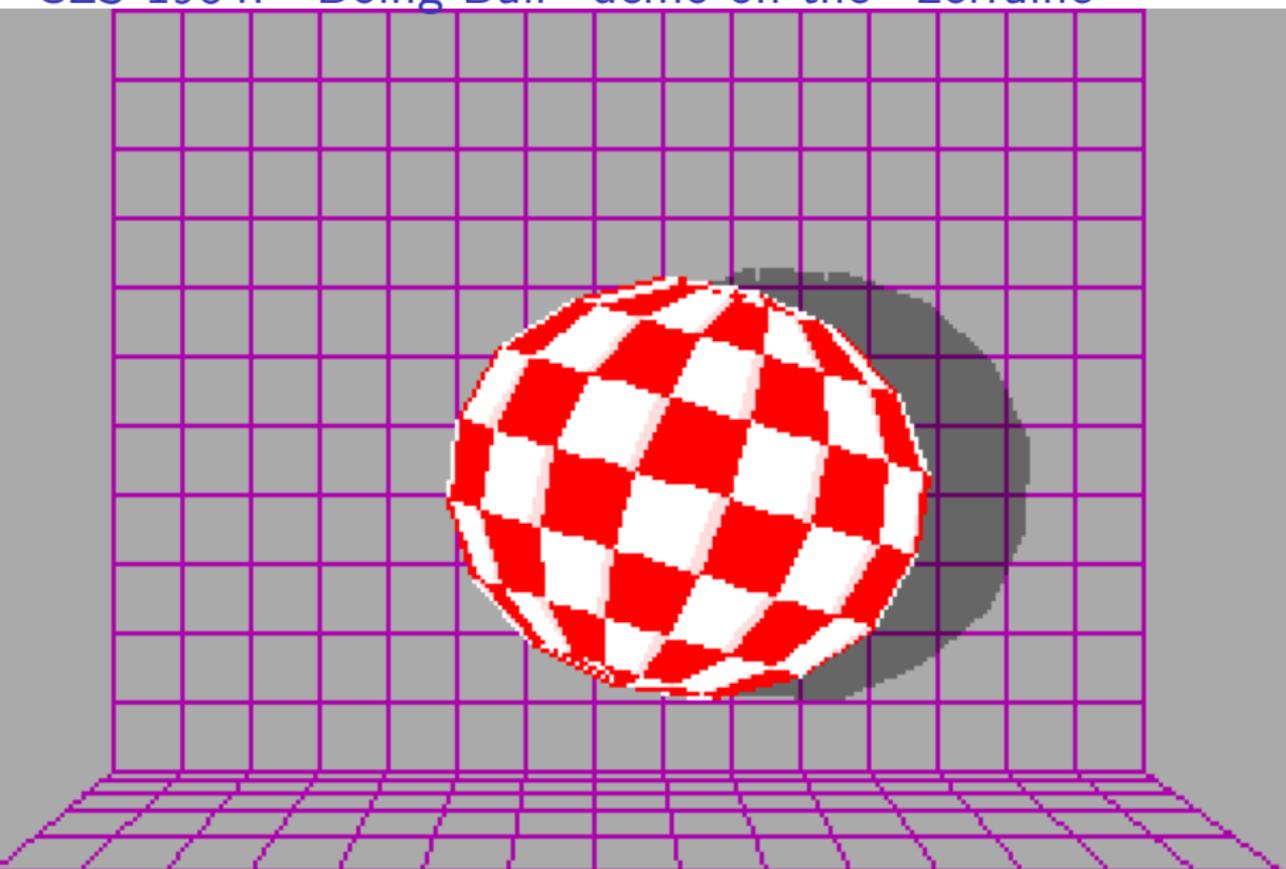


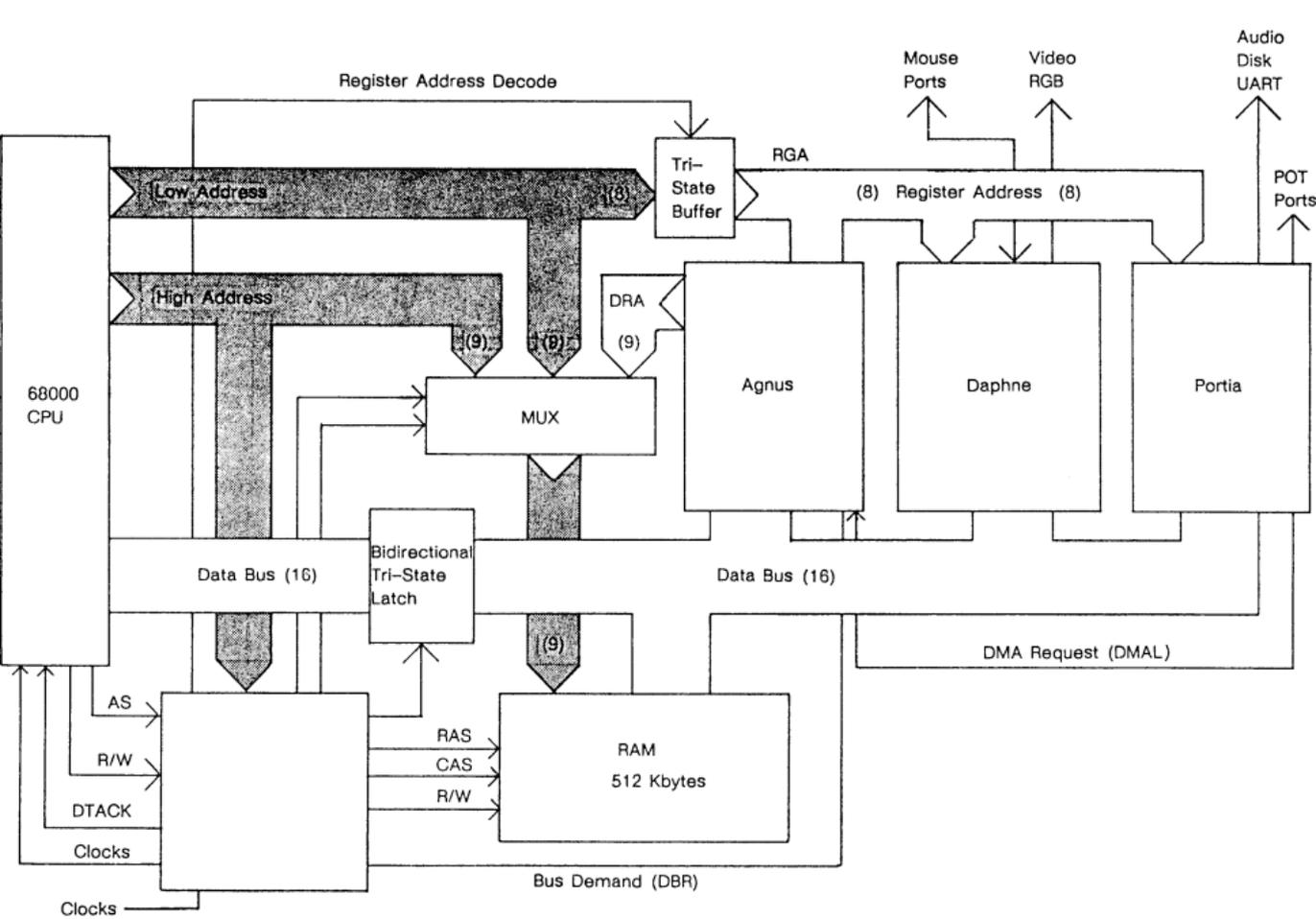
# Commodore Amiga Chips



