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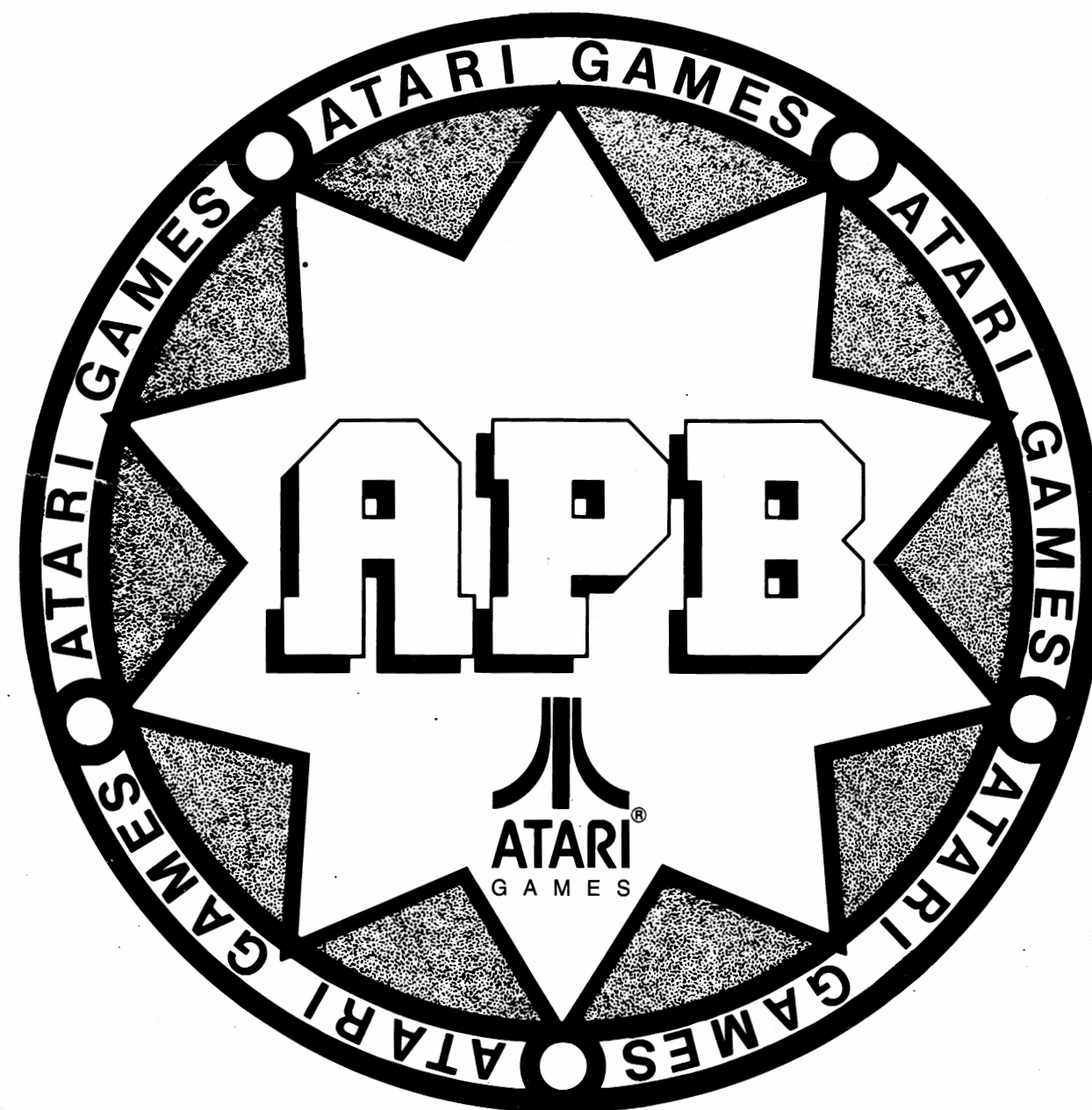
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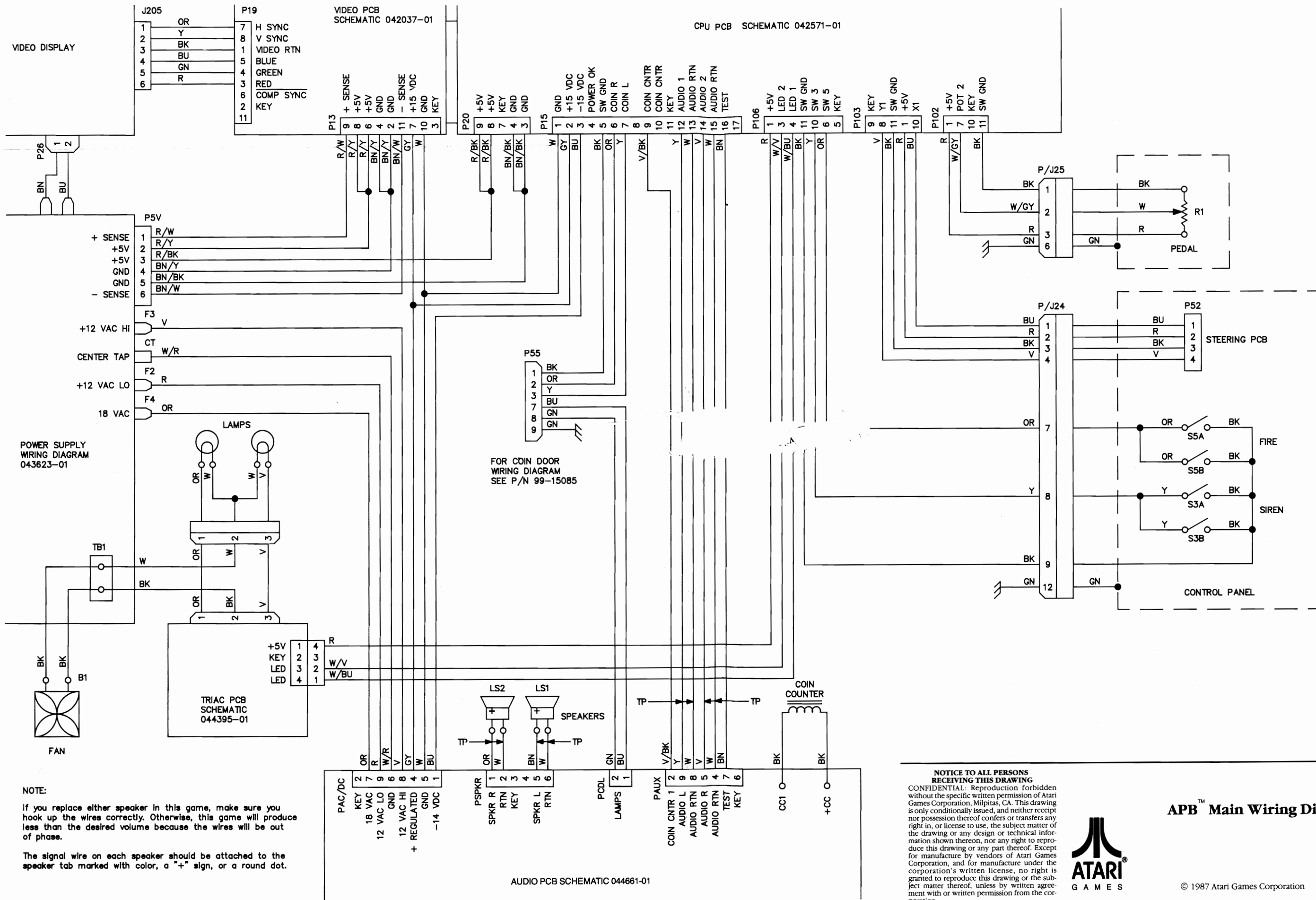
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APB™ Schematic Package

Supplement to the Operators Manual

NOTE
This staple temporarily holds the schematic package together. Remove the staple before using these schematics.





NOTE:
 If you replace either speaker in this game, make sure you hook up the wires correctly. Otherwise, this game will produce less than the desired volume because the wires will be out of phase.
 The signal wire on each speaker should be attached to the speaker tab marked with color, a "+" sign, or a round dot.

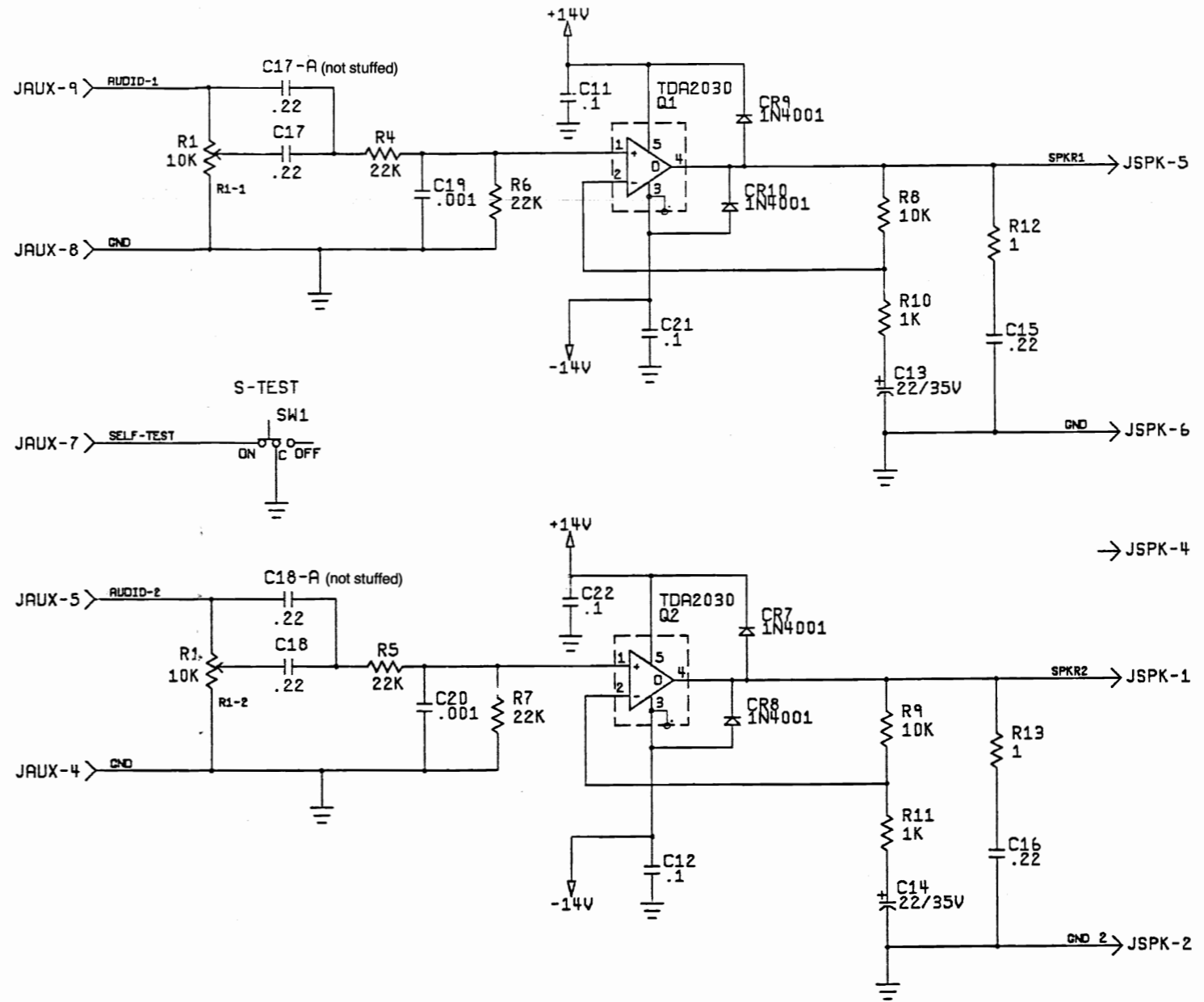
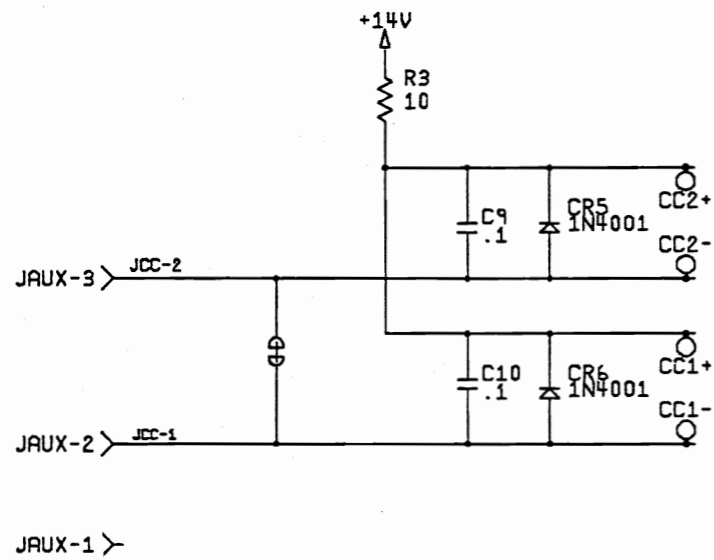
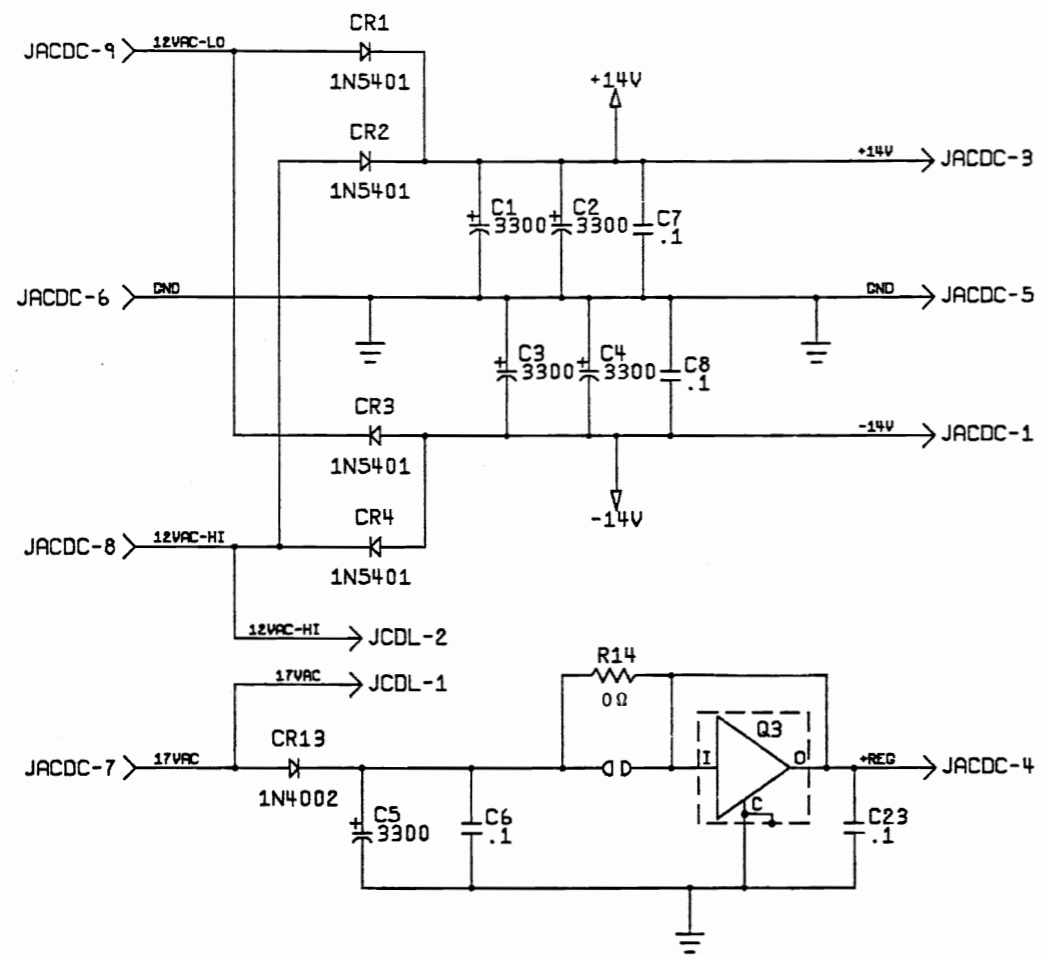
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APB™ Main Wiring Diagram

