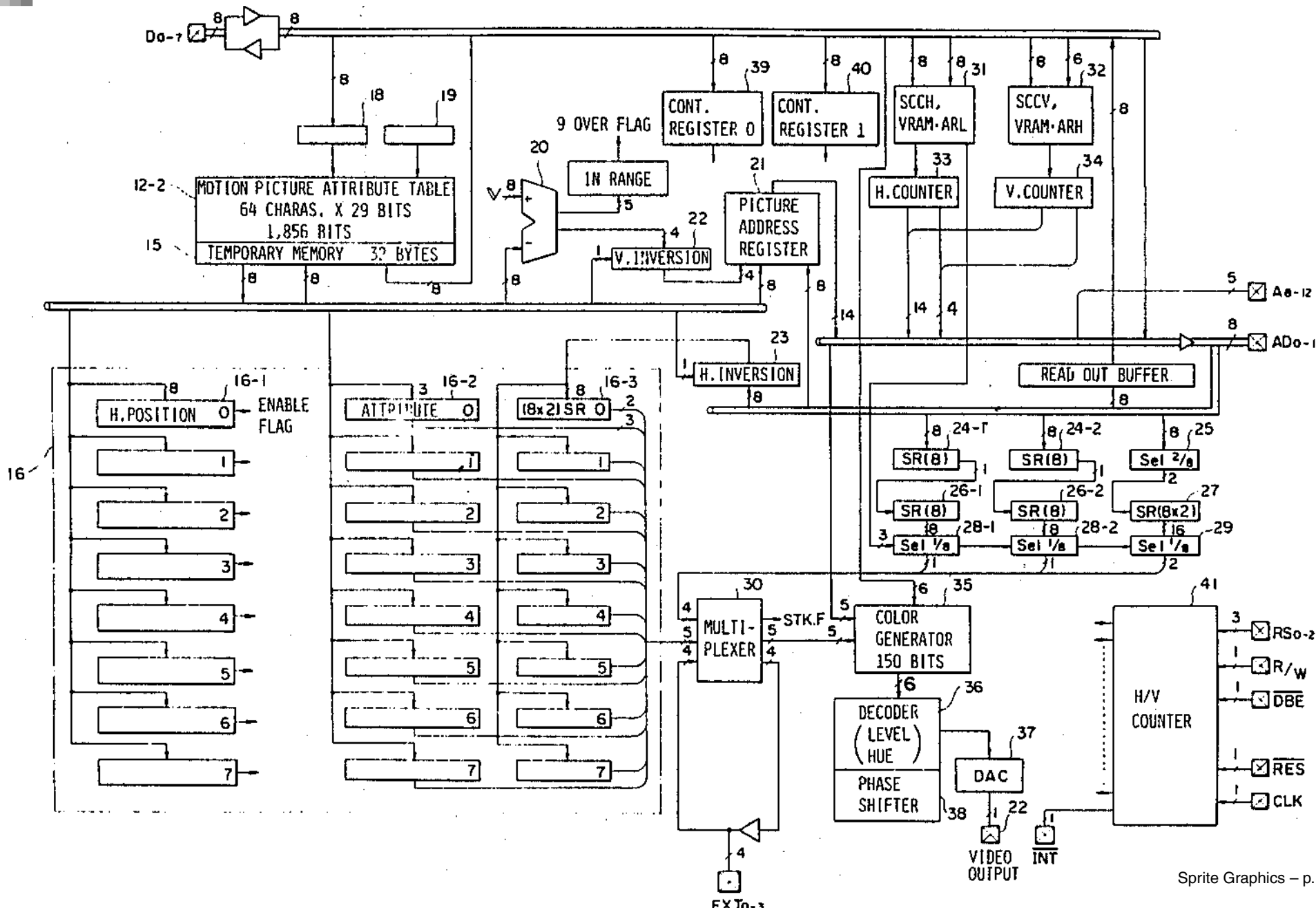


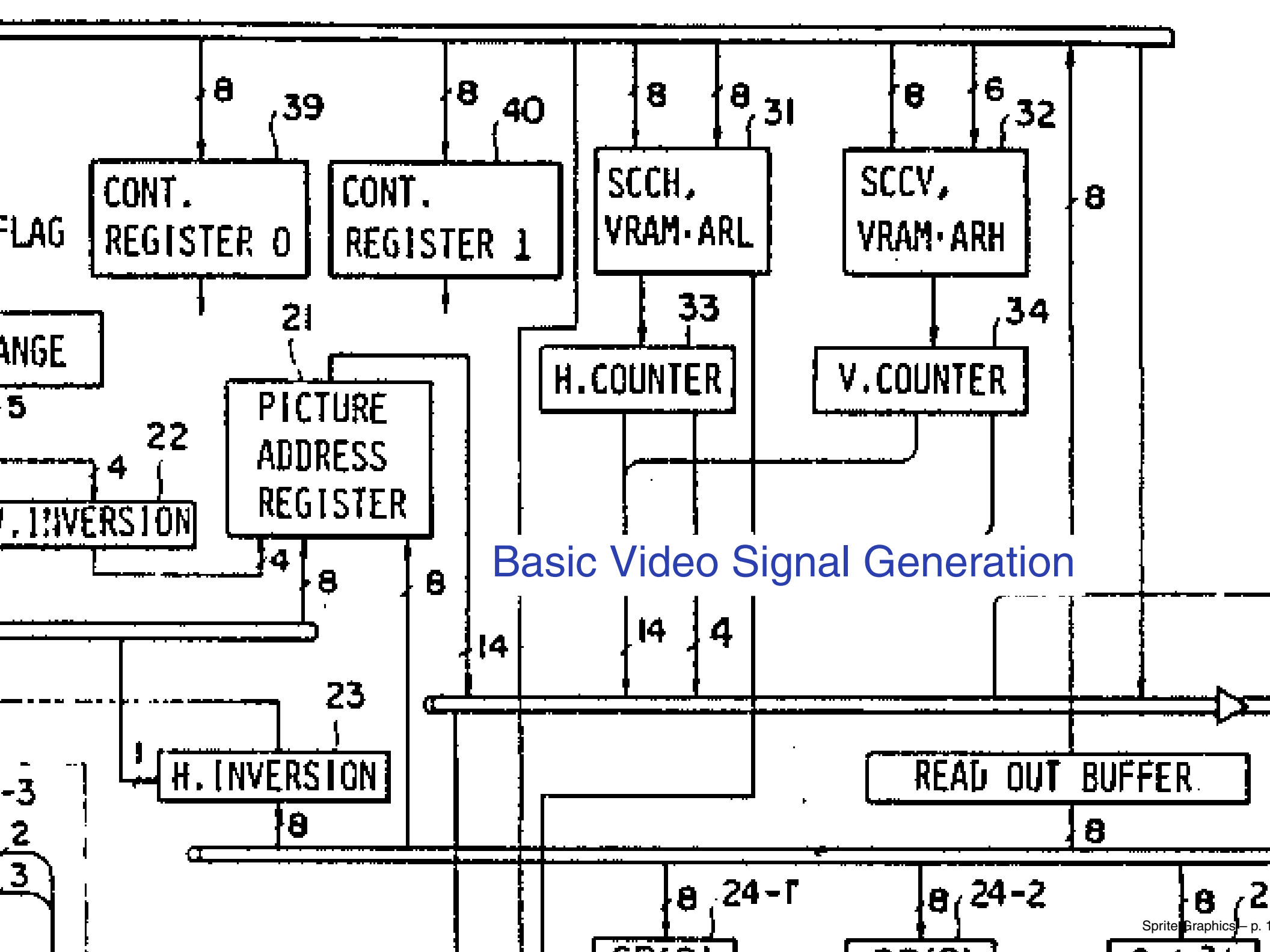