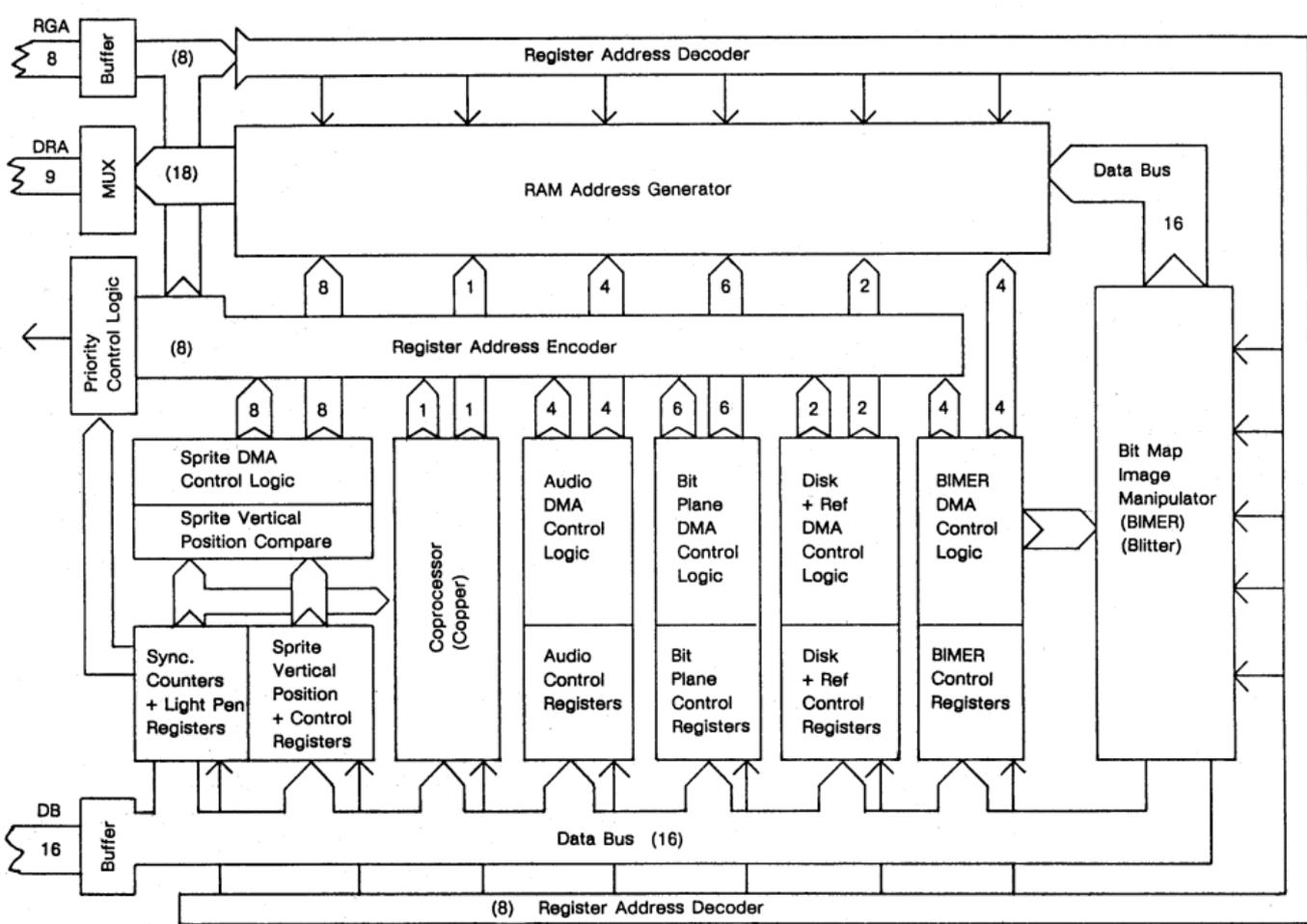
Dave Haynie  
Andy Finkel  
Bil Herd  
Stephen A. Edwards

CES 1984: "Boing Ball" demo on the "Lorraine"