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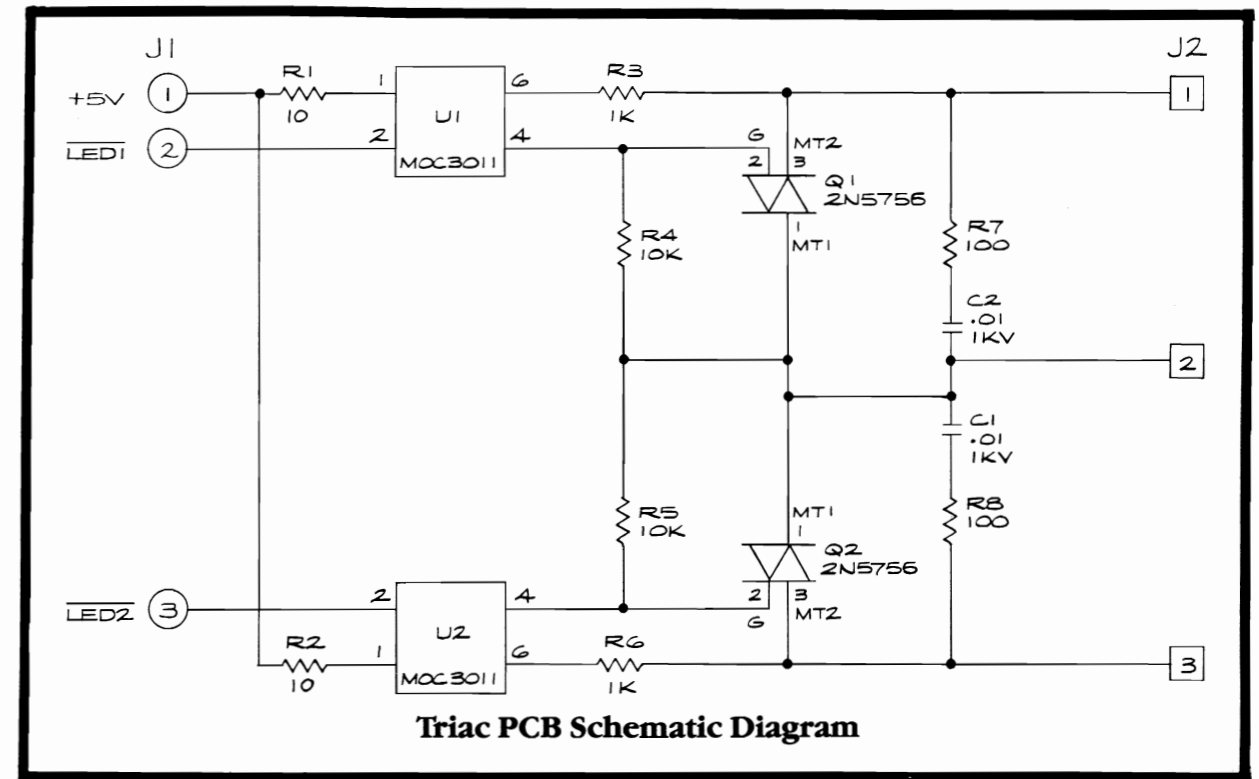
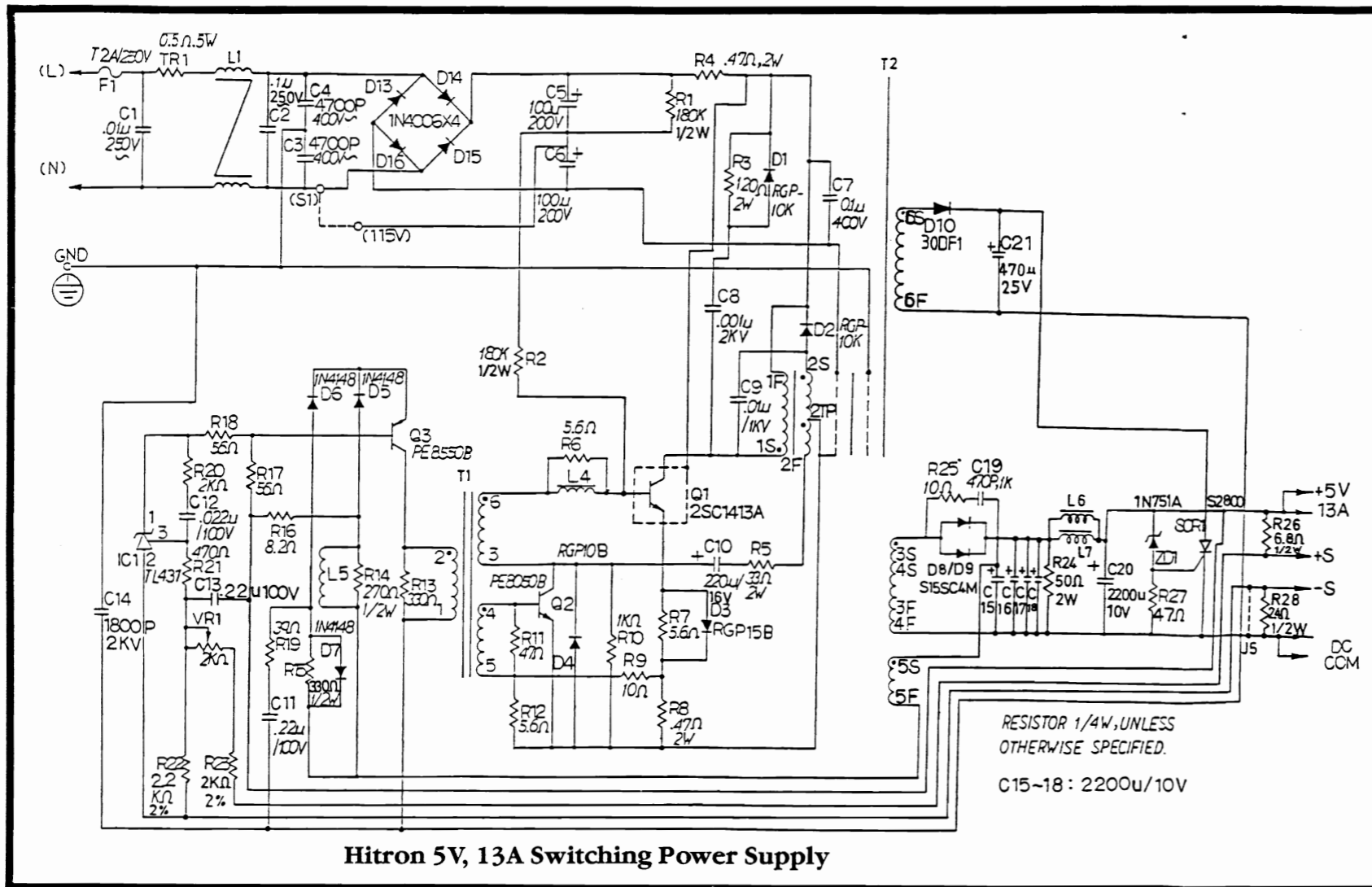
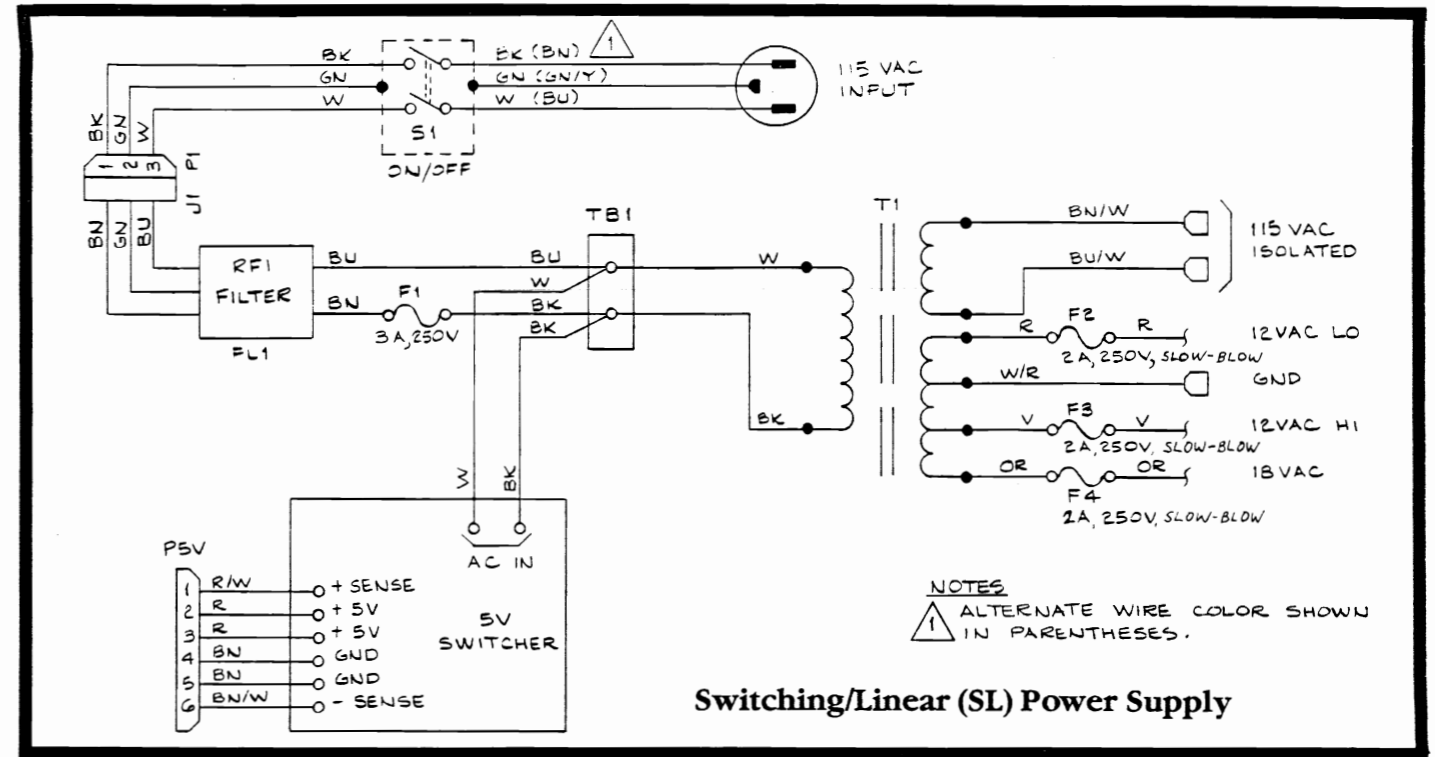
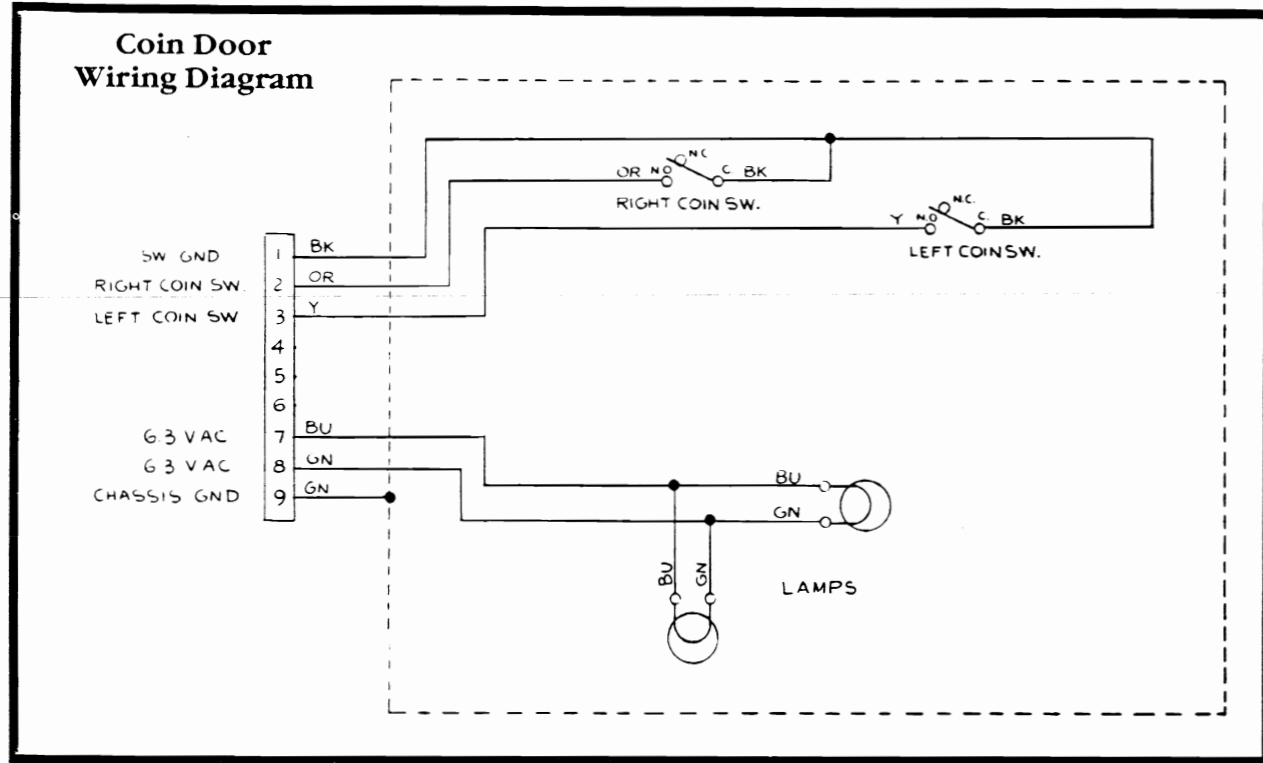
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**APB™ Audio II
PCB Schematic Diagram**

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(SL) Power Supply, Coin Door, 5V, 13A Power Supply Wiring Diagrams and Triac PCB Schematic Diagram

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Main Microprocessor (T-11) Memory Map

Octal	Address Bus Signal Lines										R/W	Data Bus Signal Lines										Function and Size
	A A A A A A A A A A A A A A A A											D D D D D D D D D D D D D D D D										
	1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0											1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0										
5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0											5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0											
000000-007777	0 0 0 0 A A A A A A A A A A A A	R/W	D D D D D D D D D D D D D D D D	Program RAM (4KB)																		
010000-010436	0 0 0 1 0 0 A A A A A A A A A 0	W	D D D D D D D D D D D D D D D D	Color RAM (144W)																		
"	0 0 0 1 0 0 A A A A A A A A A 0	W	D D D D D D D D D D D D D D D D	Z (Intensity)																		
"	0 0 0 1 0 0 A A A A A A A A A 0	W	D D D D D D D D D D D D D D D D	Blue																		
"	0 0 0 1 0 0 A A A A A A A A A 0	W	D D D D D D D D D D D D D D D D	Green																		
"	0 0 0 1 0 0 A A A A A A A A A 0	W	D D D D D D D D D D D D D D D D	Red																		
010000-010176	0 0 0 1 0 0 0 0 A A A A A A A A 0	W	D D D D D D D D D D D D D D D D	Motion Object Color RAM (64W)																		
010200-010276	0 0 0 1 0 0 0 1 A A A A A A A A 0	W	D D D D D D D D D D D D D D D D	Alphanumeric Color RAM (16W)																		
010400-010776	0 0 0 1 0 0 1 0 0 0 A A A A A A 0	W	D D D D D D D D D D D D D D D D	Playfield Color RAM (128W)																		
012000	0 0 0 1 0 1 0 0 0 0 0 0 0 0	W	D D D D D D D D D D D D D D D D	Program Page 0 Address																		
012002	0 0 0 1 0 1 0 0 0 0 0 0 0 1	W	D D D D D D D D D D D D D D D D	Program Page 1 Address																		
012200	0 0 0 1 0 1 0 0 0 1 0 0 0 0	W	D D D D D D D D D D D D D D D D	A/D Converter Start Strobe																		
012000-012002	0 0 0 1 0 1 0 0 0 0 0 0 0 0	R	D D D D D D D D D D D D D D D D	A/D Converter Output																		
012400	0 0 0 1 0 1 0 1 0 1 0 0 0 0	W	D D D D D D D D D D D D D D D D	Video Memory Page Select (VMMU)																		
012600	0 0 0 1 0 1 0 1 0 1 1 0 0 0	W	D D D D D D D D D D D D D D D D	IRQ0 Clear																		
012640	0 0 0 1 0 1 0 1 0 1 1 0 1 0	W	D D D D D D D D D D D D D D D D	6502 Reset																		
012700	0 0 0 1 0 1 0 1 0 1 1 1 0 0	W	D D D D D D D D D D D D D D D D	IRQ2 Clear																		
012740	0 0 0 1 0 1 0 1 0 1 1 1 1 0	W	D D D D D D D D D D D D D D D D	IRQ3 Clear																		
013000	0 0 0 1 0 1 1 0 0 0 0 0 0 0	W	D D D D D D D D D D D D D D D D	IRQ0 Enable 6502 RD (Active High)																		
013000	0 0 0 1 0 1 1 0 0 0 0 0 0 0	W	D D D D D D D D D D D D D D D D	IRQ1 Enable 6502 WT (Active High)																		
013000	0 0 0 1 0 1 1 0 0 0 0 0 0 0	W	D D D D D D D D D D D D D D D D	IRQ2 Enable 32V (Active High)																		
013000	0 0 0 1 0 1 1 0 0 0 0 0 0 0	W	D D D D D D D D D D D D D D D D	IRQ3 Enable VBLANK (Active High)																		
013200	0 0 0 1 0 1 1 0 1 0 0 0 0 0	W	D D D D D D D D D D D D D D D D	Communications Port Write																		
013400	0 0 0 1 0 1 1 1 0 0 0 0 0 0	W	D D D D D D D D D D D D D D D D	Horizontal Scroll & PF Bank 0																		
013600	0 0 0 1 0 1 1 1 1 0 0 0 0 0	W	D D D D D D D D D D D D D D D D	Vertical Scroll & PF Bank 1																		
014000	0 0 0 1 1 0 0 0 0 0 0 0 0 0	R	D D D D D D D D D D D D D D D D	SW 6 (Active Low)																		
014000	0 0 0 1 1 0 0 0 0 0 0 0 0 0	R	D D D D D D D D D D D D D D D D	SW 5 (Active Low)																		
014000	0 0 0 1 1 0 0 0 0 0 0 0 0 0	R	D D D D D D D D D D D D D D D D	SW 4 (Active Low)																		
014000	0 0 0 1 1 0 0 0 0 0 0 0 0 0	R	D D D D D D D D D D D D D D D D	SW 3 (Active Low)																		
014000	0 0 0 1 1 0 0 0 0 0 0 0 0 0	R	D D D D D D D D D D D D D D D D	6502 Comm. Flag (Active High)																		
014000	0 0 0 1 1 0 0 0 0 0 0 0 0 0	R	D D D D D D D D D D D D D D D D	T-11 Comm. Flag (Active High)																		
014000	0 0 0 1 1 0 0 0 0 0 0 0 0 0	R	D D D D D D D D D D D D D D D D	SW 2 (Active Low)																		
014000	0 0 0 1 1 0 0 0 0 0 0 0 0 0	R	D D D D D D D D D D D D D D D D	SW 1 (Active Low)																		
014000	0 0 0 1 1 0 0 0 0 0 0 0 0 0	R	D D D D D D D D D D D D D D D D	Self-Test (Active Low)																		
016000	0 0 0 1 1 1 0 0 0 0 0 0 0 0	R	D D D D D D D D D D D D D D D D	Communications Port Read																		
020000-033776	0 0 1 A A A A A A A A A A A A A 0	R/W	D D D D D D D D D D D D D D D D	Alphanumerics RAM (VMMU=0) (3KW)																		
"	0 0 1 A A A A A A A A A A A A A 0	R/W	D D D D D D D D D D D D D D D D	ANPIC																		
034000-037776	0 0 1 1 1 A A A A A A A A A A A 0	R/W	D D D D D D D D D D D D D D D D	Motion Object RAM (VMMU=0) (1KW)																		
"	0 0 1 1 1 A A A A A A A A A A 0 0	R/W	D D D D D D D D D D D D D D D D	MOV																		
"	0 0 1 1 1 A A A A A A A A A A 0 1	R/W	D D D D D D D D D D D D D D D D	MOPIC																		
"	0 0 1 1 1 A A A A A A A A A A 1 0	R/W	D D D D D D D D D D D D D D D D	MOH																		
"	0 0 1 1 1 A A A A A A A A A A 1 1	R/W	D D D D D D D D D D D D D D D D	MOLNK																		
020000-037776	0 0 1 A A A A A A A A A A A A A 0	R/W	D D D D D D D D D D D D D D D D	Playfield RAM Top (VMMU=2) (4KW)																		
020000-037776	0 0 1 A A A A A A A A A A A A A 0	R/W	D D D D D D D D D D D D D D D D	Playfield RAM Bottom (VMMU=3) (4KW)																		
040000-057776	0 1 0 A A A A A A A A A A A A A 0	R	D D D D D D D D D D D D D D D D	Paged Program (Page 0) (4KW)																		
060000-077776	0 1 1 A A A A A A A A A A A A A 0	R	D D D D D D D D D D D D D D D D	Paged Program (Page 1) (4KW)																		
100000-177776	1 A A A A A A A A A A A A A A A 0	R	D D D D D D D D D D D D D D D D	Program ROM (16KW)																		

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APB™ Main Microprocessor Memory Map