# TMS9918 Video Display Processor





# Nintendo NES/Famicom





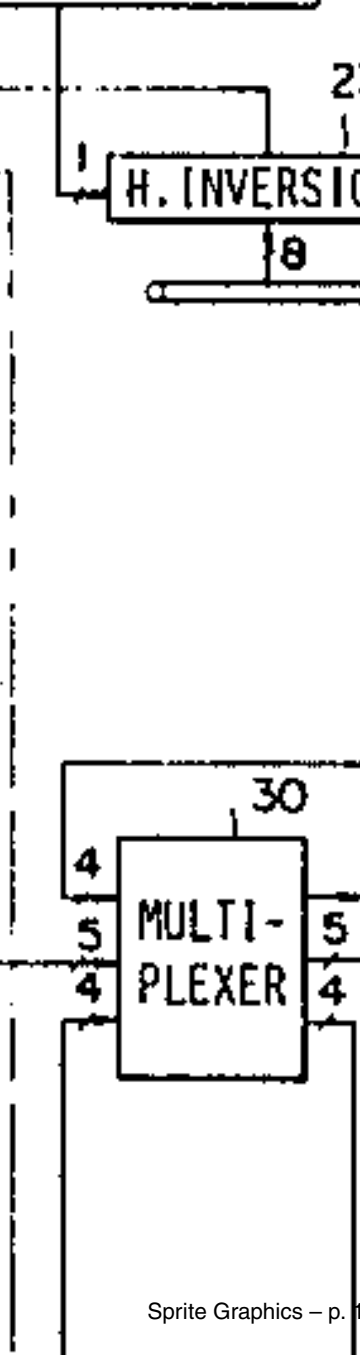
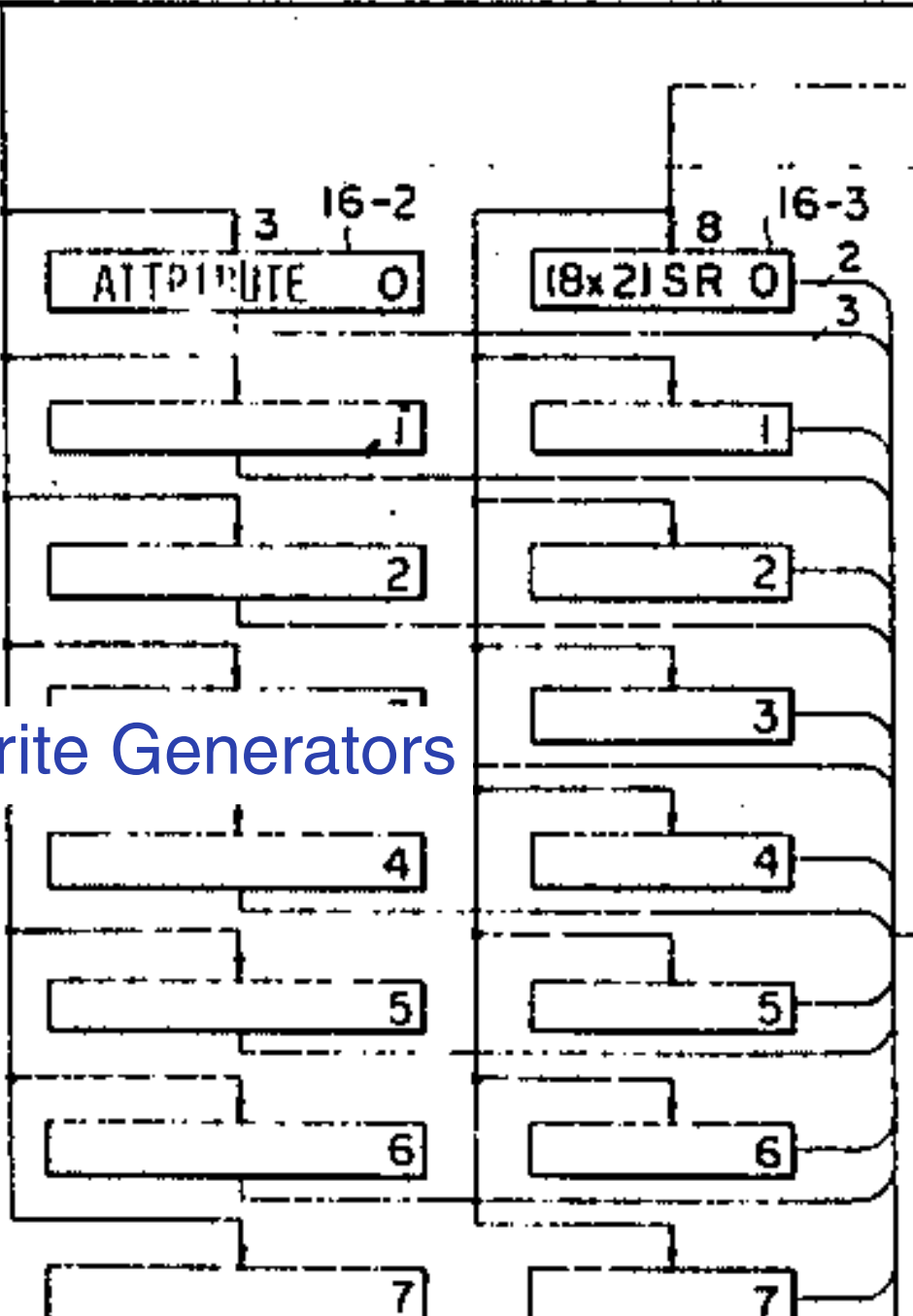