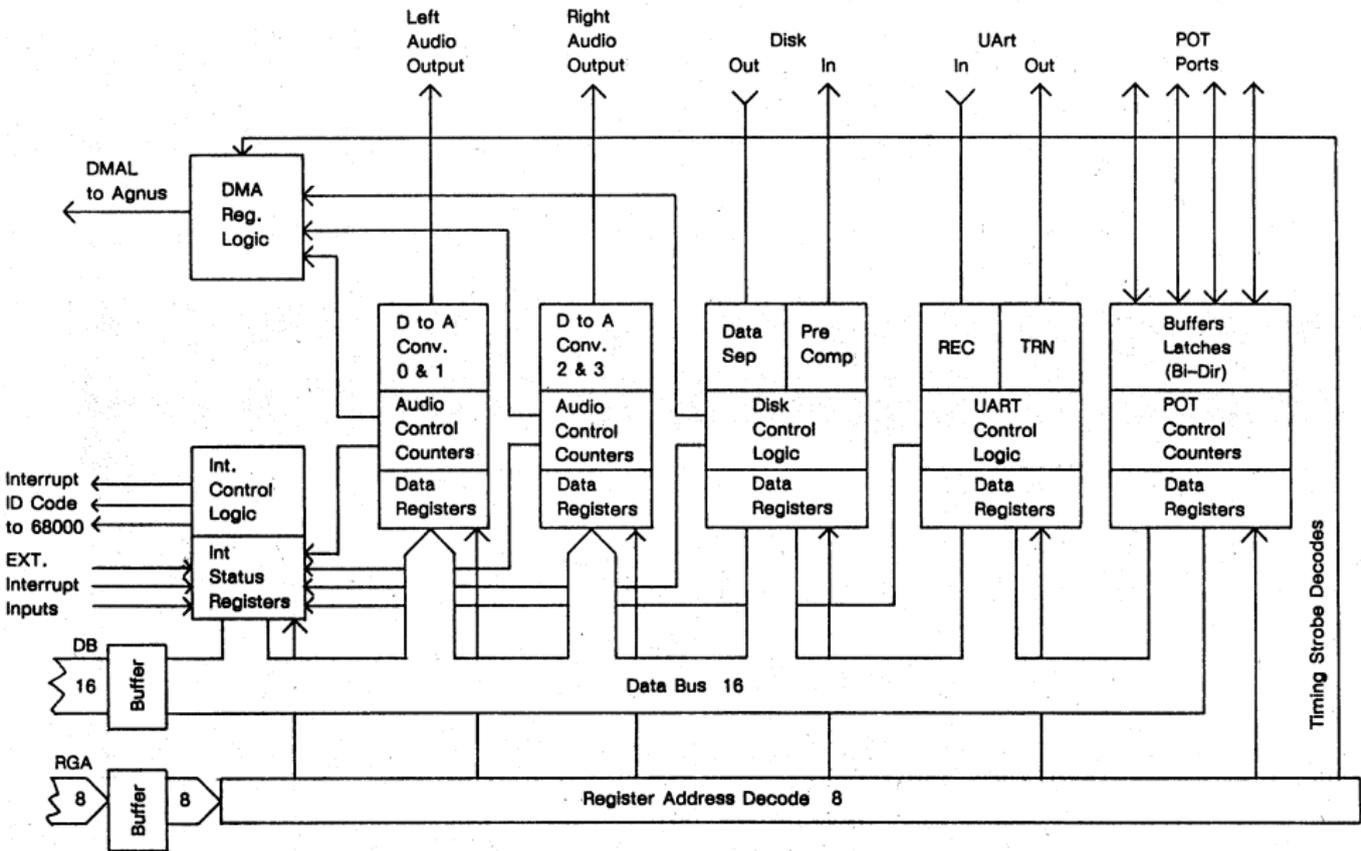




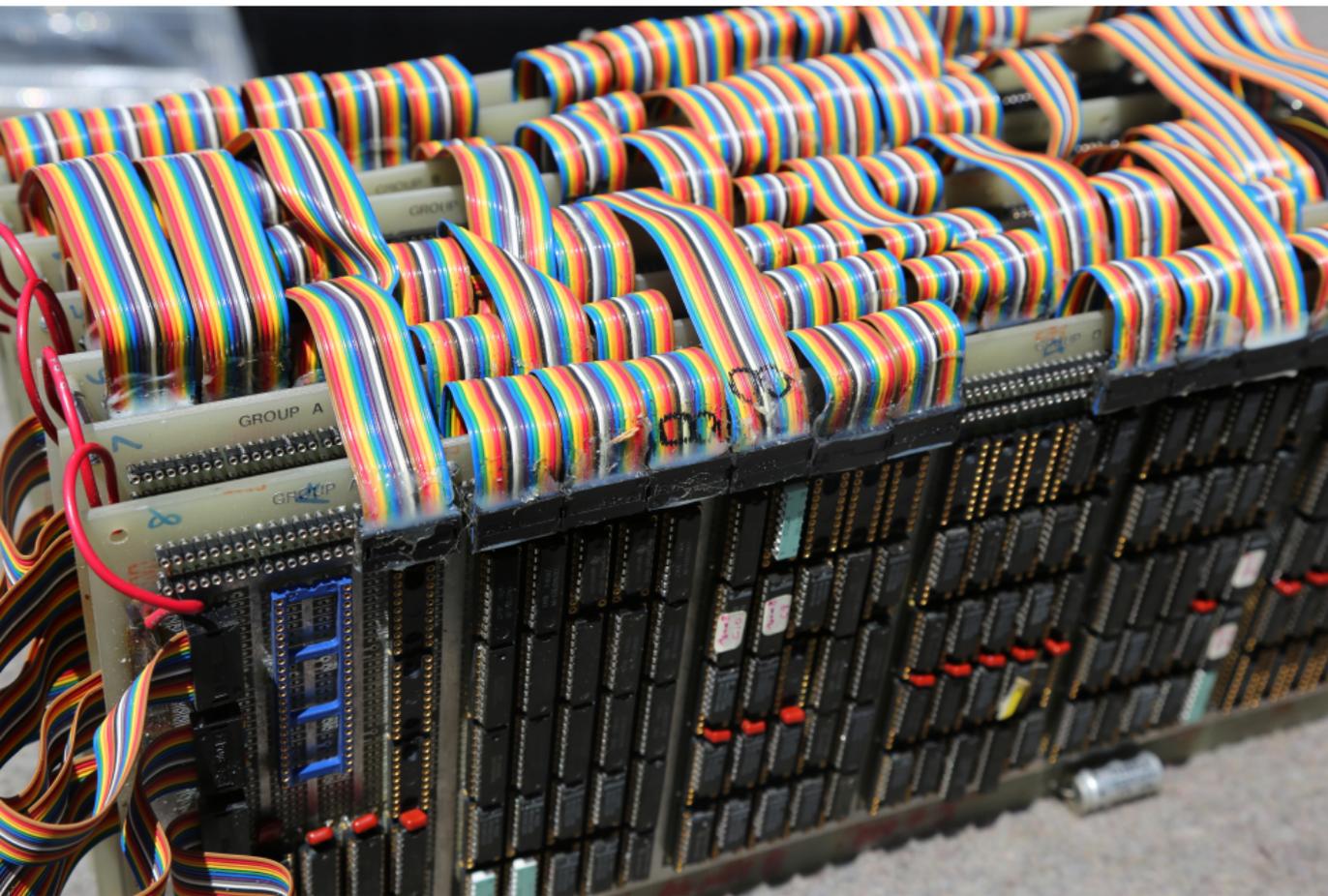
Lorraine



**Agnus**



**Portia**



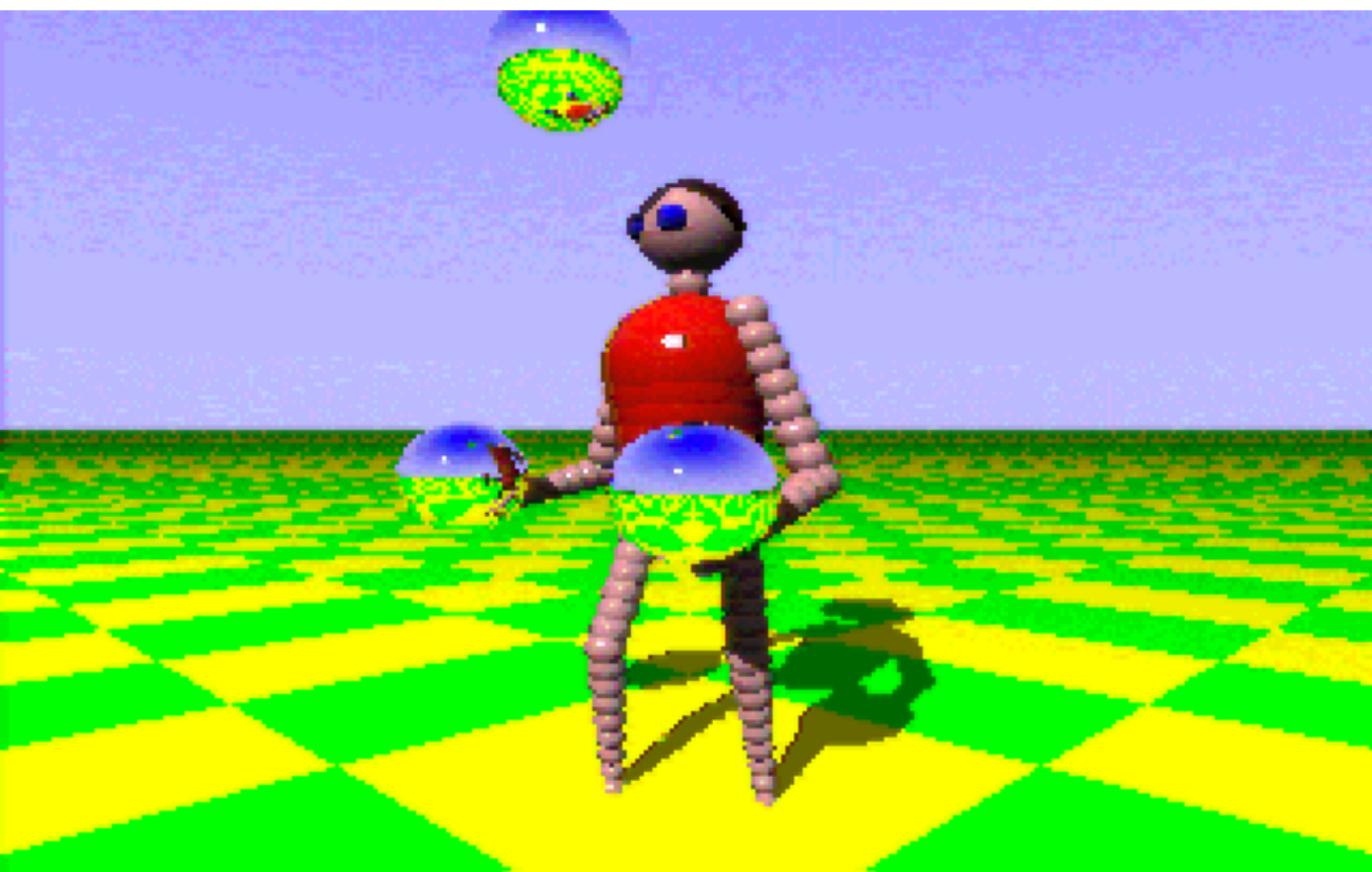
## 1985: Amiga 1000



- ▶ Motorola 68000 @ 7.16 MHz
- ▶ 256K RAM
- ▶ 256K ROM (w/ OS)
- ▶ 4096 colors
- ▶ 640 × 400 interlaced
- ▶ 6 bitplanes
- ▶ 8 sprites/scanline