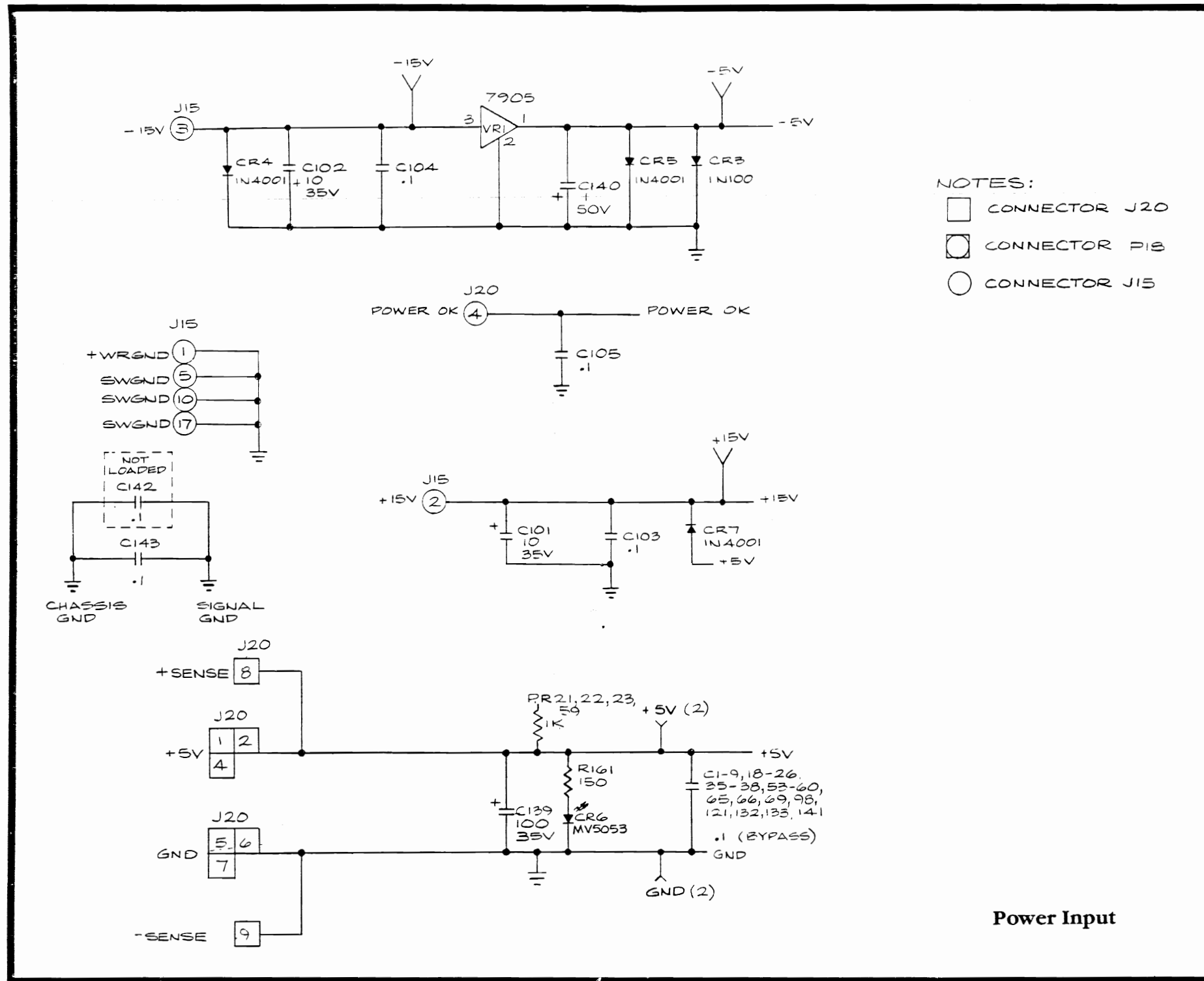
Sound Microprocessor (6502) Memory Map

Hexa- decimal	A A A A A A A A A A A A A A A A	R/W	D D D D D D D D	Function and Size
	1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0		0 0 0 0 0 0 0 0	
	5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0		7 6 5 4 3 2 1 0	
0000-0FFF	0 0 0 0 A A A A A A A A A A A A	R/W	D D D D D D D D	Program RAM (4KB)
1000-17FF	0 0 0 1 0 A A A A A A A A A A A A	R/W	D D D D D D D D	EEROM (2KB)
1800-180F	0 0 1 1 0 0 0 A A A A A	R/W	D D D D D D D D	POKEY 1 (16B)
1810-1813	0 0 1 1 0 0 1 A A	R	D D D D D D D D	LETA
1830-183F	0 0 1 1 0 1 1 A A A A A	R/W	D D D D D D D D	POKEY 2 (16B)
1840	0 0 1 1 1 0 0	R	D	T-11 Talk (Active High)
1840	0 0 1 1 1 0 0	R	D	6502 Talk (Active High)
1840	0 0 1 1 1 0 0	R	D	TI READY (Active High)
1840	0 0 1 1 1 0 0	R	D	Self-Test Switch (Active Low)
1840	0 0 1 1 1 0 0	R	D	Auxiliary Coin Switch (Active Low)
1840	0 0 1 1 1 0 0	R	D	Left Coin Switch (Active Low)
1840	0 0 1 1 1 0 0	R	D	Right Coin Switch (Active Low)
1850-1851	0 0 1 1 1 0 1 A	R	D D D D D D D D	Yamaha Sound Chip
1860	0 0 1 1 1 1 0	R	D D D D D D D D	Communications Port Read
1870	0 0 1 1 1 1 1 0 0 0	W	D D D D D D D D	TI Data
1872-1873	0 0 1 1 1 1 1 0 0 1 A	W	D D D D D D D D	TI Write Enable
1874	0 0 1 1 1 1 1 0 1 0	W	D D D D D D D D	Communications Port Write
1876	0 0 1 1 1 1 1 0 1 1	W	D	Right Coin Counter (Active High)
1876	0 0 1 1 1 1 1 0 1 1	W	D	Left Coin Counter (Active High)
1878	0 0 1 1 1 1 1 1 0 0	W	D	IRQ Clear
187A	0 0 1 1 1 1 1 1 0 1	W	D D D	Yamaha Mixer
187A	0 0 1 1 1 1 1 1 0 1	W	D D	POKEY Mixer
187A	0 0 1 1 1 1 1 1 0 1	W	D D D	TI Sound Mixer
187C	0 0 1 1 1 1 1 1 1 0	W	D	LED 1
187C	0 0 1 1 1 1 1 1 1 0	W	D	LED 2
187C	0 0 1 1 1 1 1 1 1 0	W	D	LETA Resolution
187C	0 0 1 1 1 1 1 1 1 0	W	D	TI Frequency Select
187E	0 0 1 1 1 1 1 1 1 1	W	D	Sound Enable (Active High)
4000-7FFF	0 1 A A A A A A A A A A A A A A	R	D D D D D D D D	Program ROM (16KB)
8000-FFFF	1 A A A A A A A A A A A A A A	R	D D D D D D D D	Program ROM (32KB)

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APB™ Sound Microprocessor Memory Map



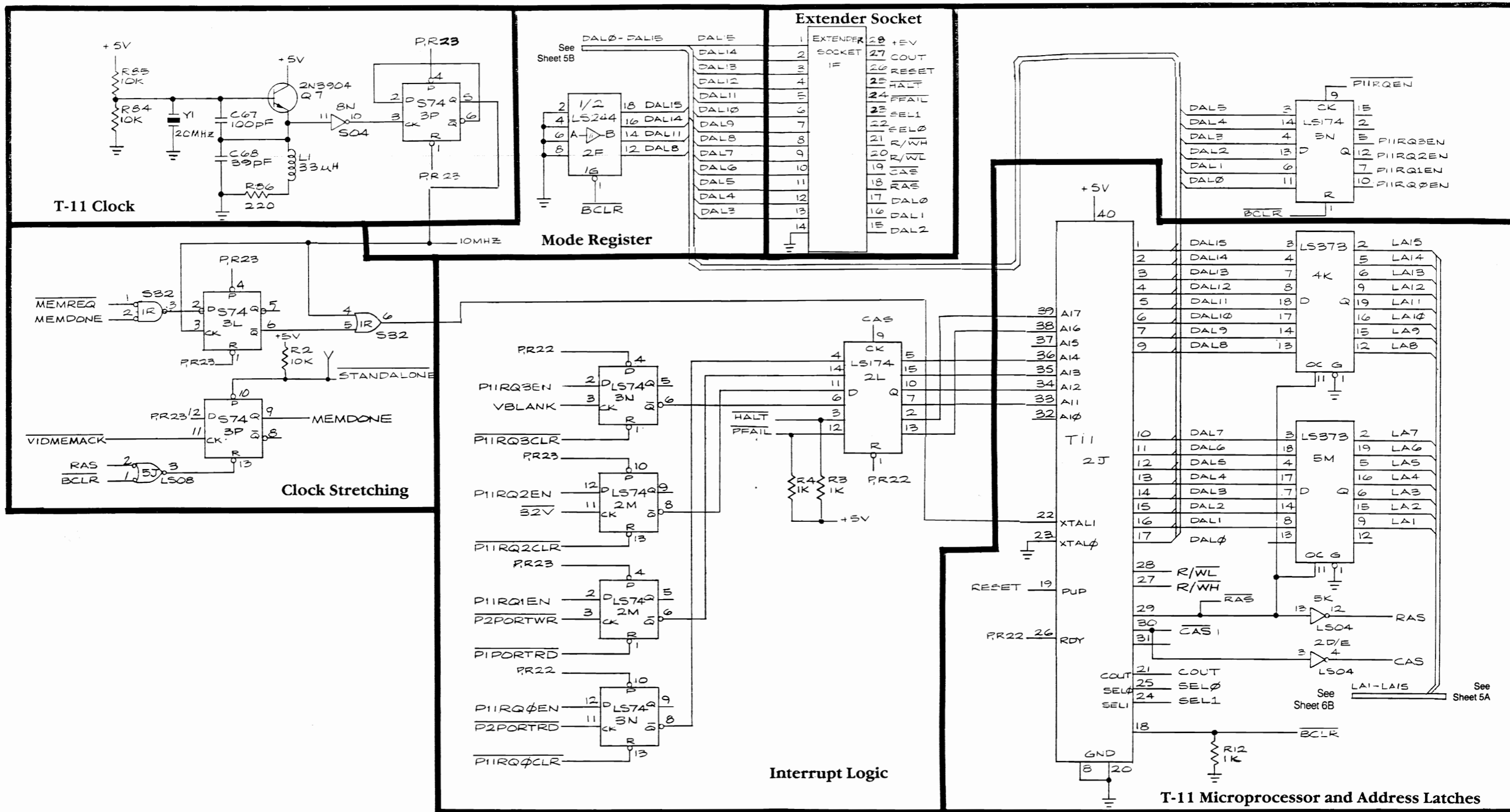
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**APB™ CPU PCB
 Schematic Diagram**

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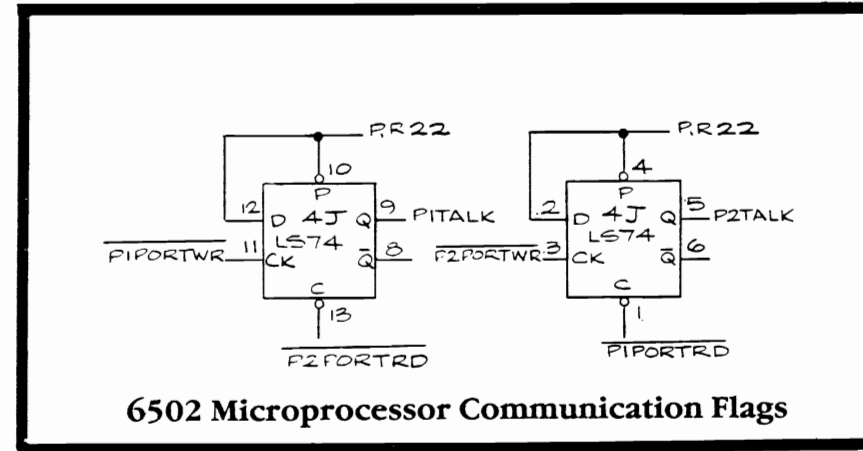
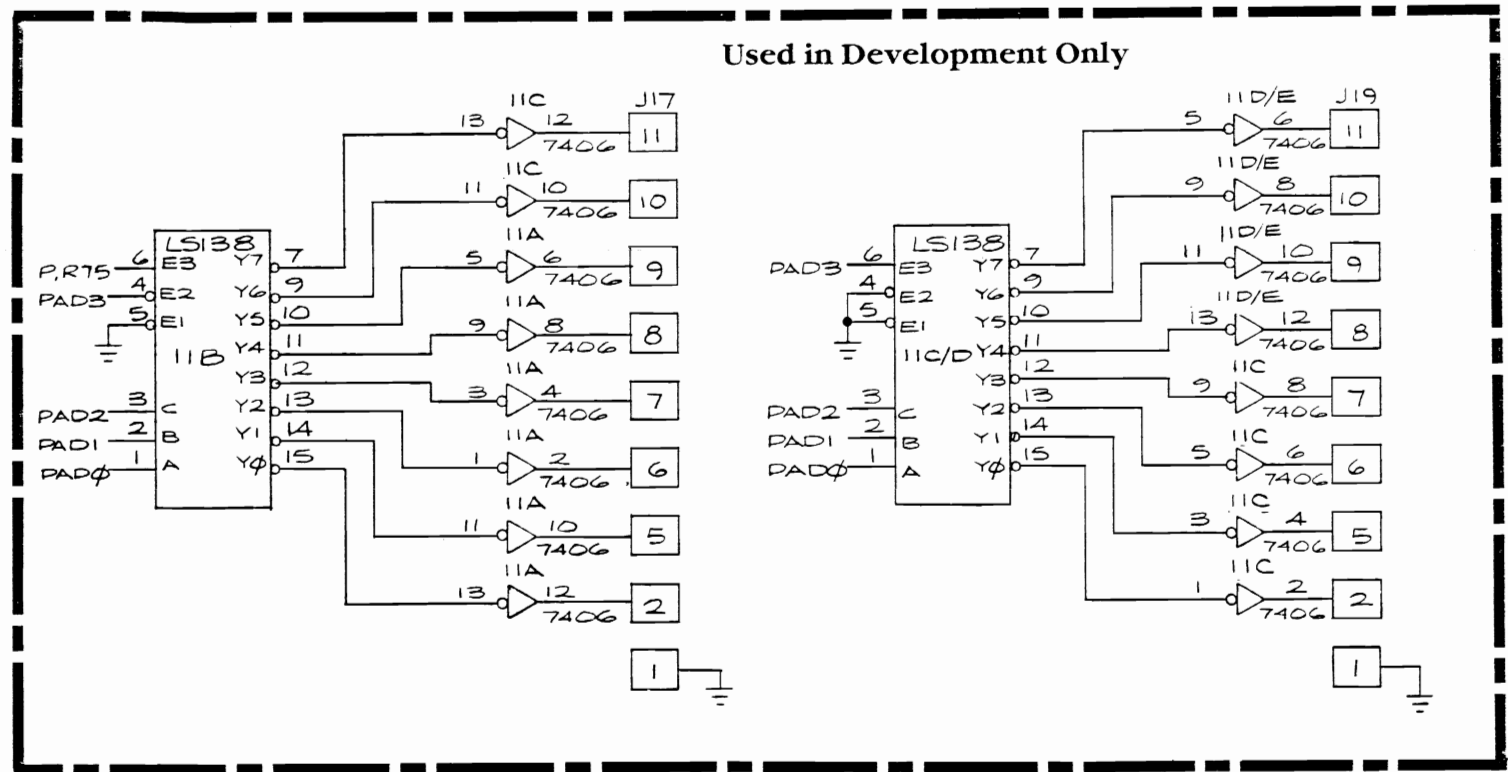
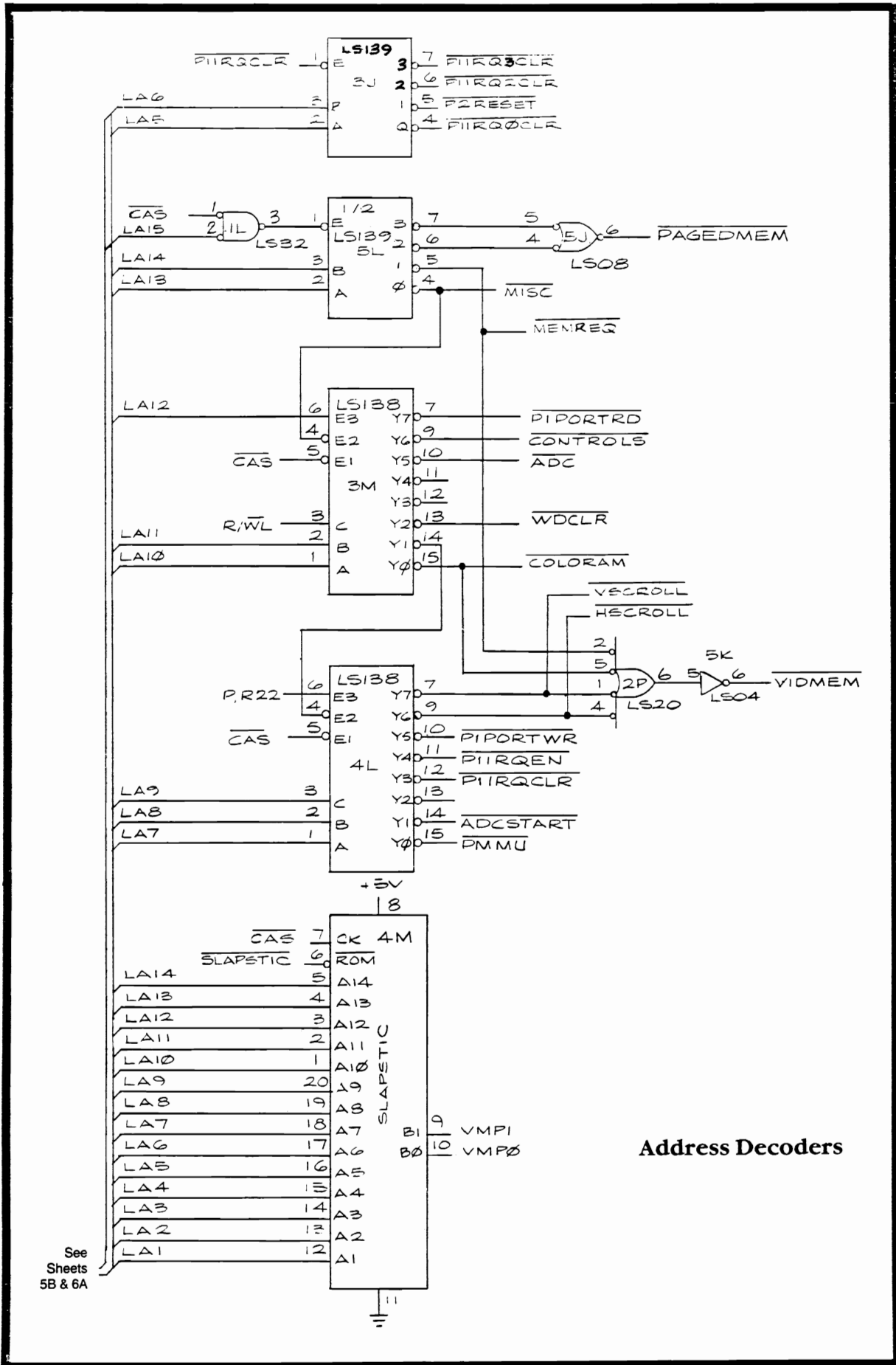
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APB™ CPU PCB Schematic Diagram