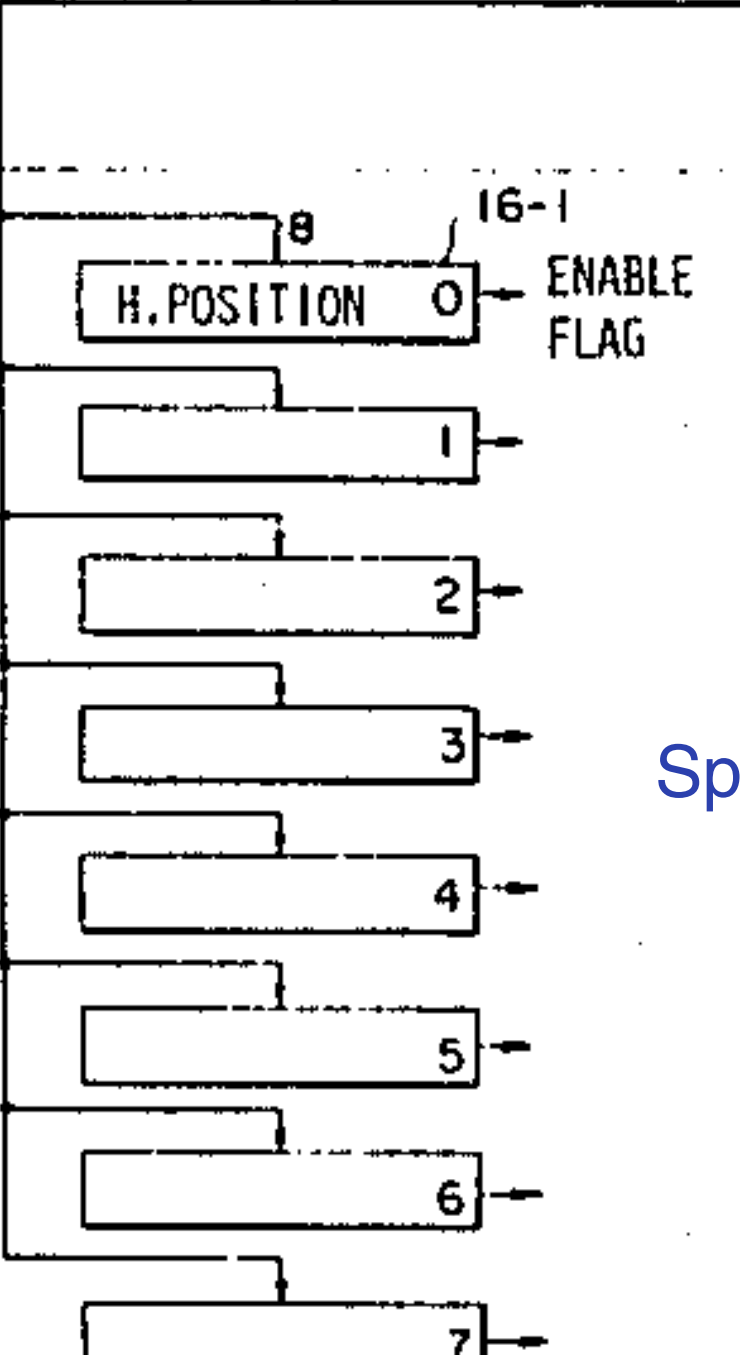
## Basic Video Signal Generation