- ▶ 4 8-bit audio @ 24 kHz
- ▶ Hardware blitter











## 1987: Amiga 2000

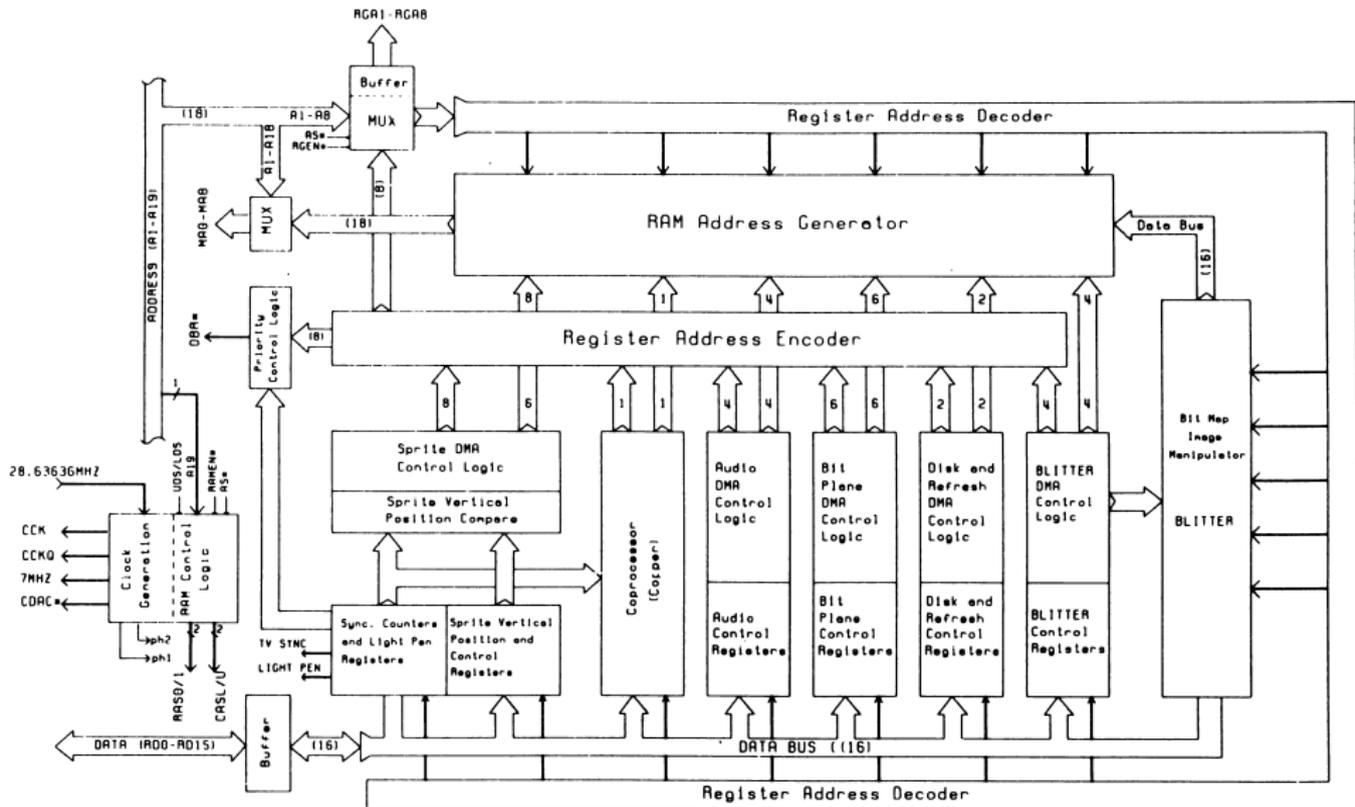


- ▶ Motorola 68000 @ 7.16 MHz
- ▶ 512 KB “Chip” + 512 KB “fast” RAM
- ▶ 512K ROM (w/ OS)
- ▶ 4096 colors
- ▶ 640 × 400 interlaced
- ▶ 6 bitplanes
- ▶ 8 sprites/scanline
- ▶ 4 8-bit audio @ 24 kHz
- ▶ Hardware blitter