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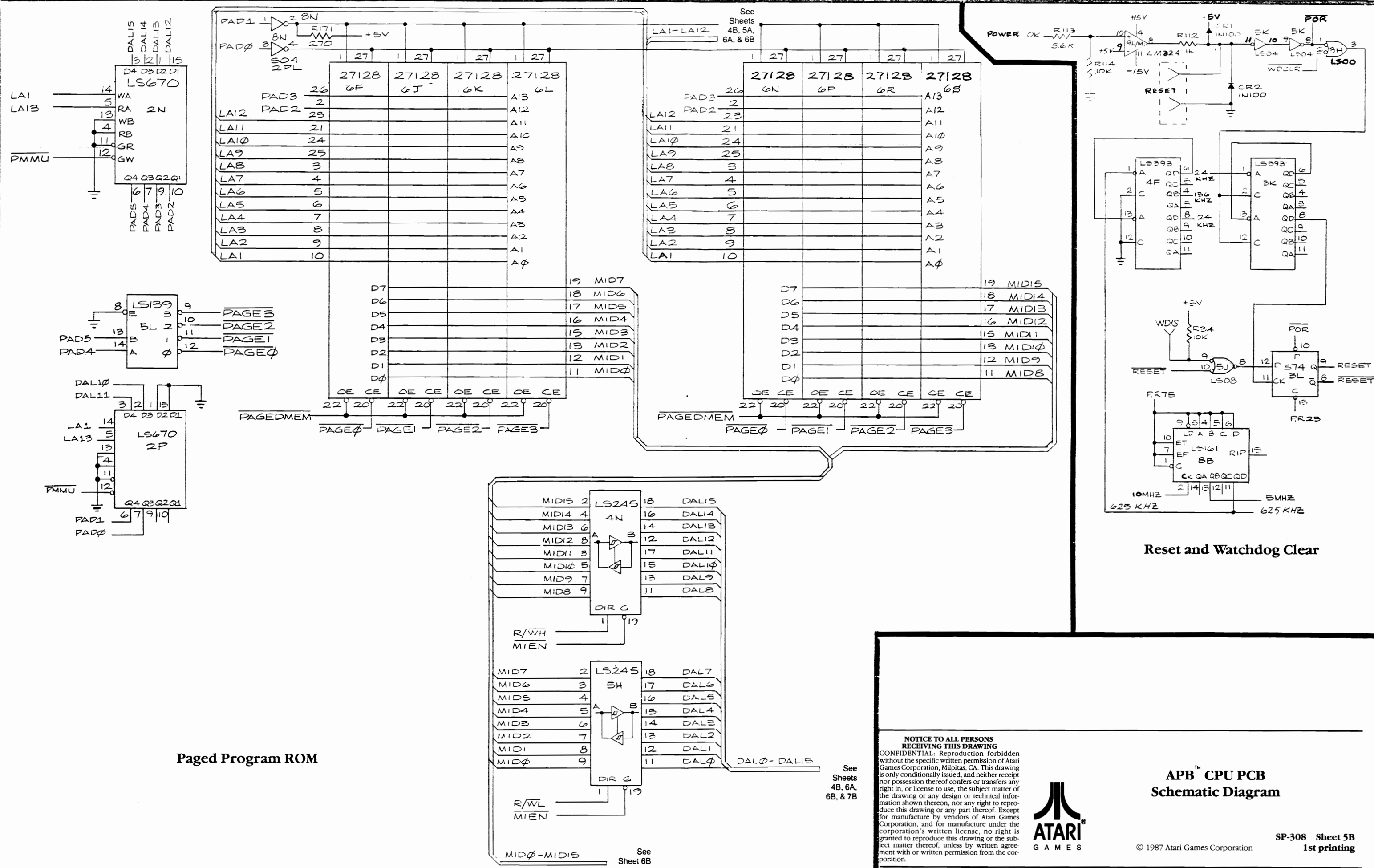
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APB™ CPU PCB Schematic Diagram



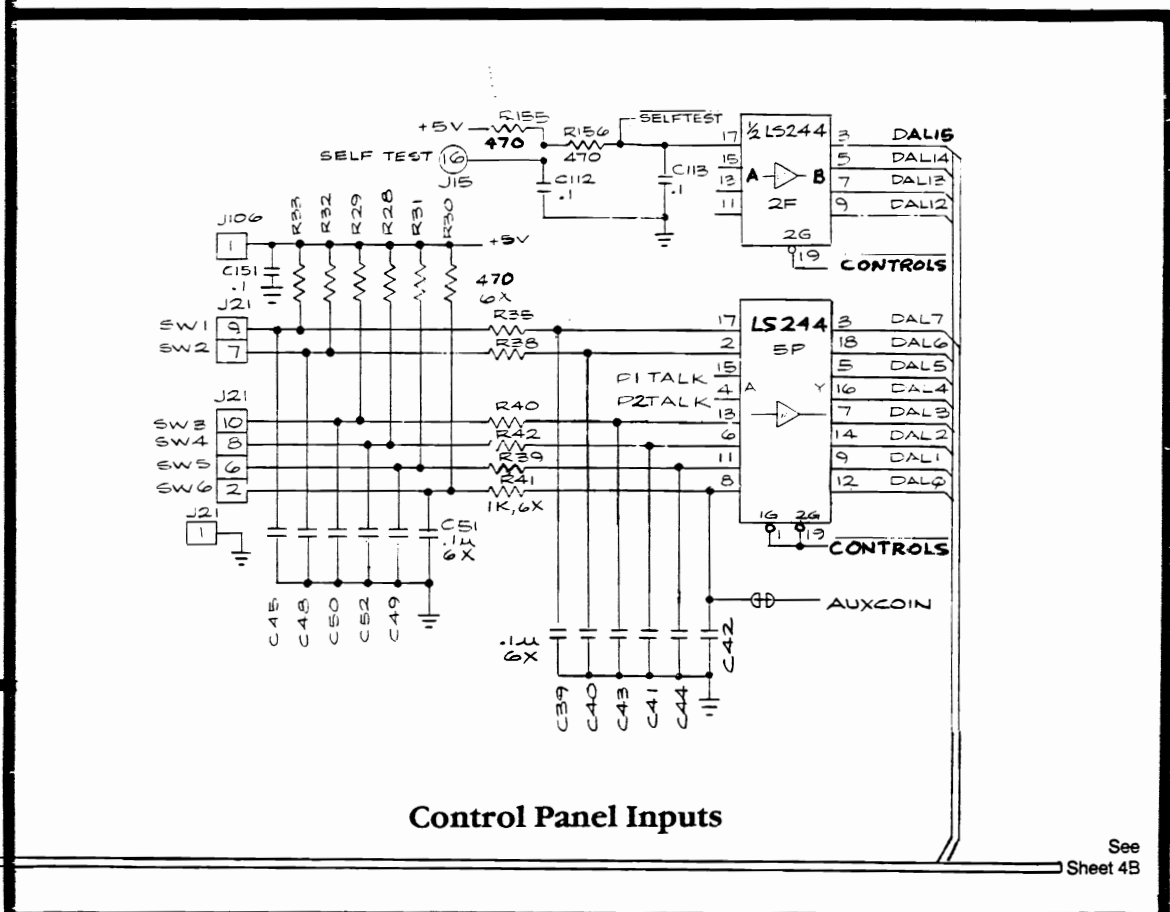
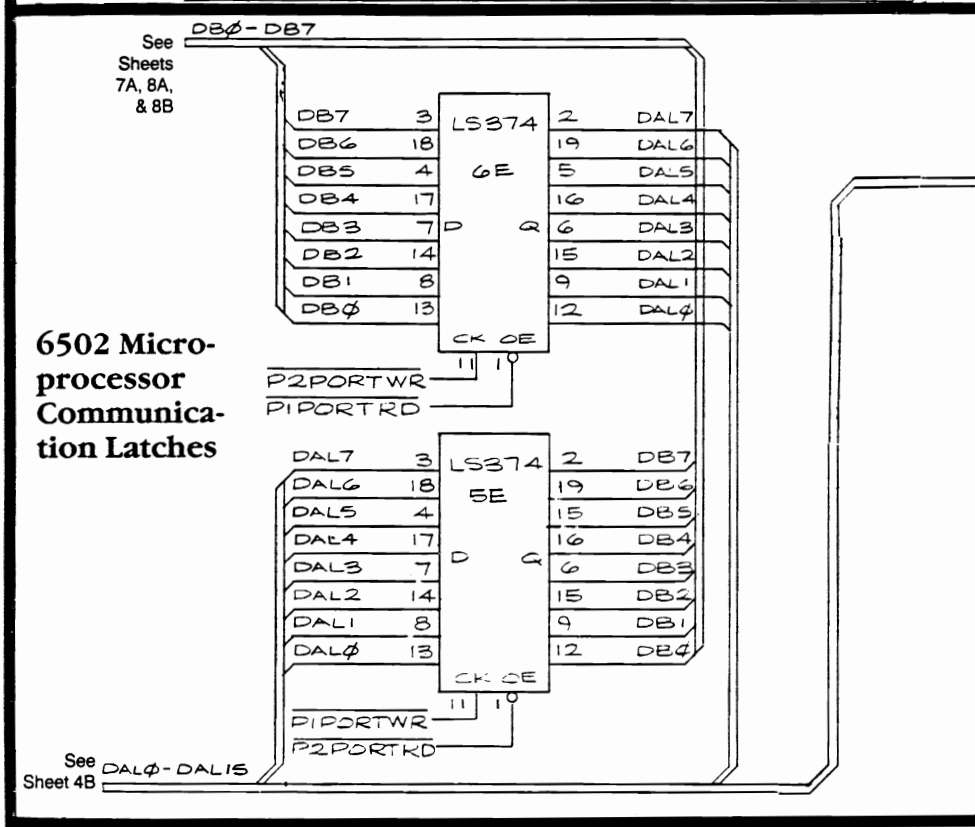
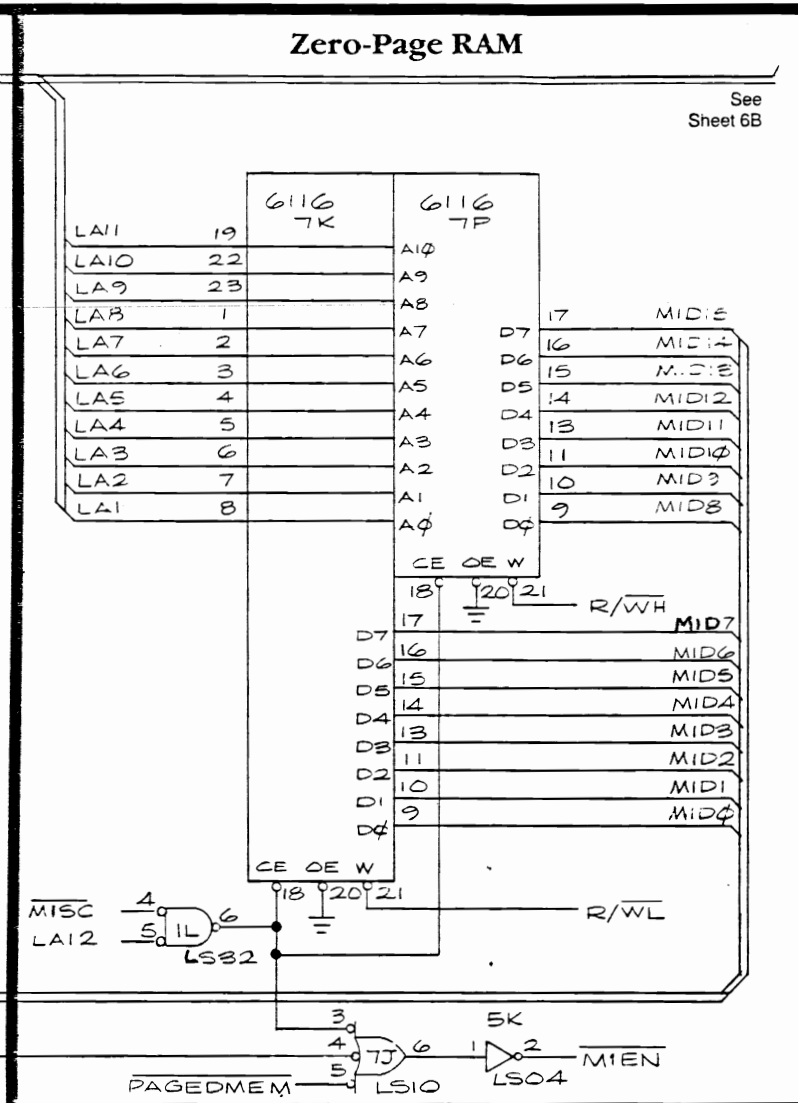
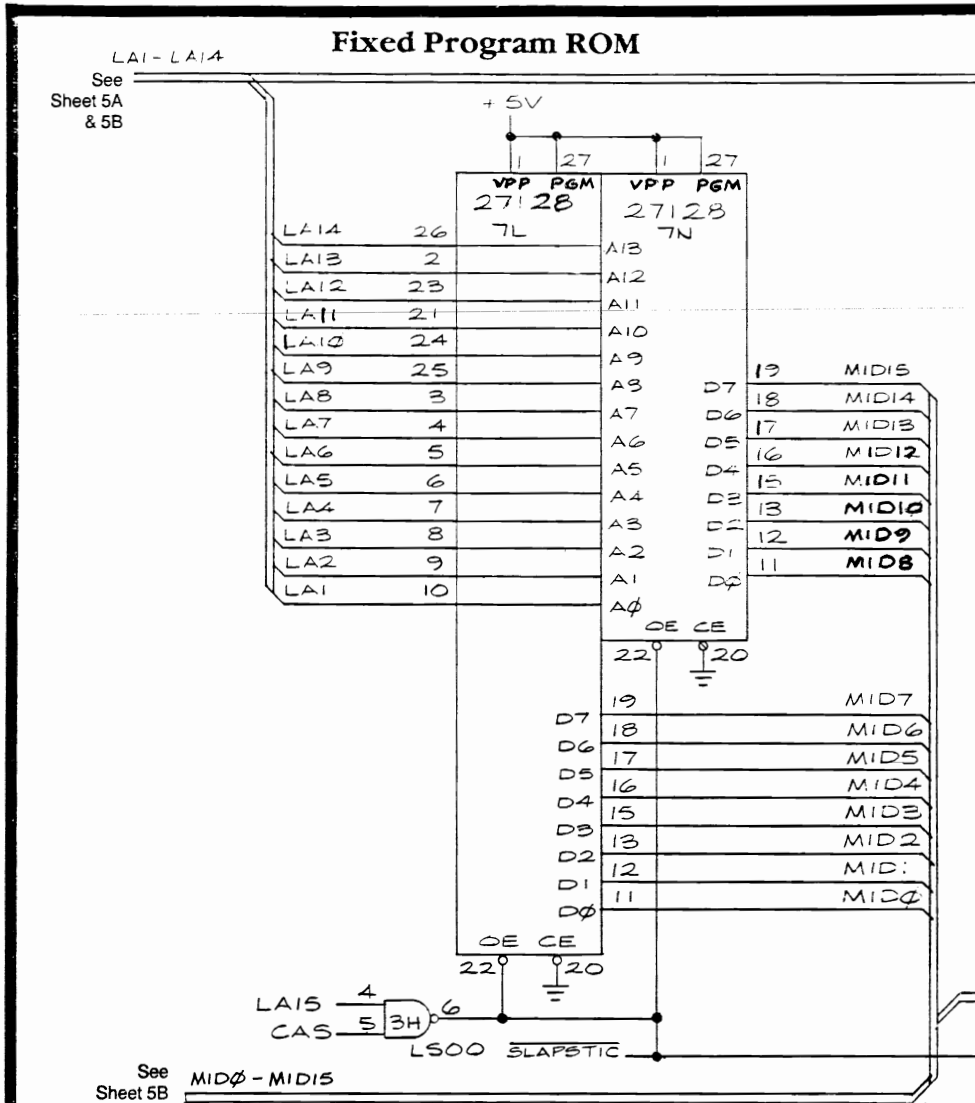
Paged Program ROM