15

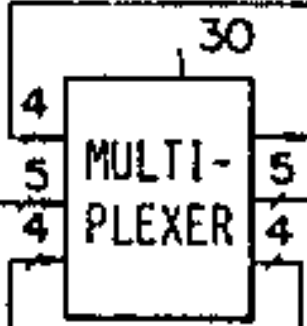
1,850 BITS  
TEMPORARY MEMORY 32 BYTES

REGIS

V. INVERSION

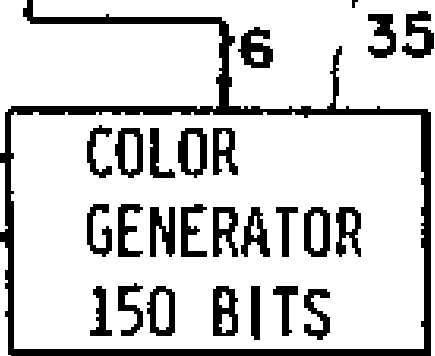
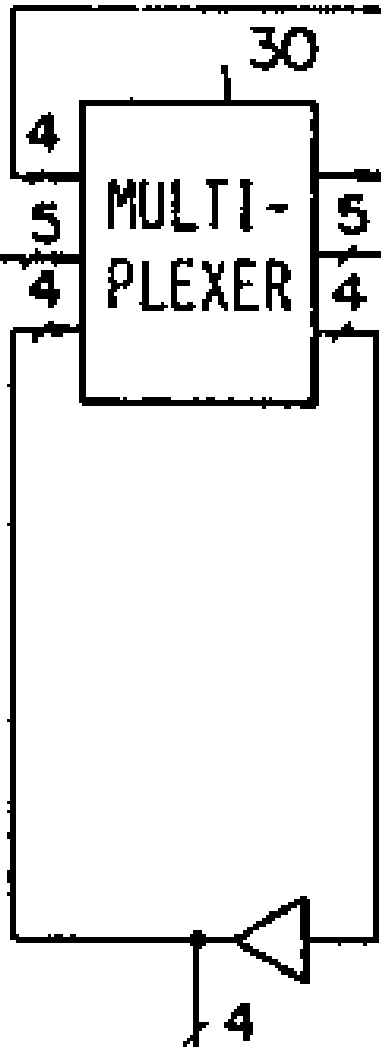
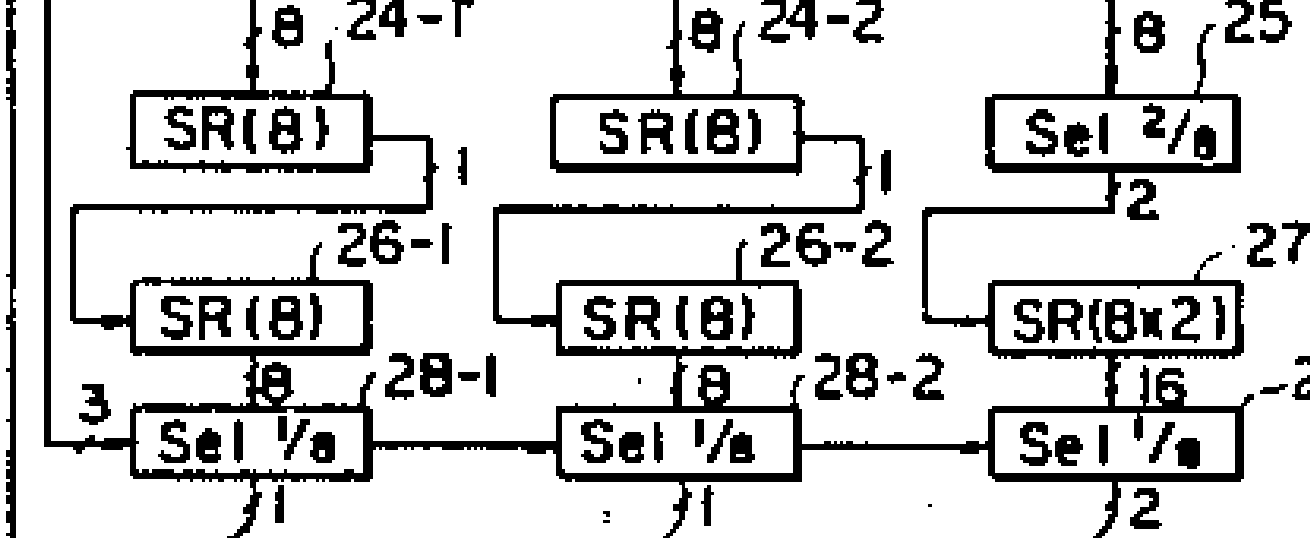