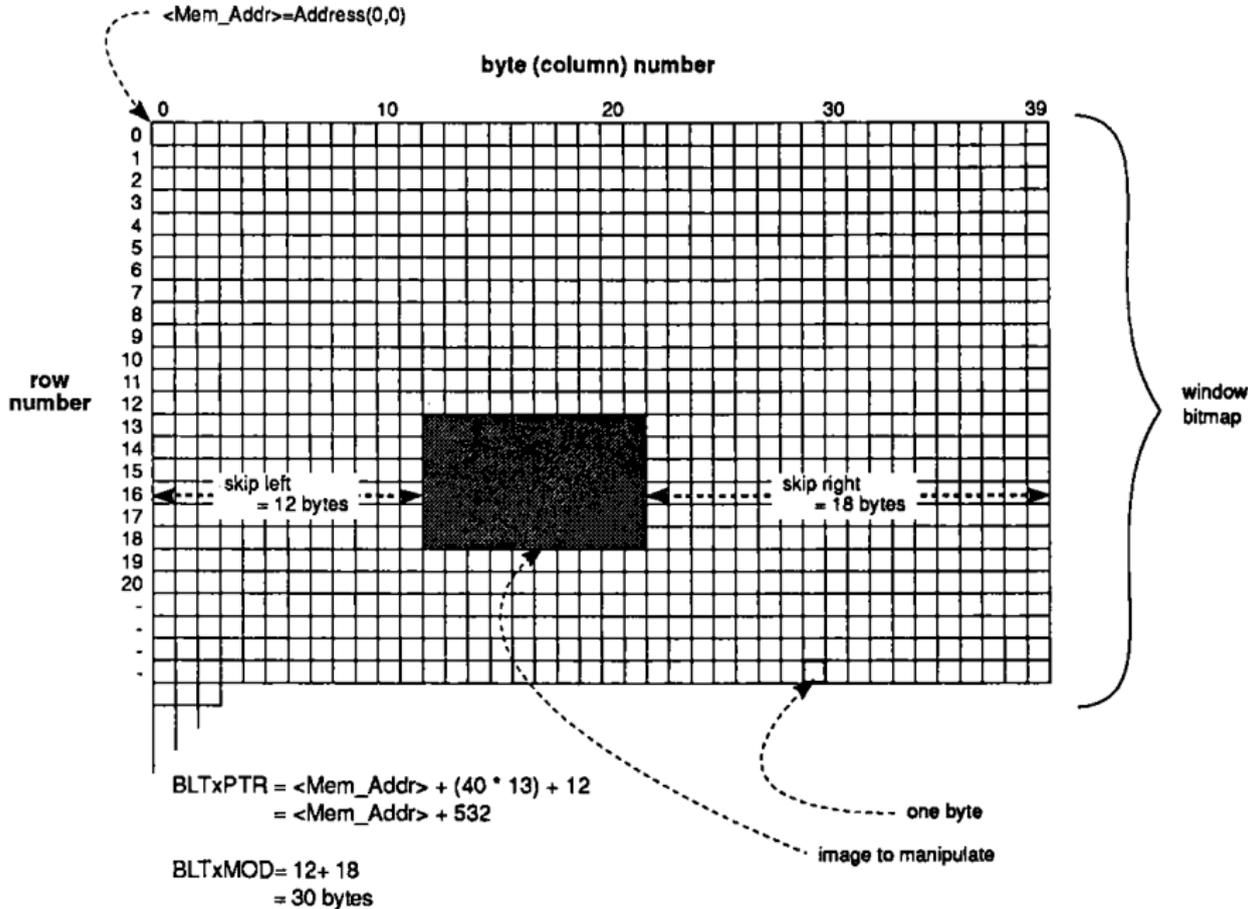


# Fat Agnus

- ▶ Blitter
- ▶ Display Synchronized Coprocessor (“Copper”)
- ▶ 25 Channel DMA controller
- ▶ System clock generator
- ▶ DRAM controller