Reset and Watchdog Clear

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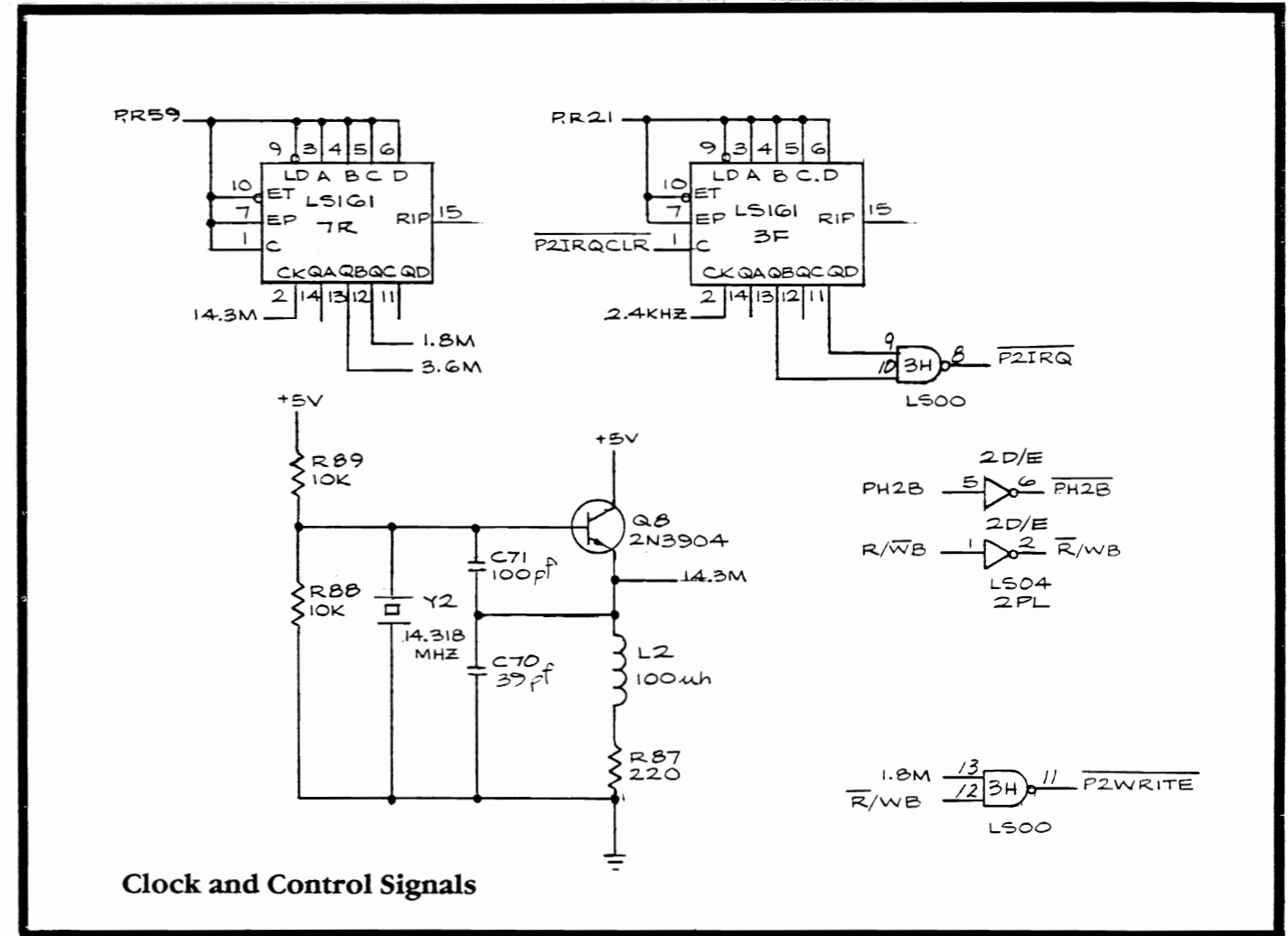
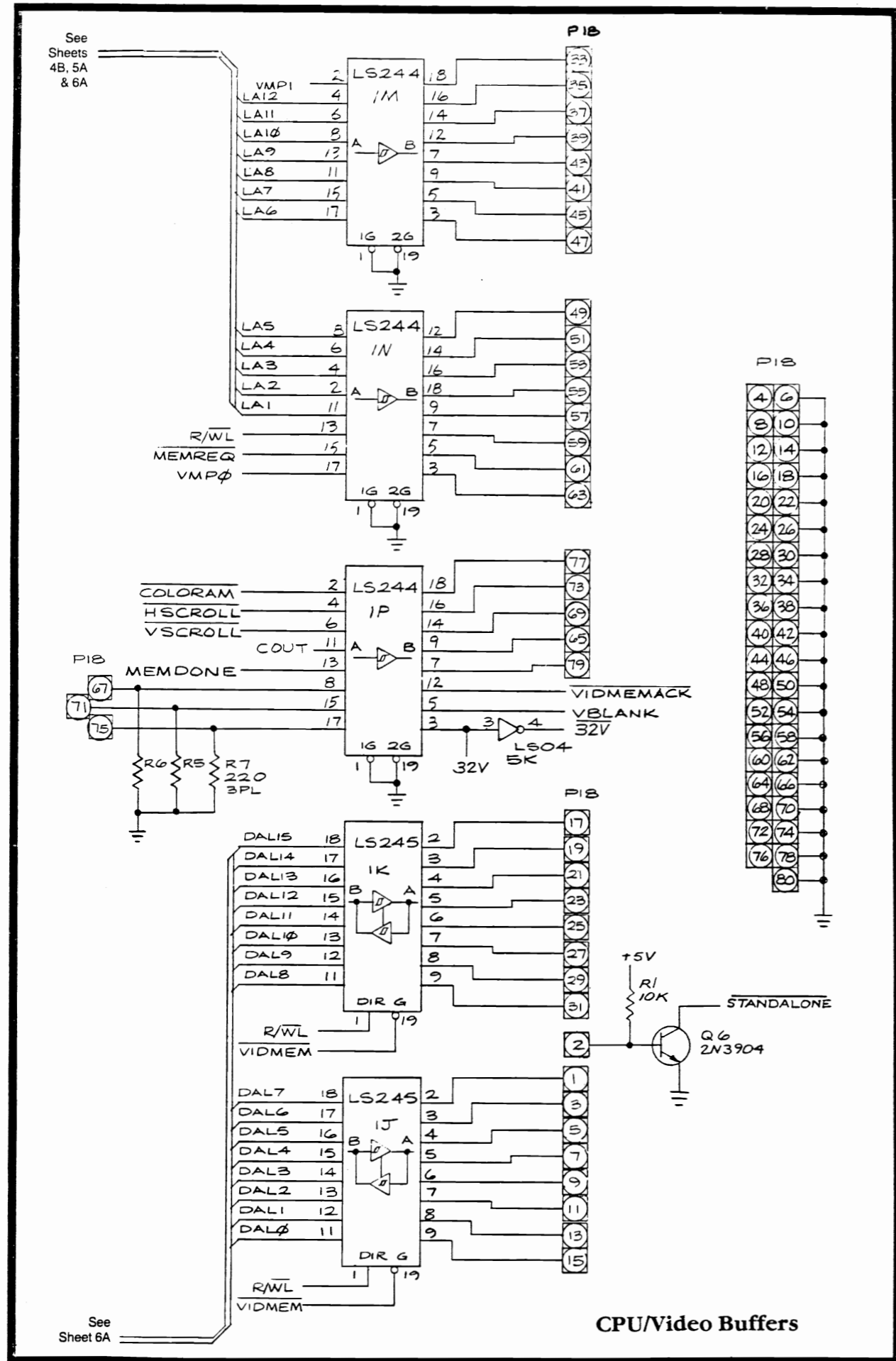
APB™ CPU PCB Schematic Diagram



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APB™ CPU PCB Schematic Diagram



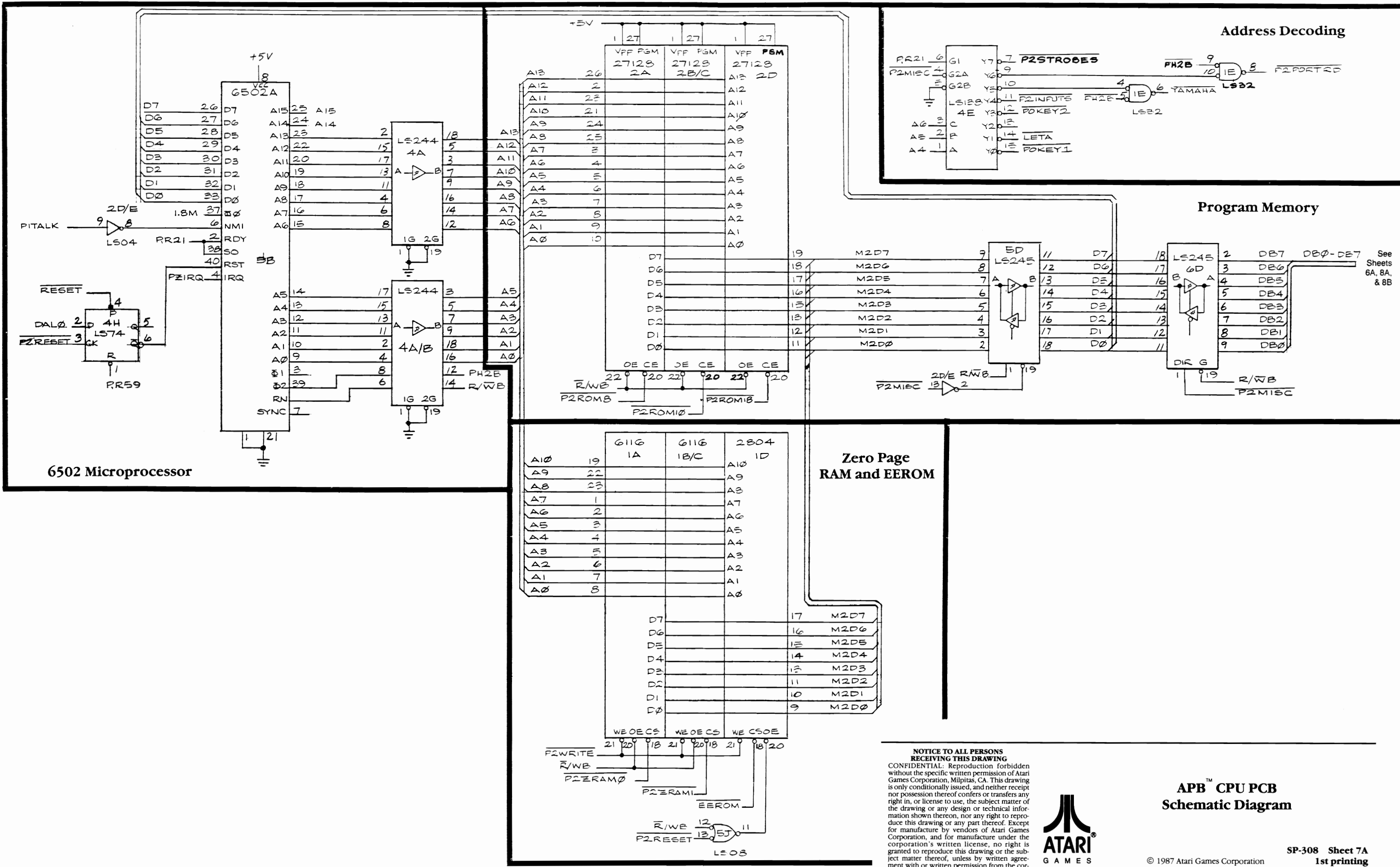
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APB™ CPU PCB Schematic Diagram

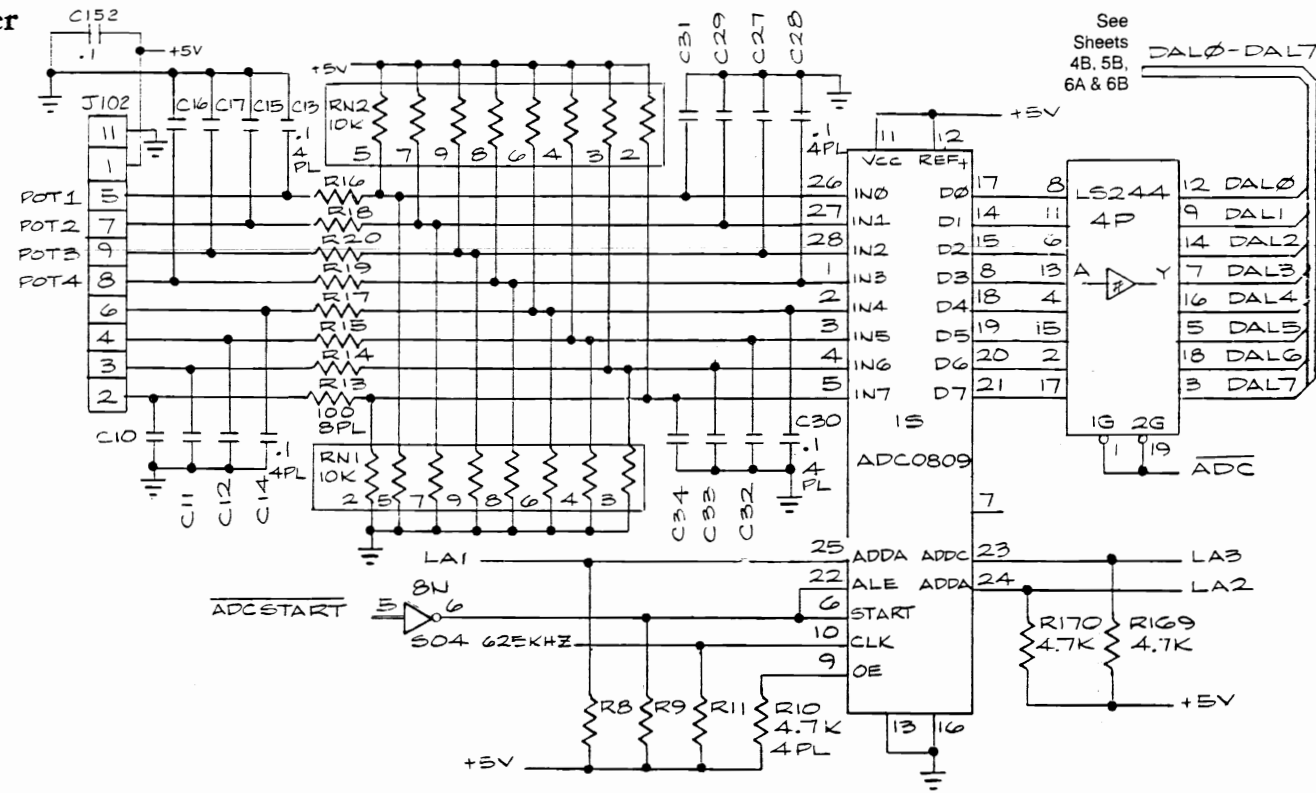
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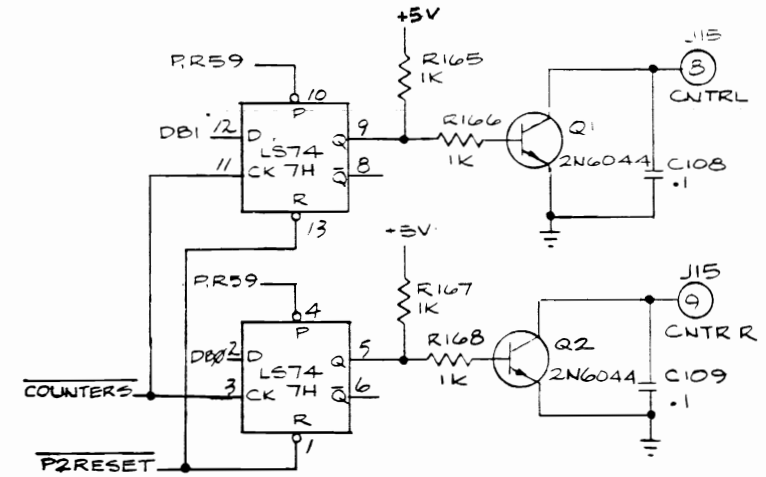


APB™ CPU PCB Schematic Diagram

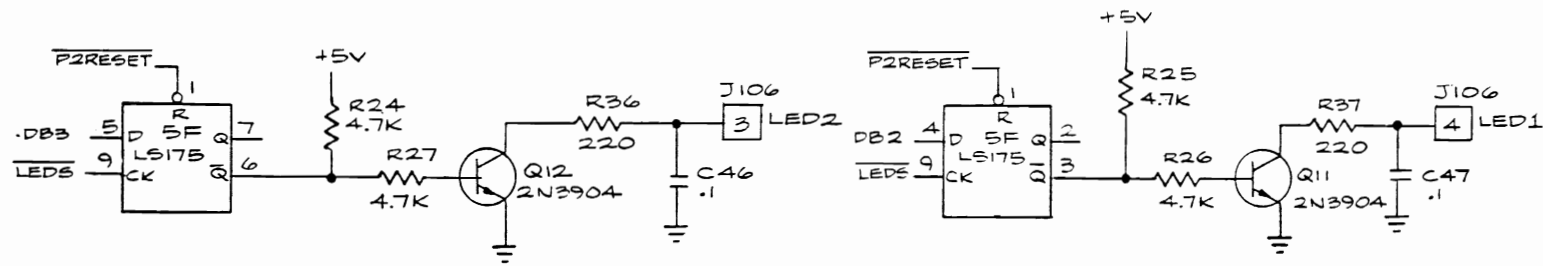
A/D Converter



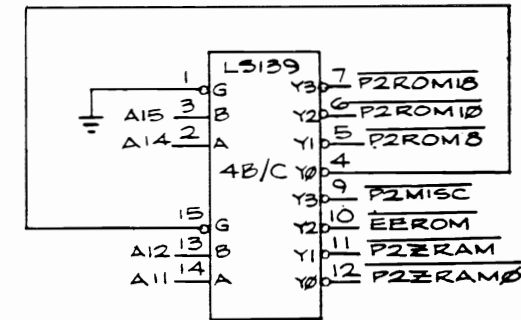
Coin Counters



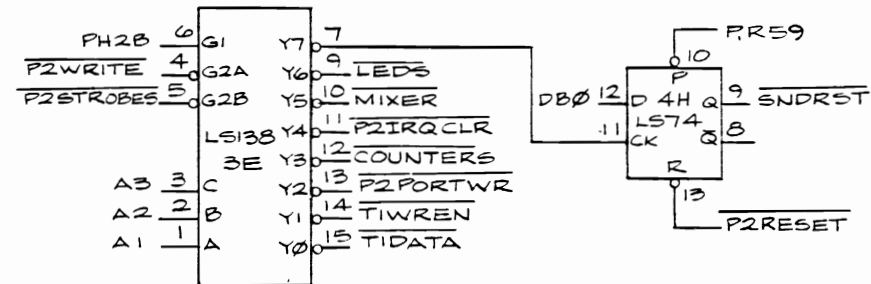
LED Drivers



Address Decoding



Address Decoding



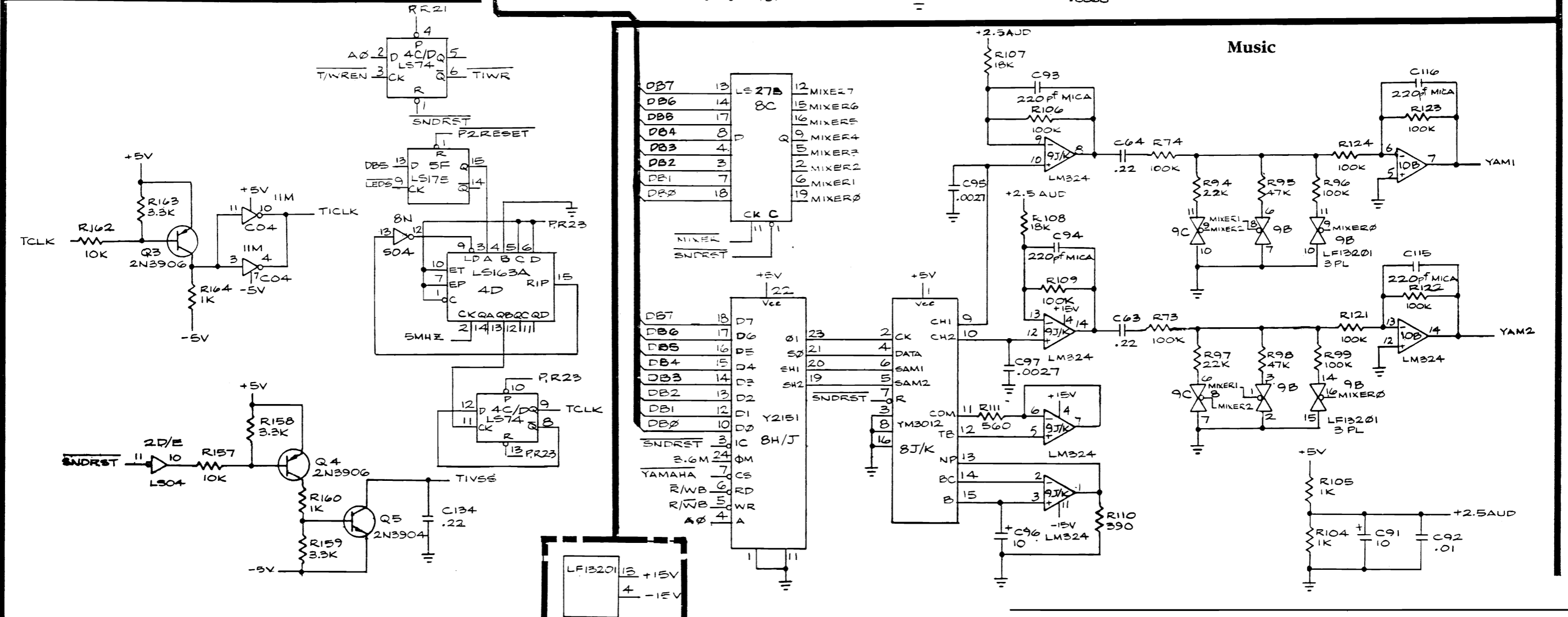
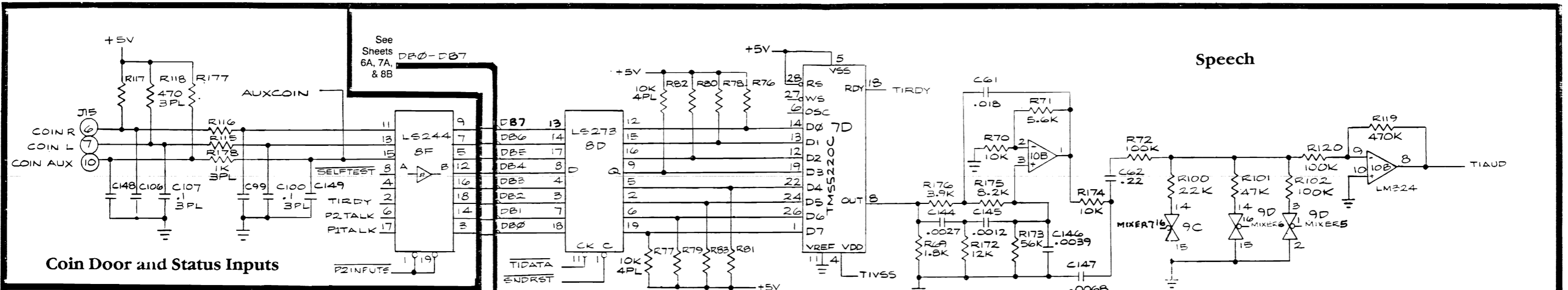
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APB™ CPU PCB Schematic Diagram