H. INVERSION

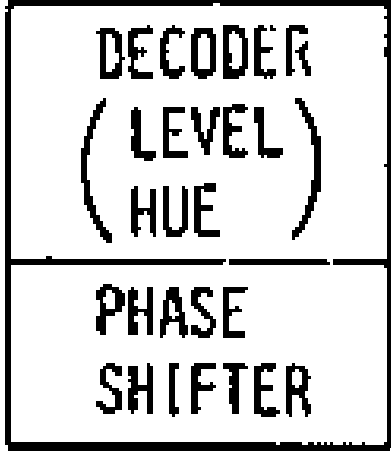


# Sprite Generators

Tile Output



Video Output



# 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

# Simplified Memory Map

Pattern Table: bitmaps for tiles & sprites

Name Table: Tile numbers

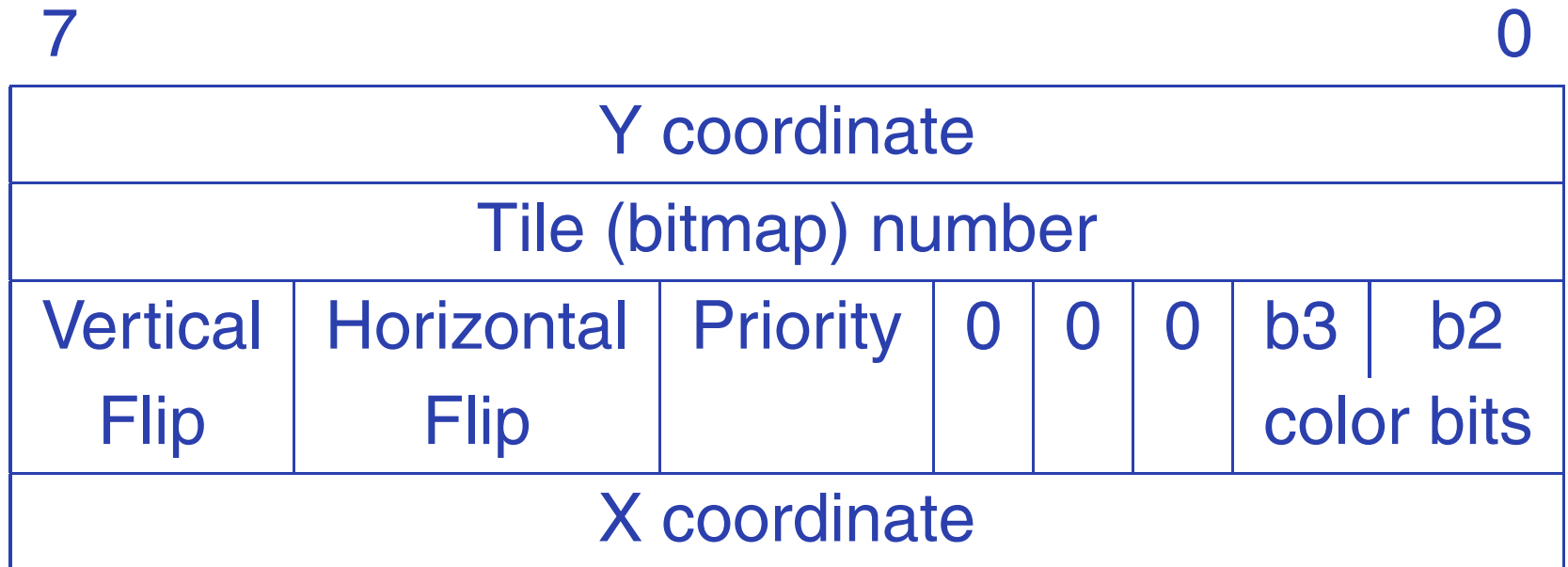
Attribute Table: Extra tile color information

Sprite Palette: 16 colors

Tile Palette: 16 colors

Sprite Information

# Sprite Information



Tiles are  $2 \times 8$  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](http://nesdev.parodius.com/kevin_palette.txt)

Nintendo Entertainment System Documentation v. 0.40.

[http://db.gamefaqs.com/console/nes/file/nes\\_tech](http://db.gamefaqs.com/console/nes/file/nes_tech).

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