**Fat Agnus Block Diagram**



**Figure 6-2: BLTxPTR and BLTxMOD calculations**

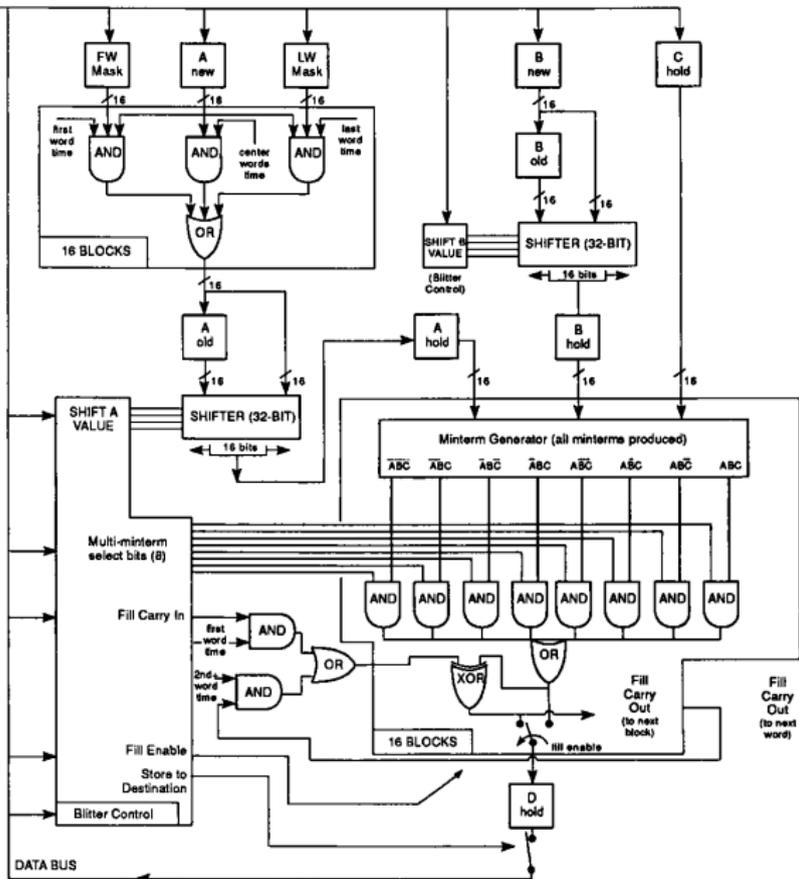
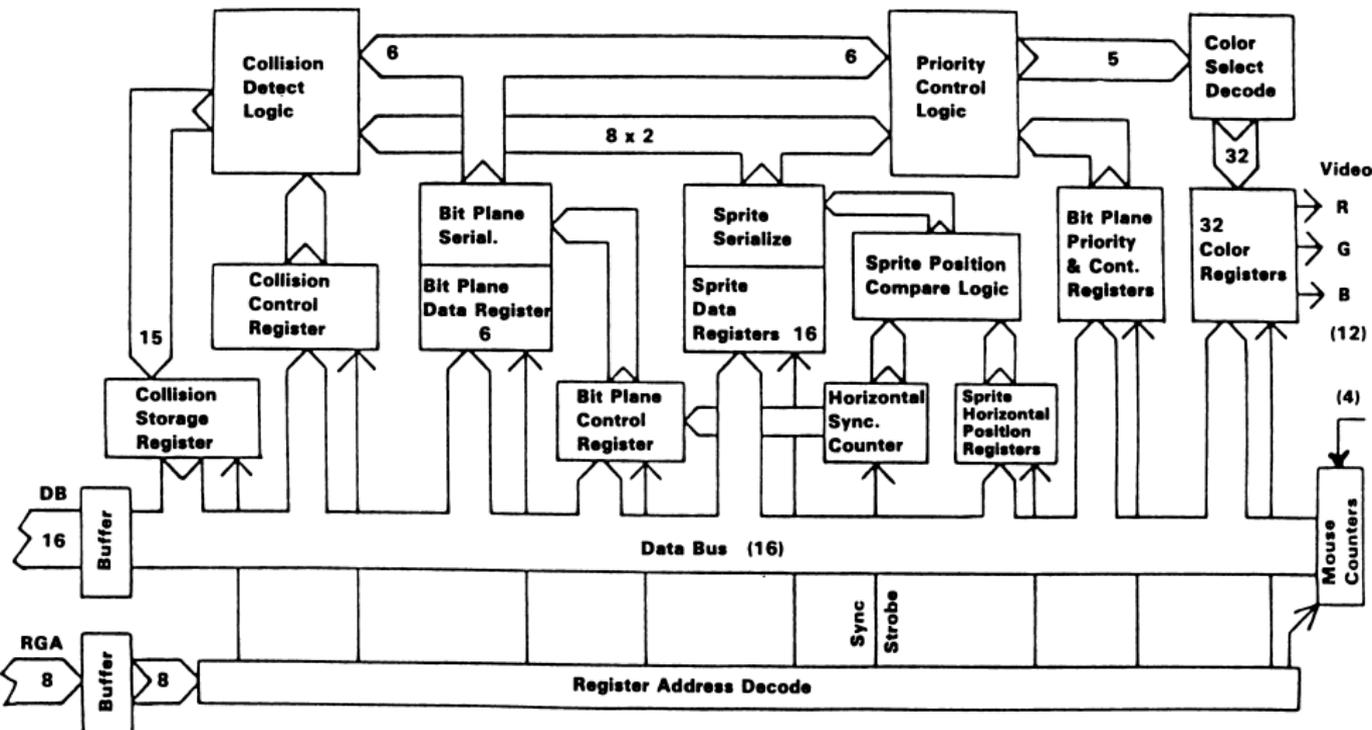


Figure 6-13: Blitter Block Diagram

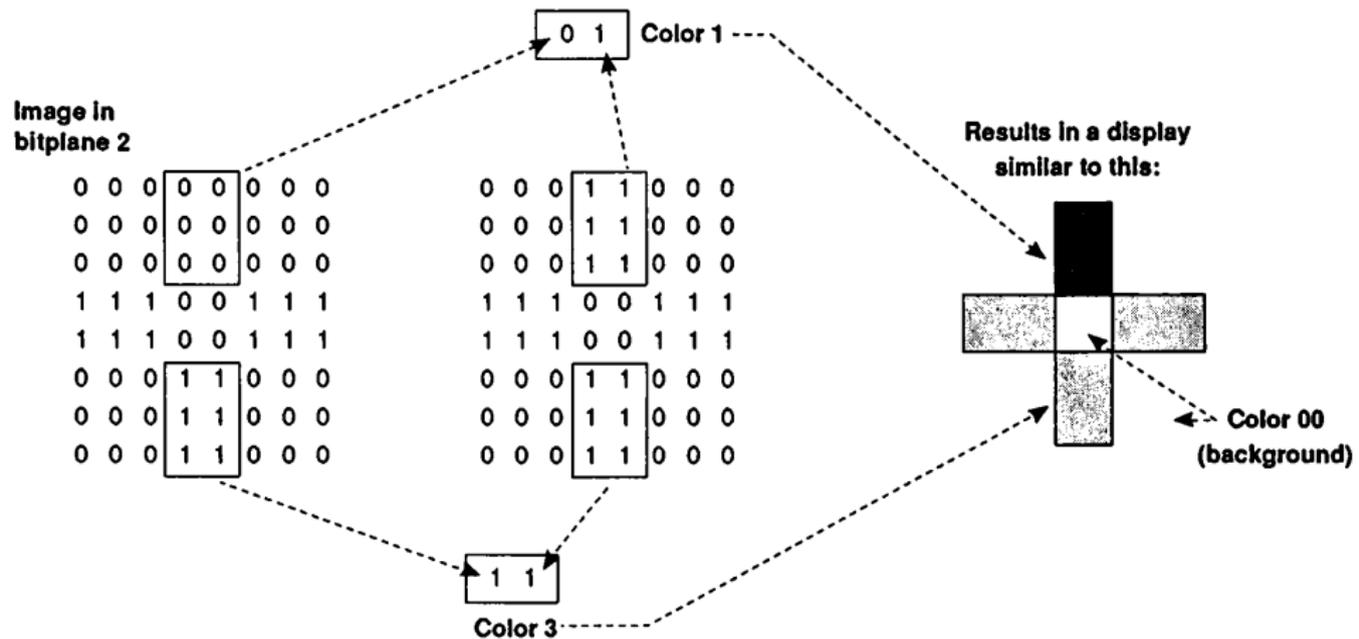
# Denise

- ▶  $320 \times 200$  to  $640 \times 400$  resolution (interlaced)
- ▶ 4096 colors
- ▶ Eight sprite controllers
- ▶ Sprite collision detection
- ▶ 60 or 80 column text