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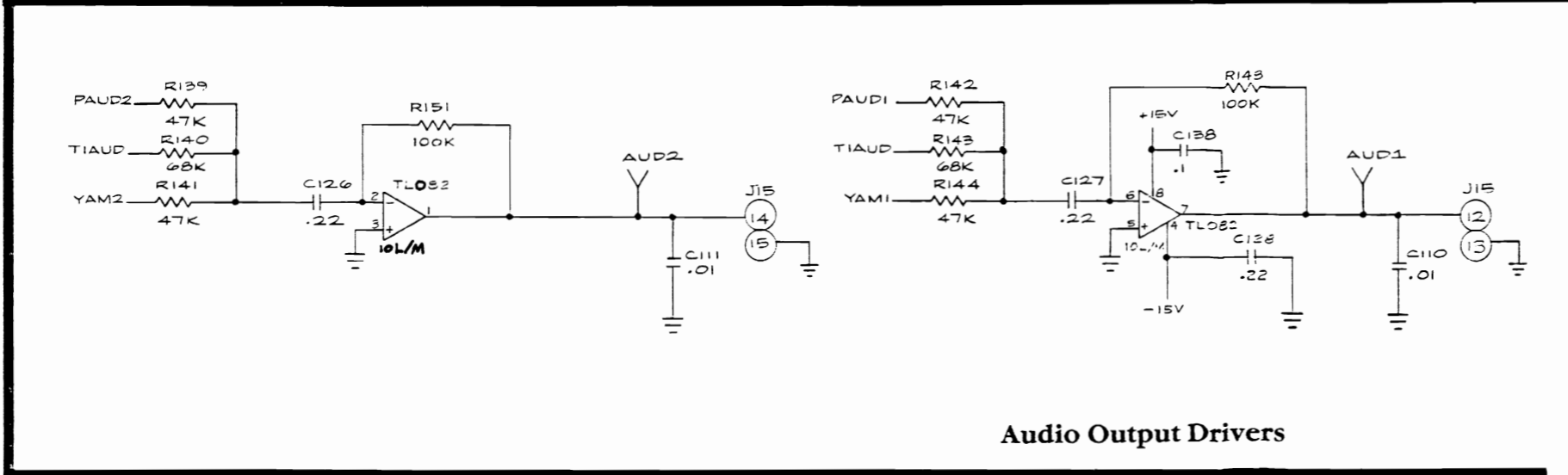
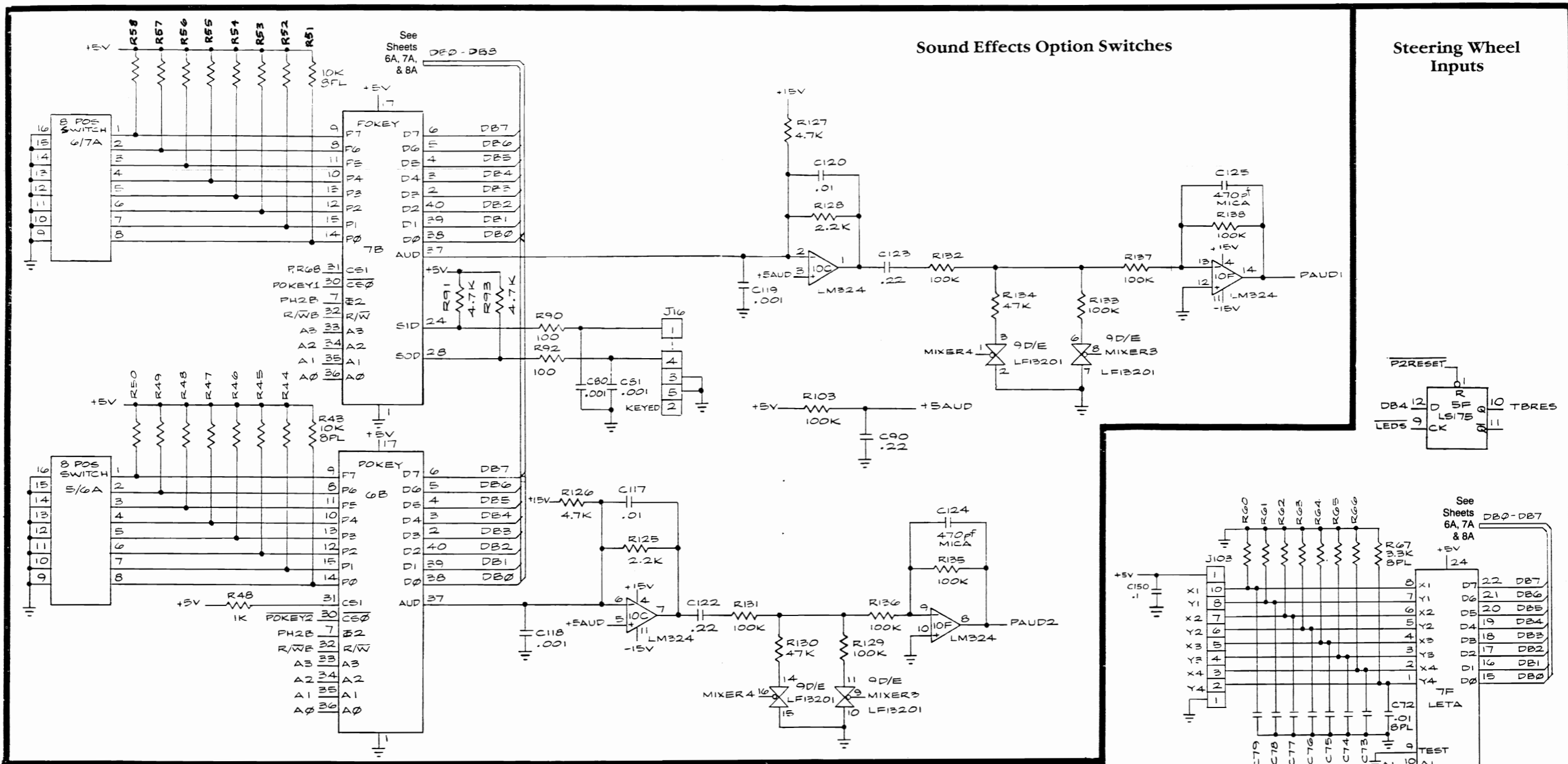
SP-308 Sheet 7B
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APB™ CPU PCB Schematic Diagram



Audio Output Drivers

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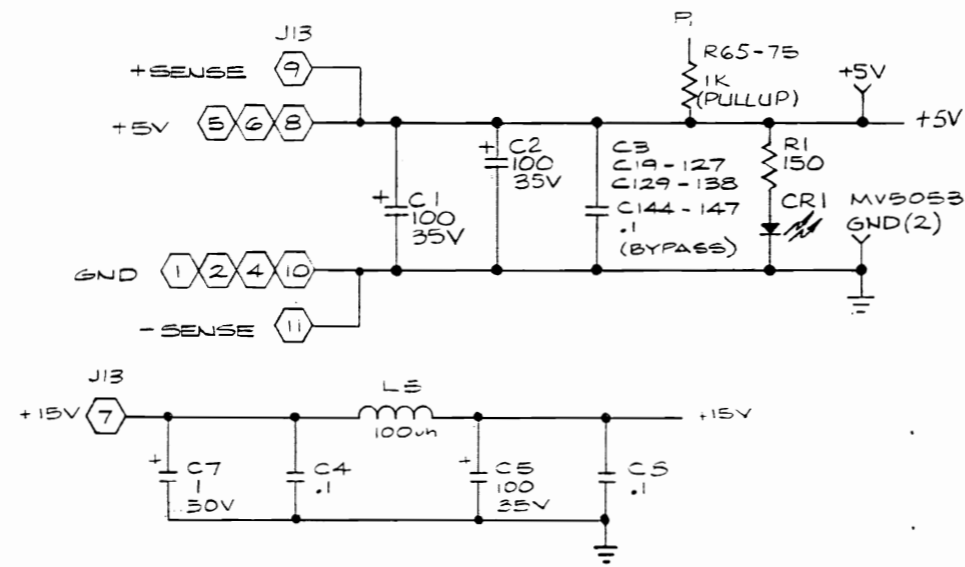


APB™ CPU PCB
 Schematic Diagram

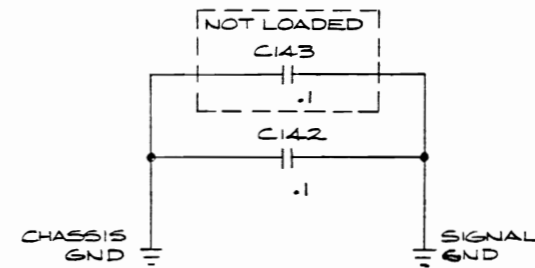
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Power Input



- DESIGNATES CONNECTOR J13
- ⬡ DESIGNATES CONNECTOR J13
- DESIGNATES CONNECTOR J19



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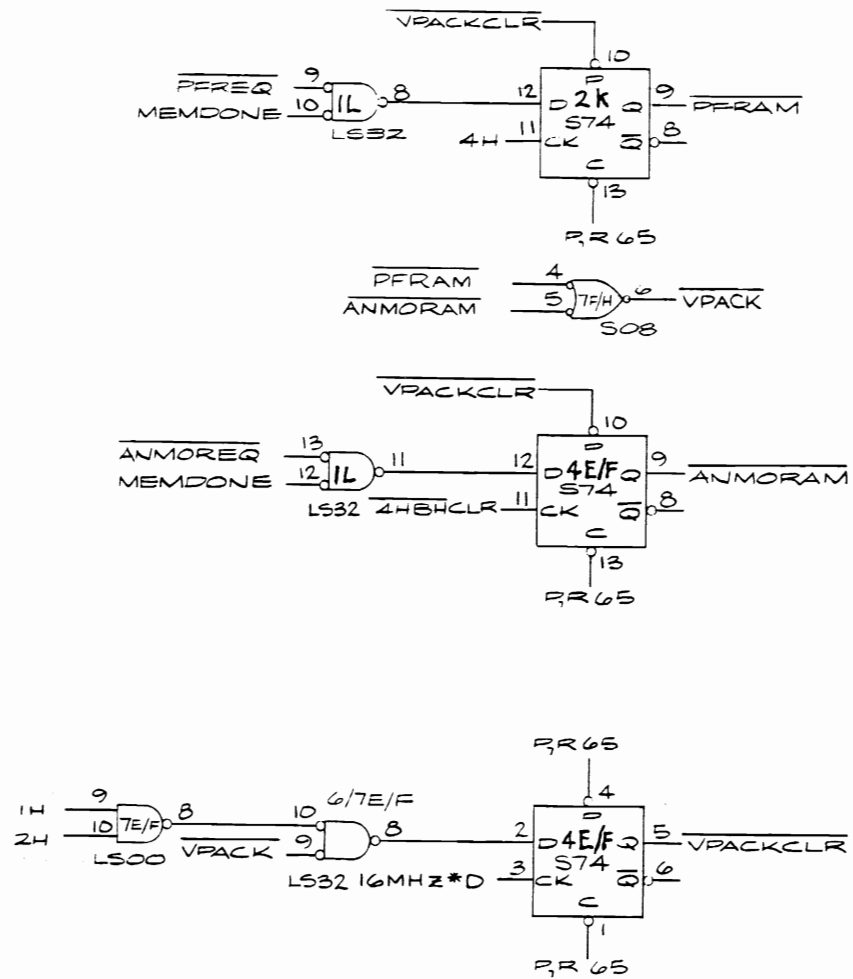
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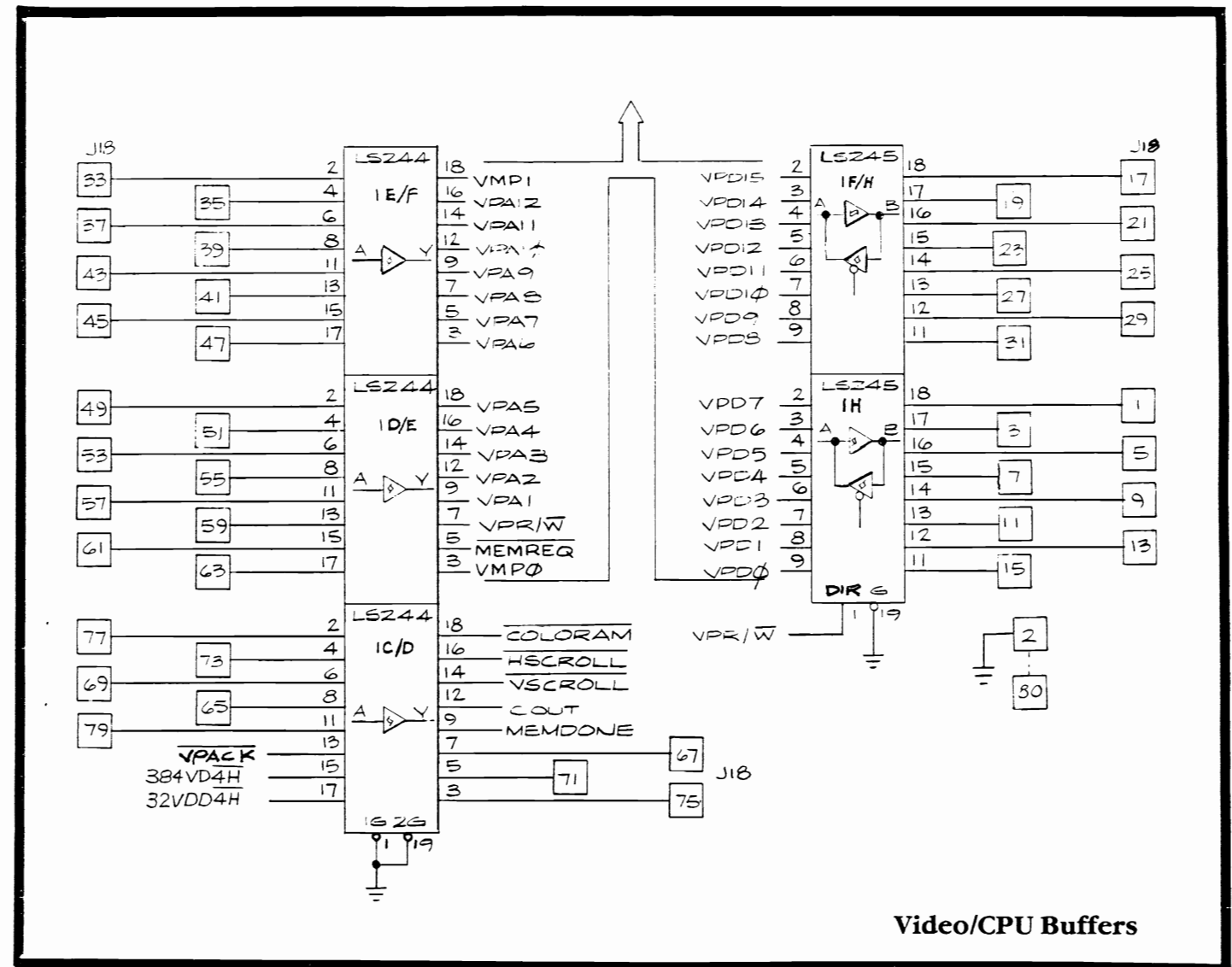
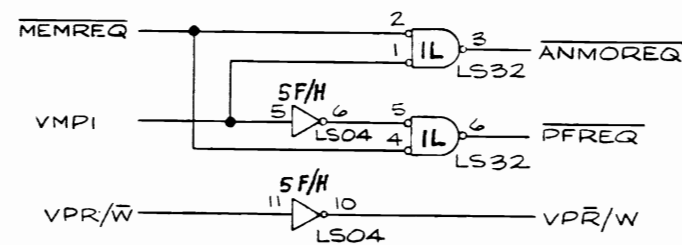
APB™ Video PCB Schematic Diagram

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Address Decoding Control Signals



Video/CPU Buffers

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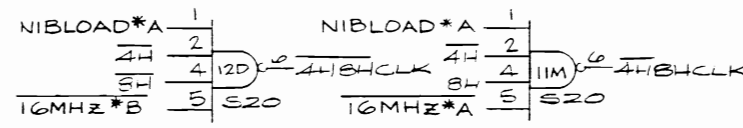
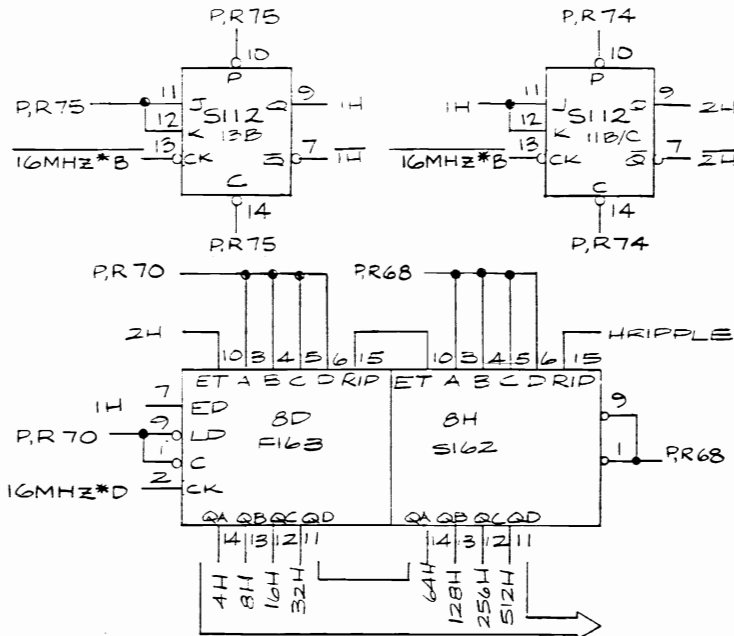
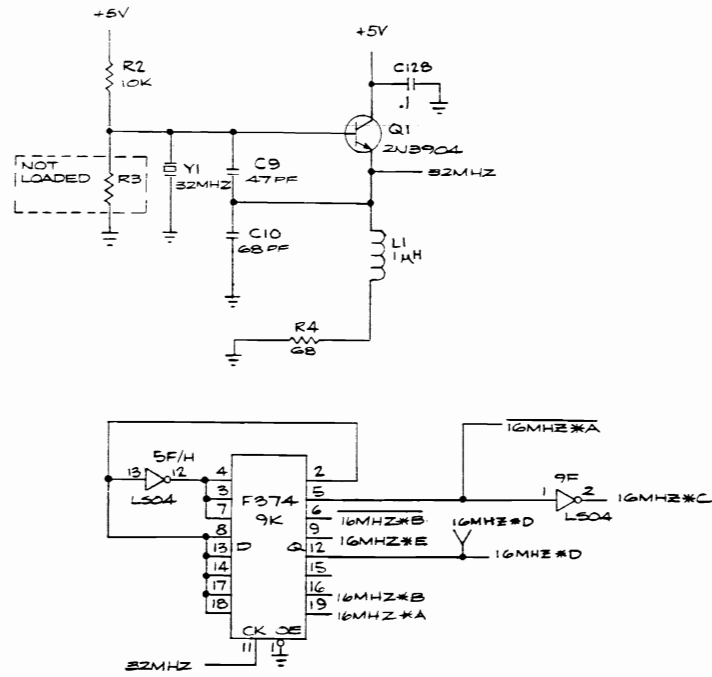