DENISE BLOCK DIAGRAM





**Figure 3-8: Combining Bitplanes**

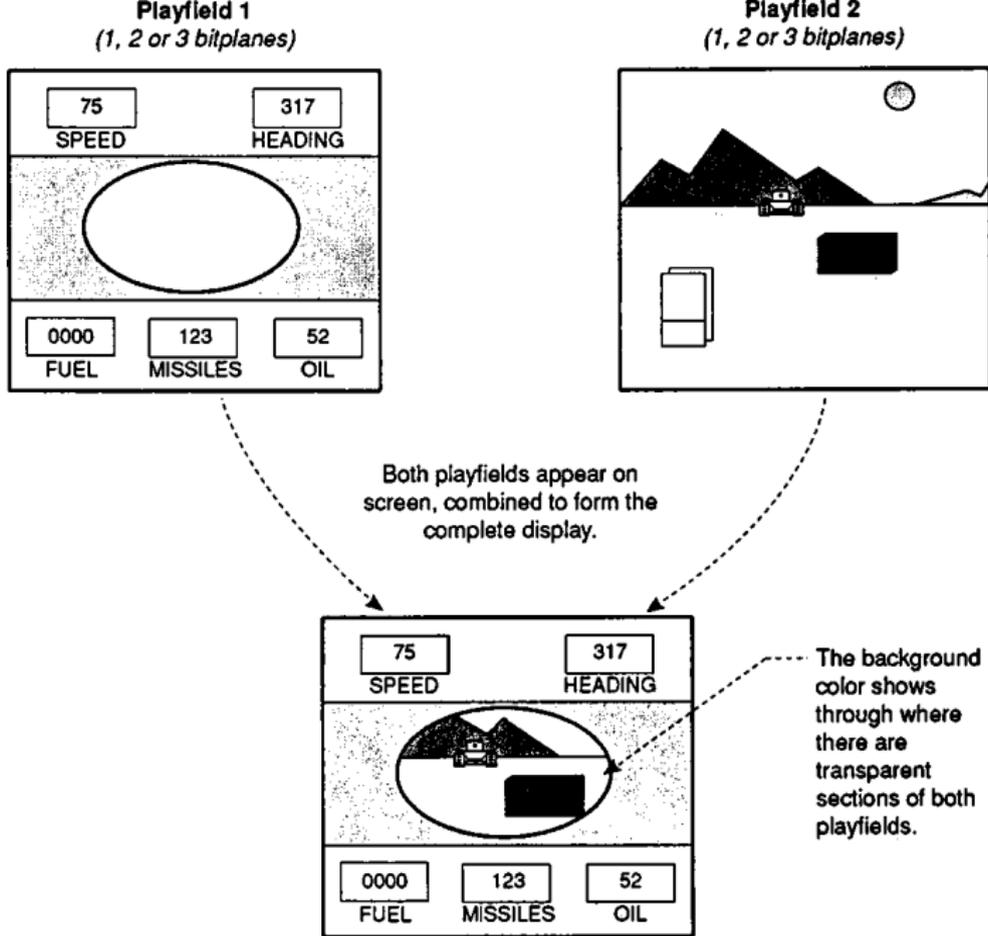
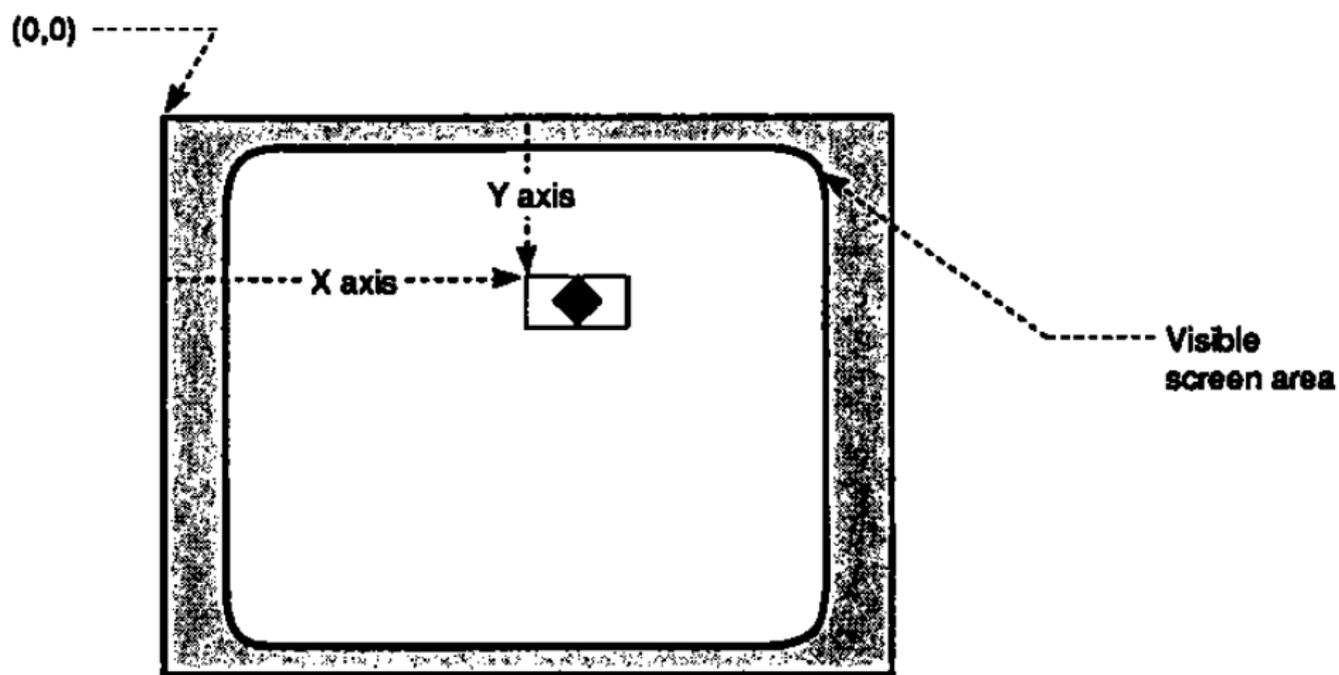


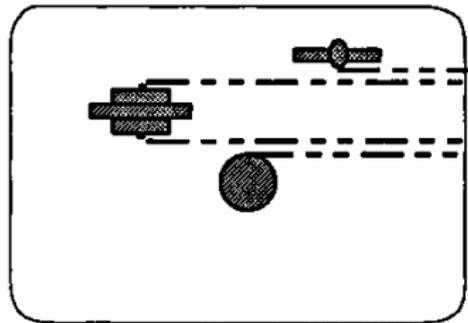
Figure 3-12: A Dual-playfield Display





**Figure 4-1: Defining Sprite On-screen Position**

*Part of a screen display*



Each image of this sprite may be placed at any desired spot, horizontally or vertically. However, at least one video line must separate the bottom of one usage of a sprite from the starting point of the next usage.

**Figure 4-9: Typical Example of Sprite Reuse**

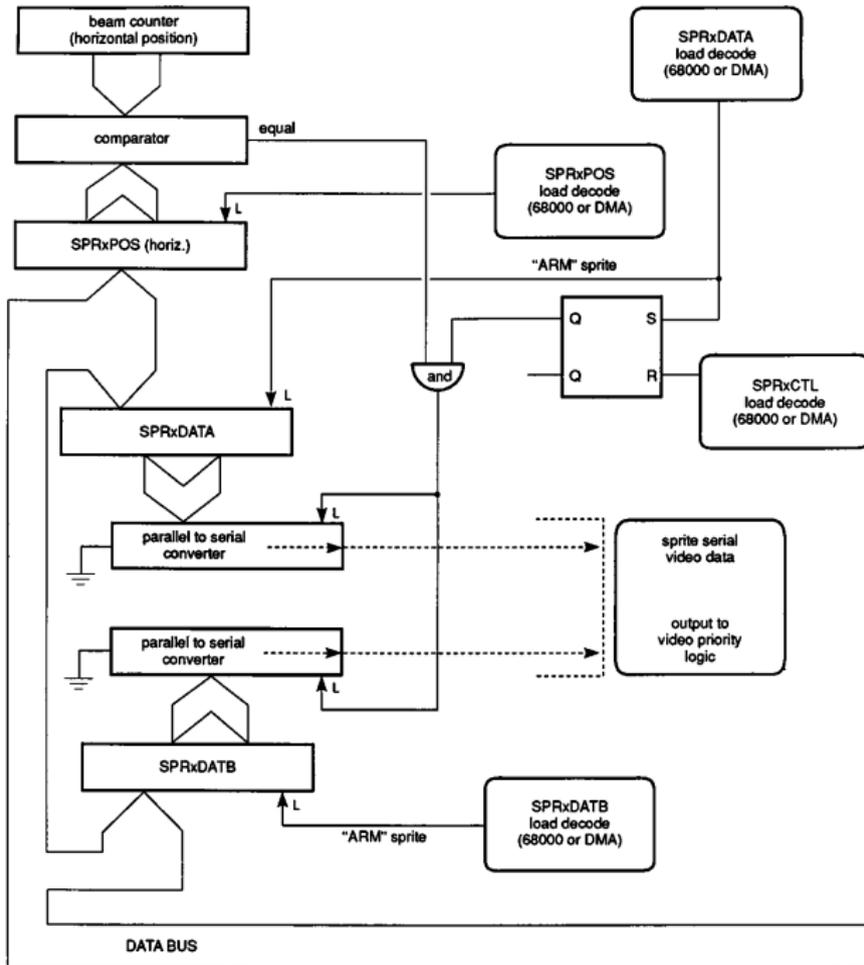


Figure 4-13: Sprite Control Circuitry



## COLOR SELECTION IN HOLD-AND-MODIFY MODE

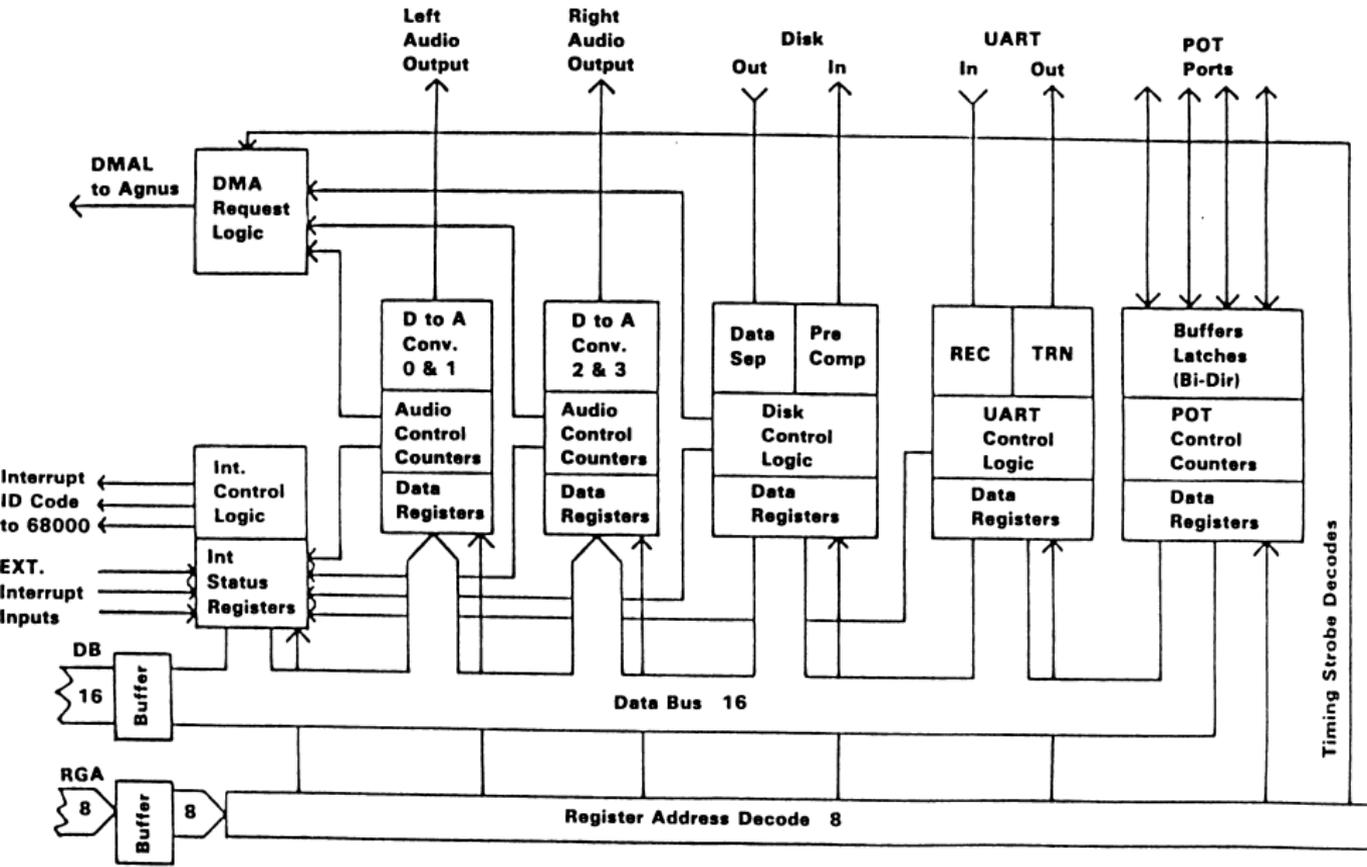
In hold-and-modify mode, the color register contents are changed as shown in Table 3-19. This mode is in effect only if bit 10 of BPLCON0 = 1.

Bitplane 6	Bitplane 5		Result
0	0	Normal operation	(use color register itself)
0	1	Hold green and red	B = Bitplane 4-1 contents
1	0	Hold green and blue	R = Bitplane 4-1 contents
1	1	Hold blue and red	G = Bitplane 4-1 contents

Table 1-19: Color Selection in Hold-and-modify Mode

# Paula

- ▶ Four voices; two channels
- ▶ Nine octaves
- ▶ Complex waveforms
- ▶ Both amplitude and frequency modulation
- ▶ I/O controller for disk and controller ports
- ▶ Floppy controller
- ▶ Interrupt controller



PAULA BLOCK DIAGRAM