APB™ Video PCB Schematic Diagram

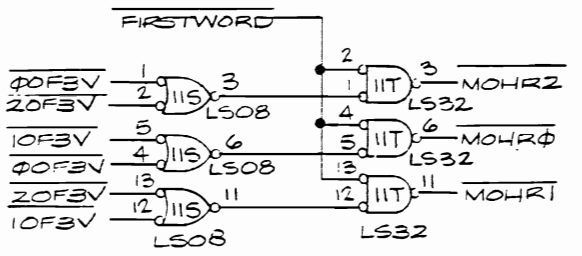
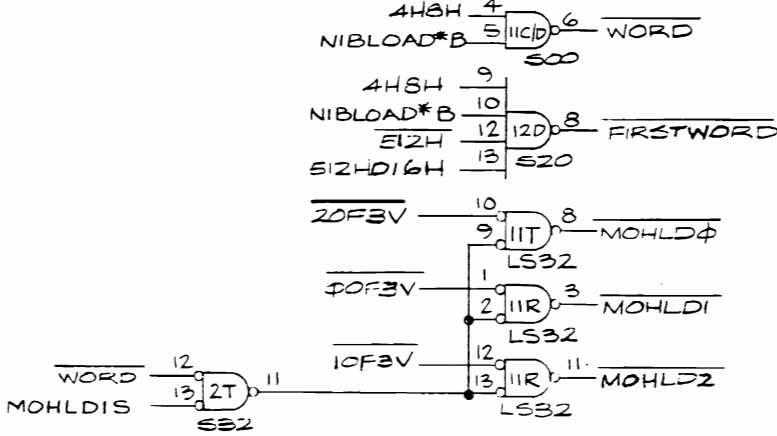
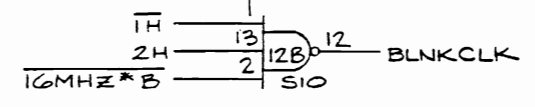
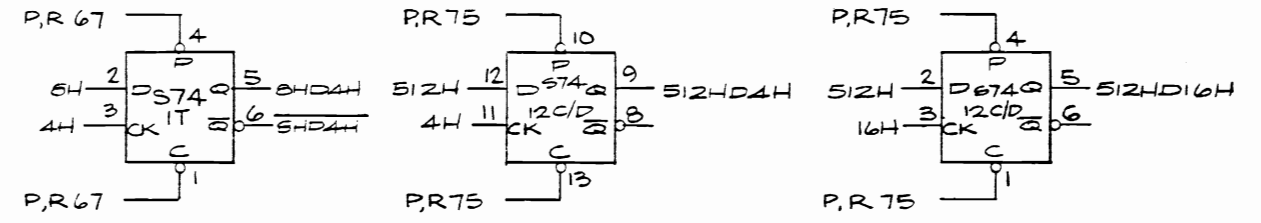
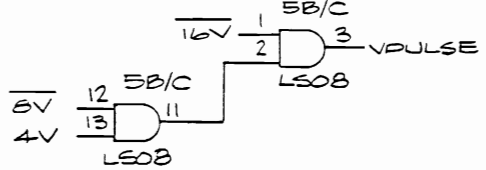
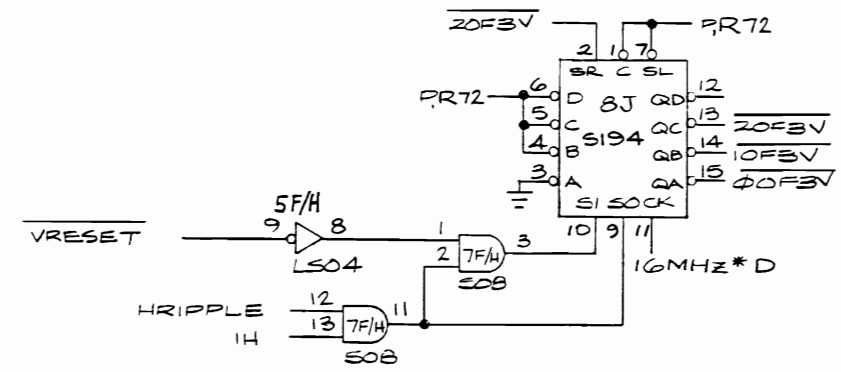
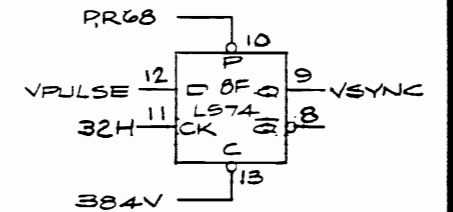
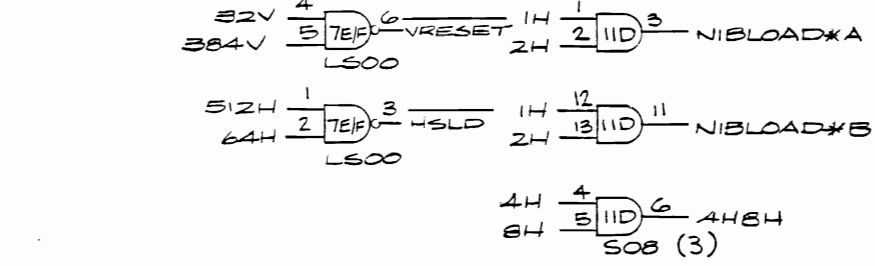
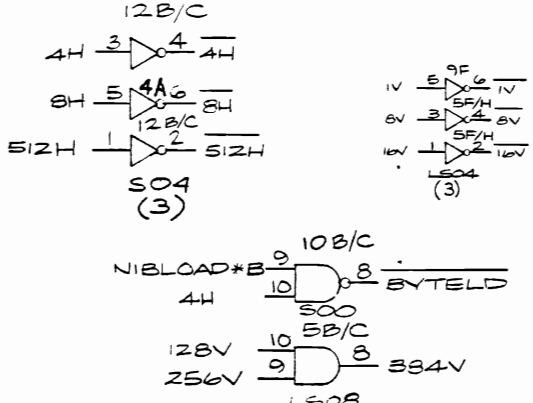
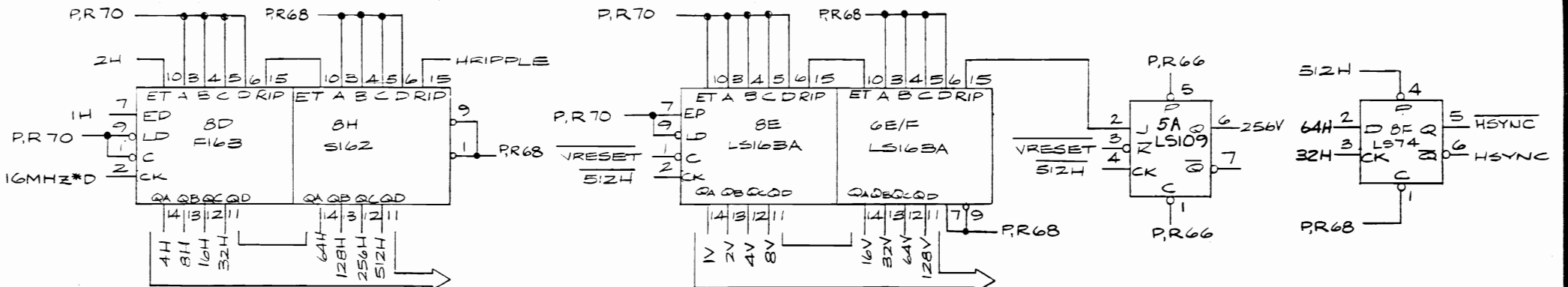
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Video Clock



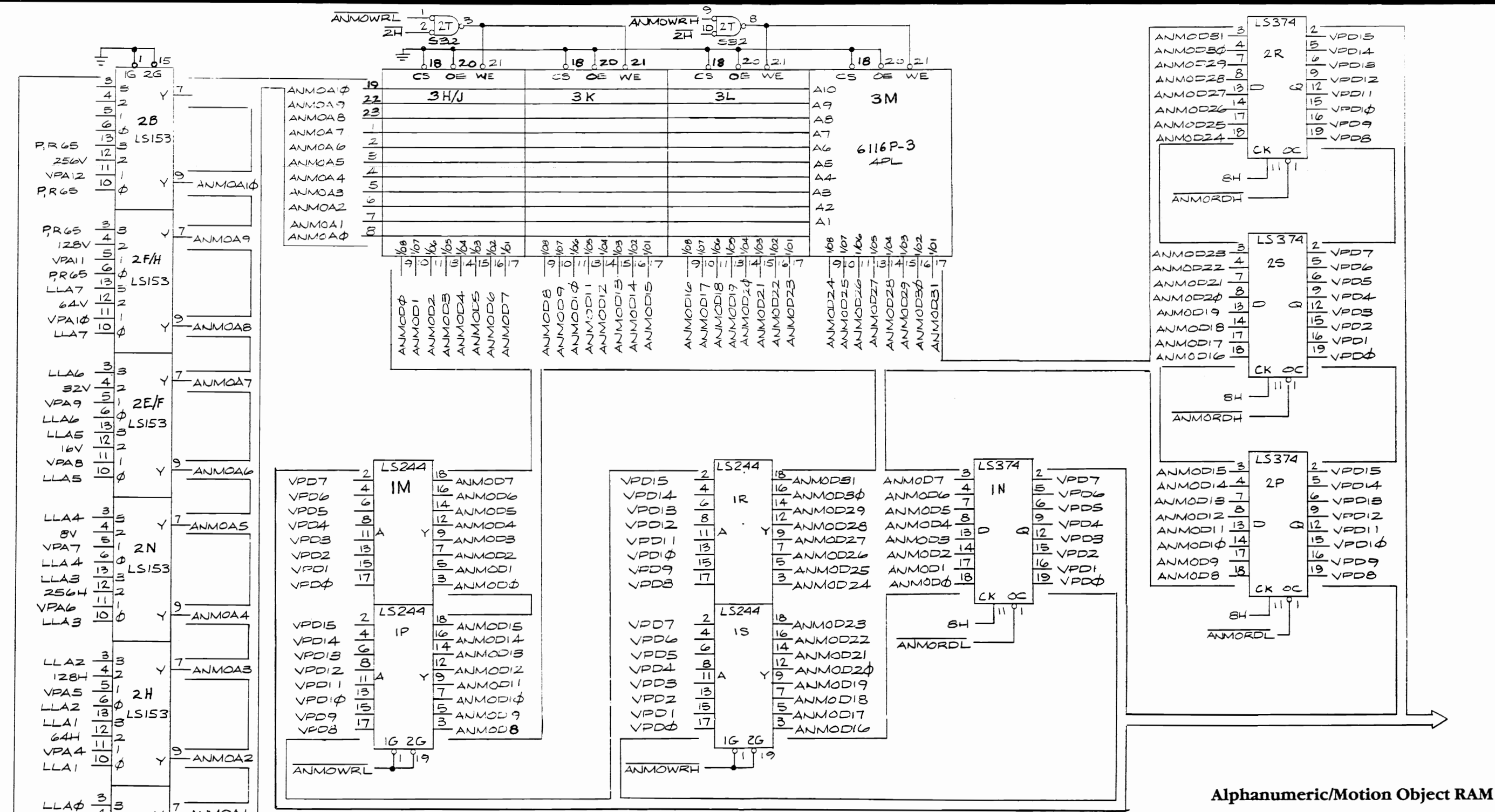
Sync Chain and Timing Strobes



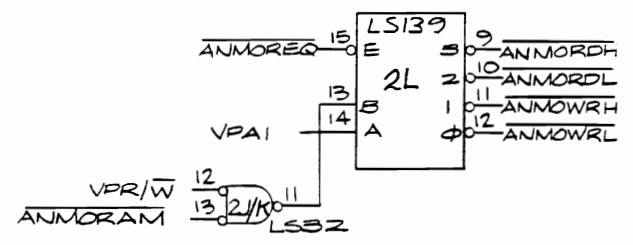
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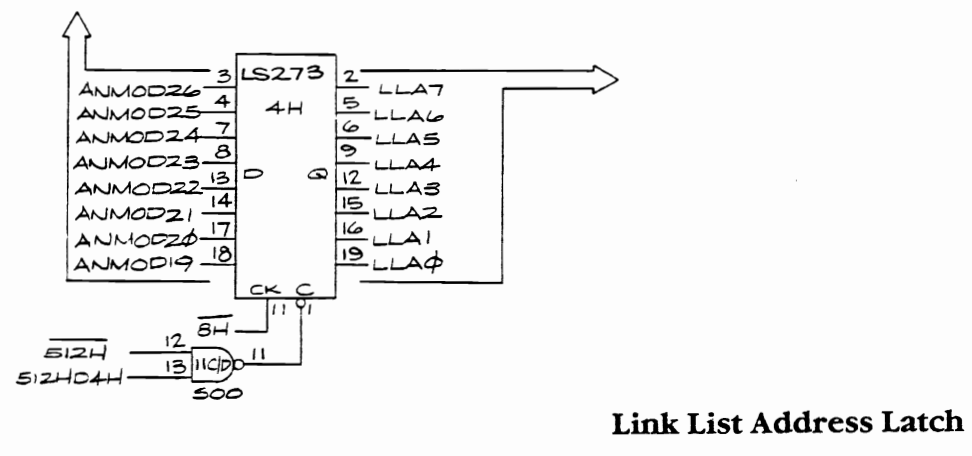
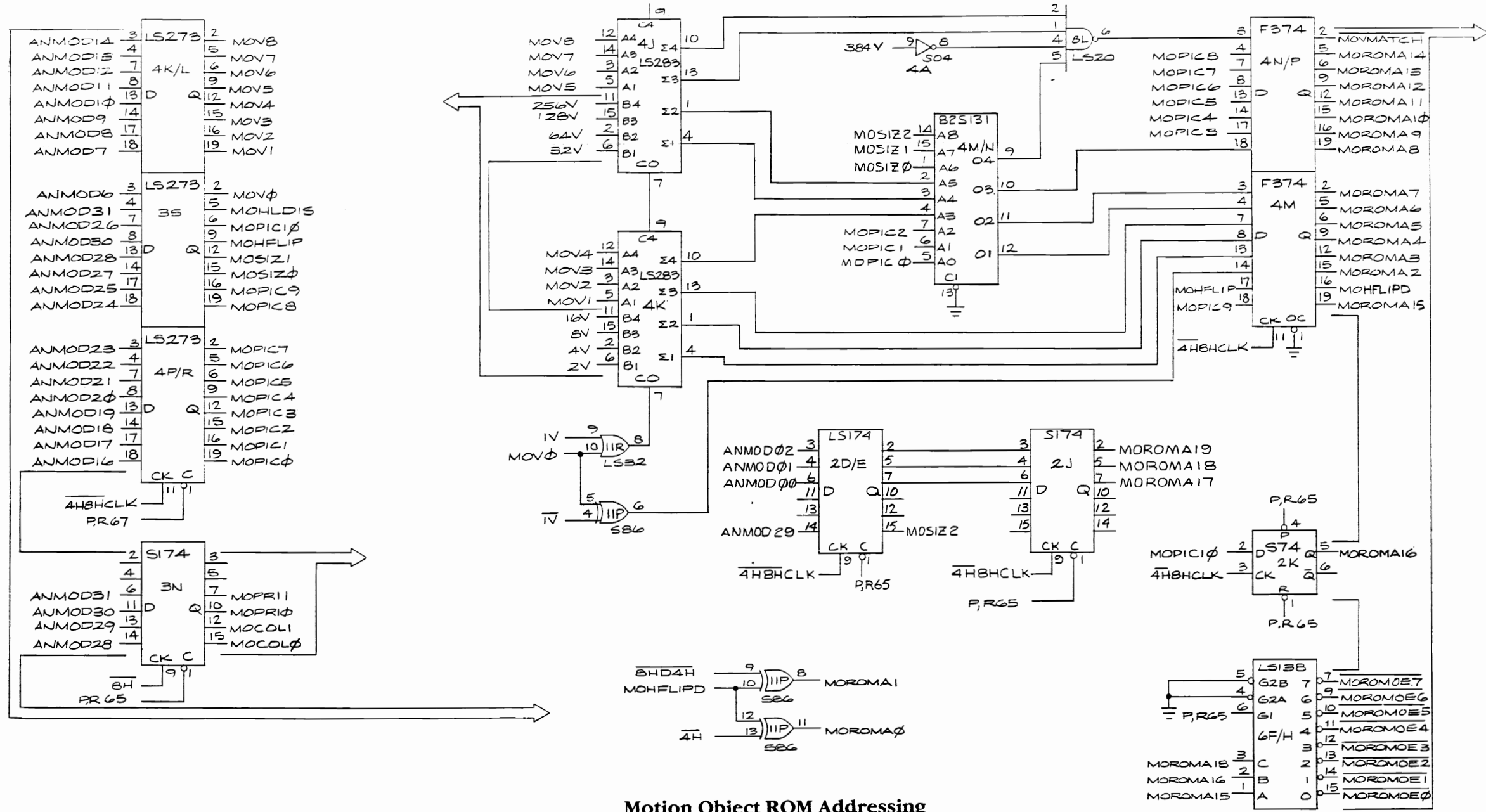
Alphanumeric/Motion Object RAM



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APB™ Video PCB Schematic Diagram



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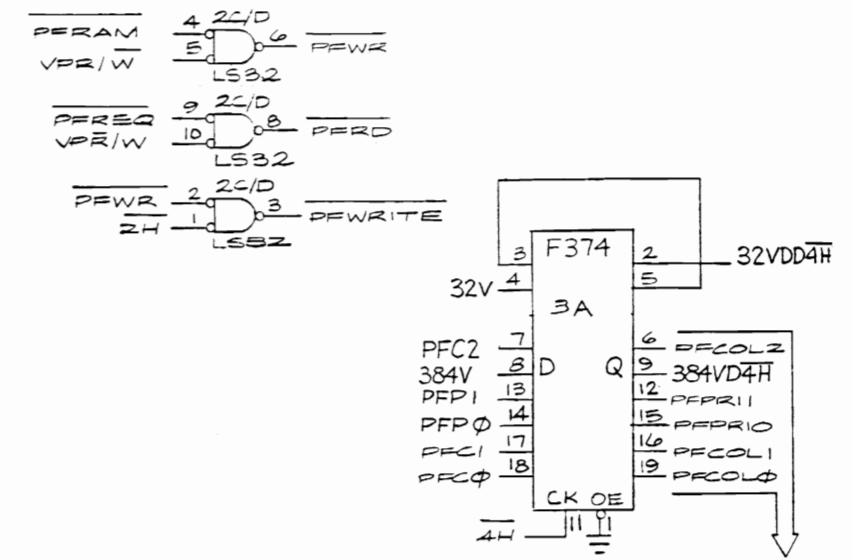
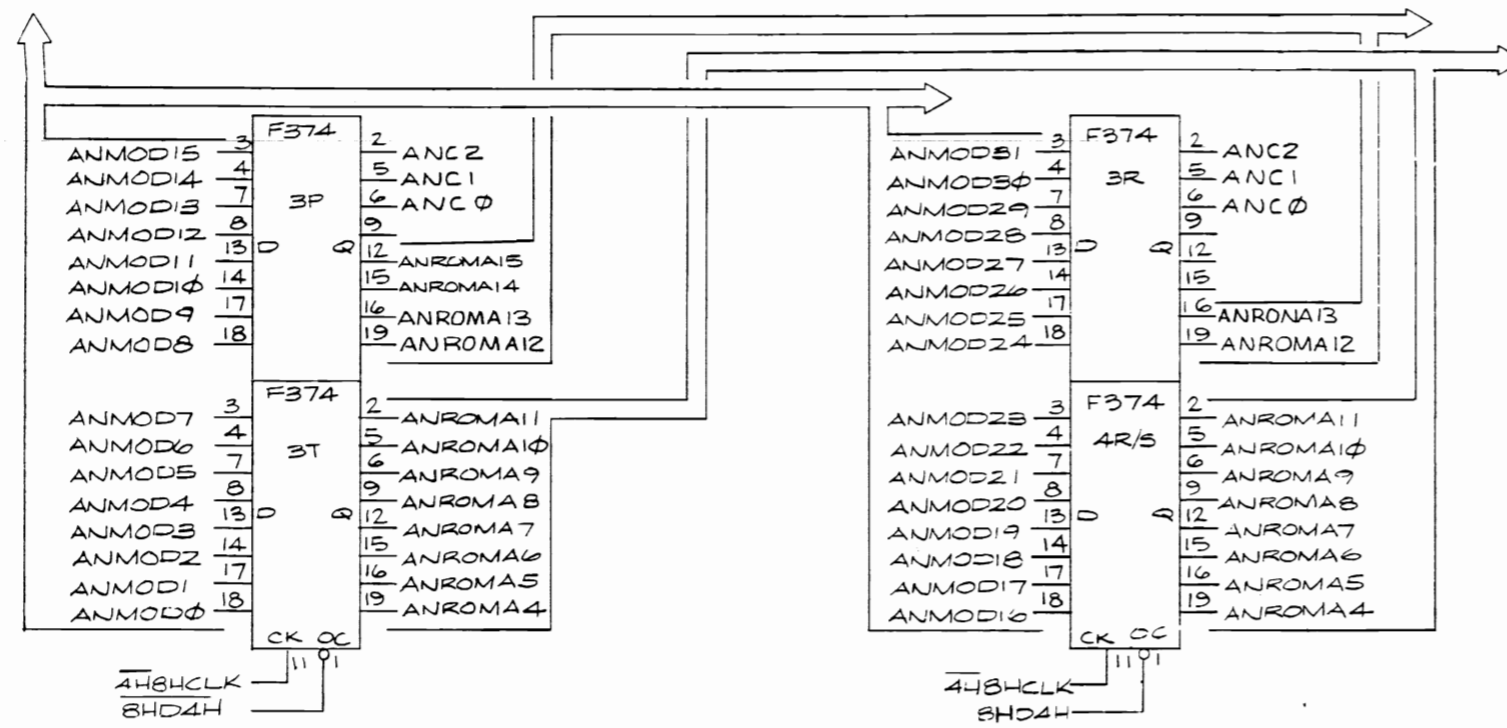
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APB™ Video PCB Schematic Diagram

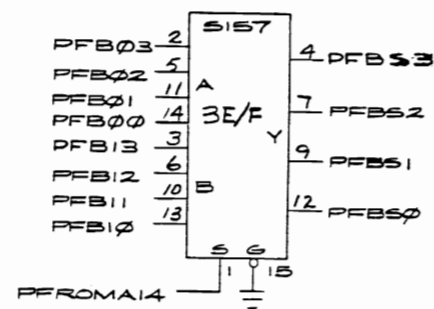
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Alphanumeric ROM Addressing



Playfield Data Latch Strobes



Playfield Bank Select

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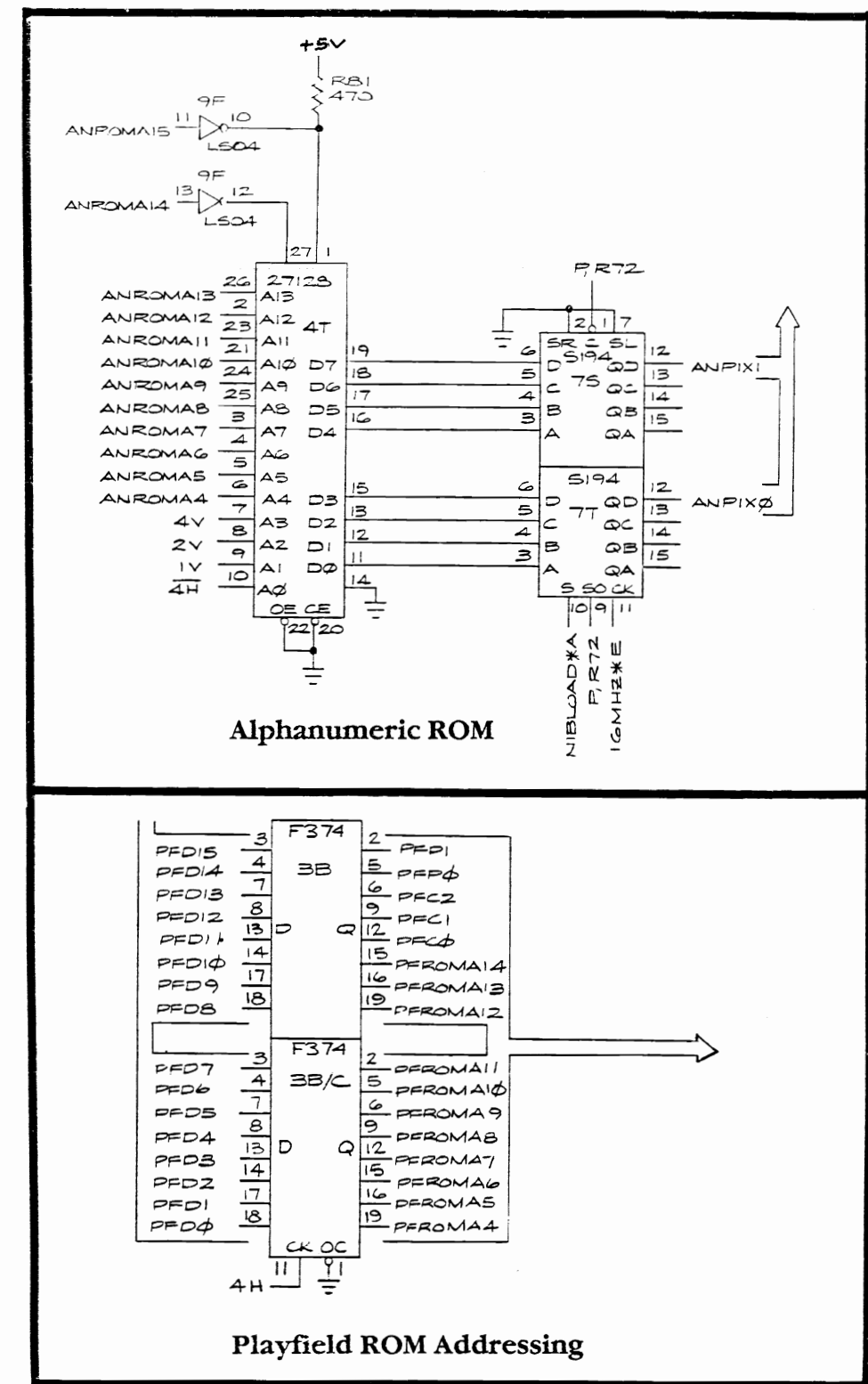
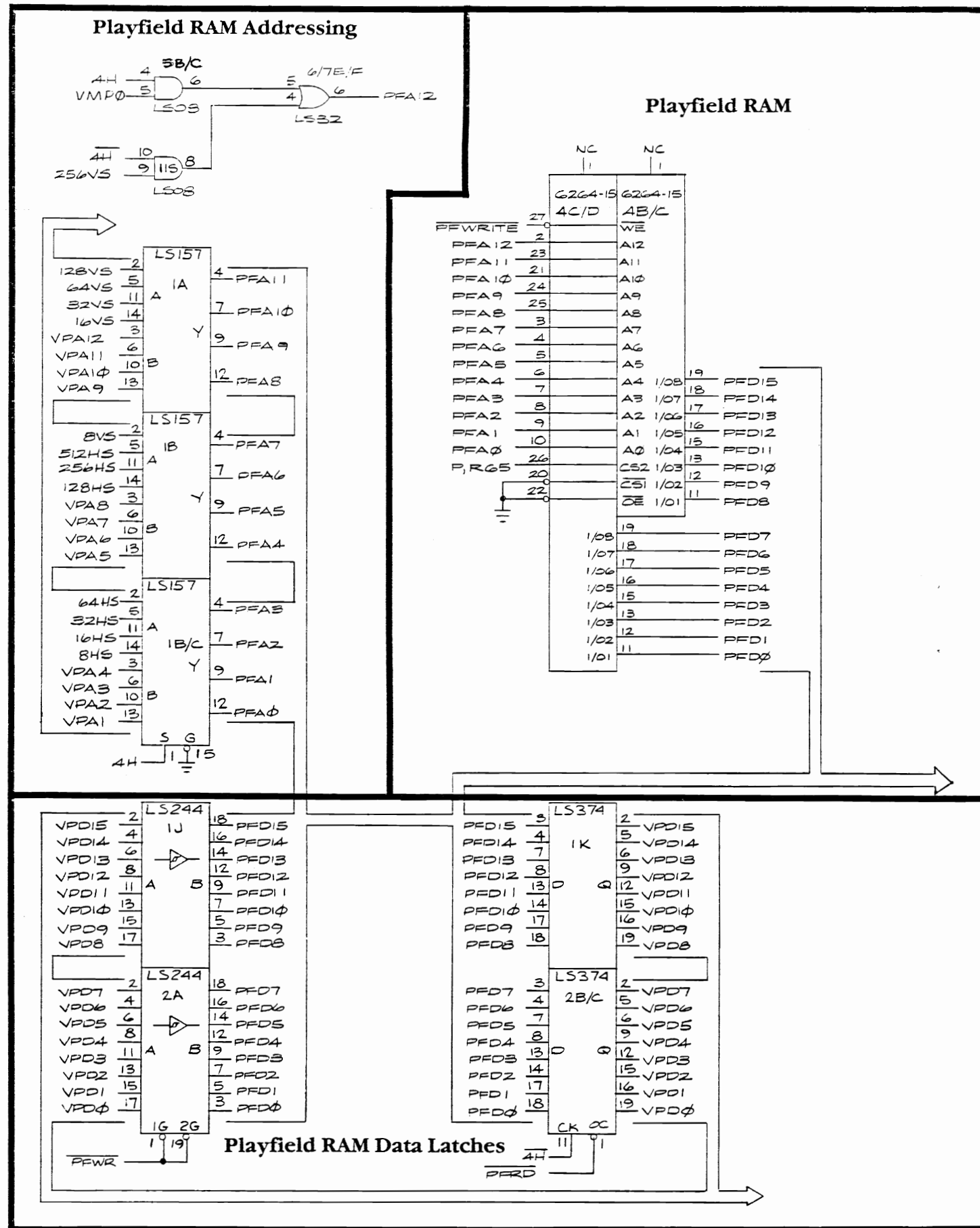
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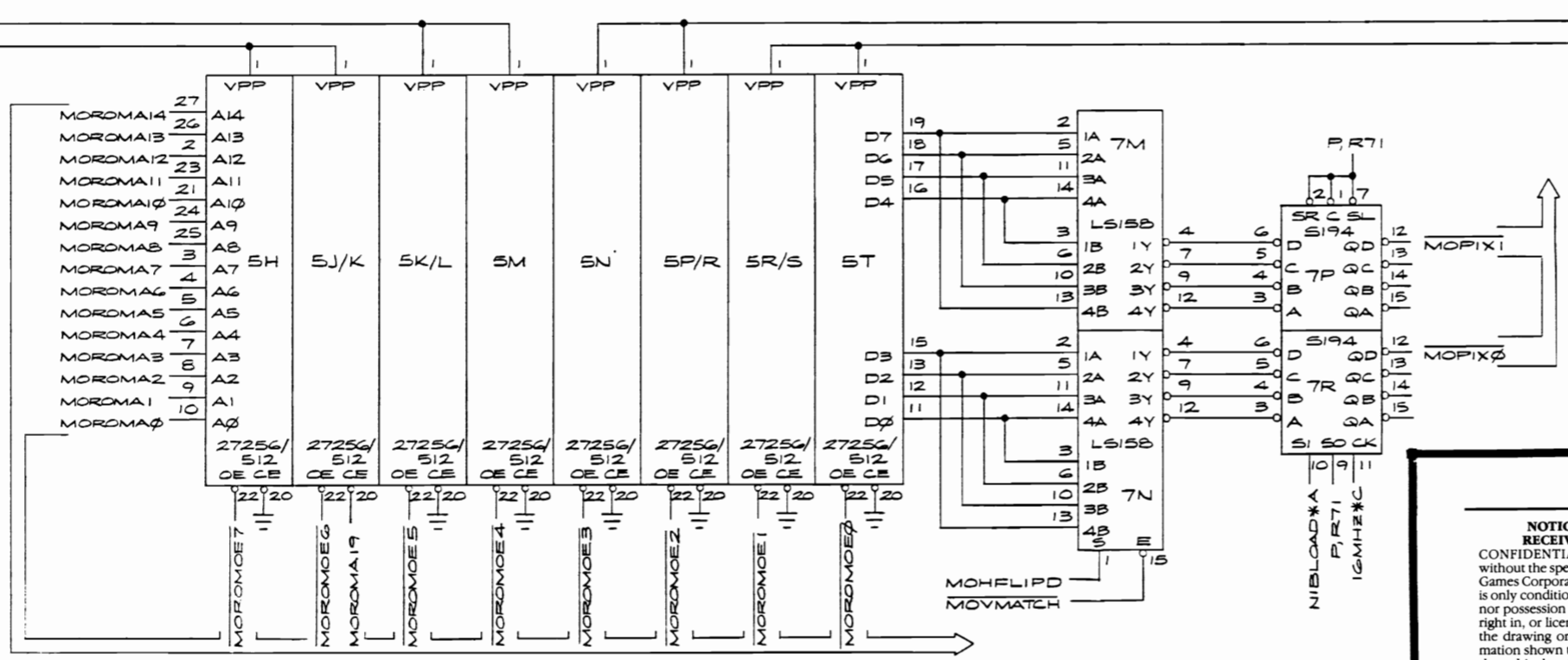
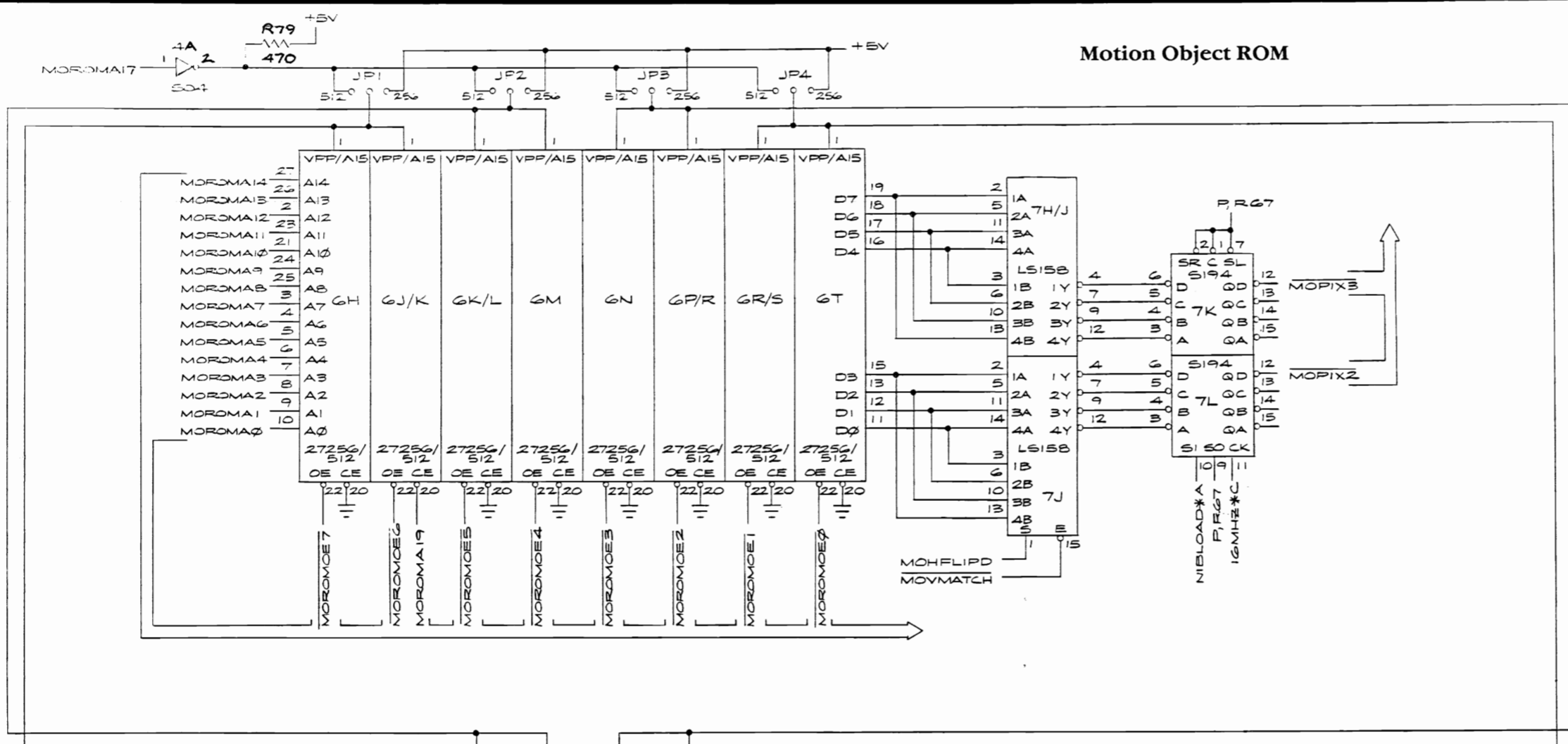
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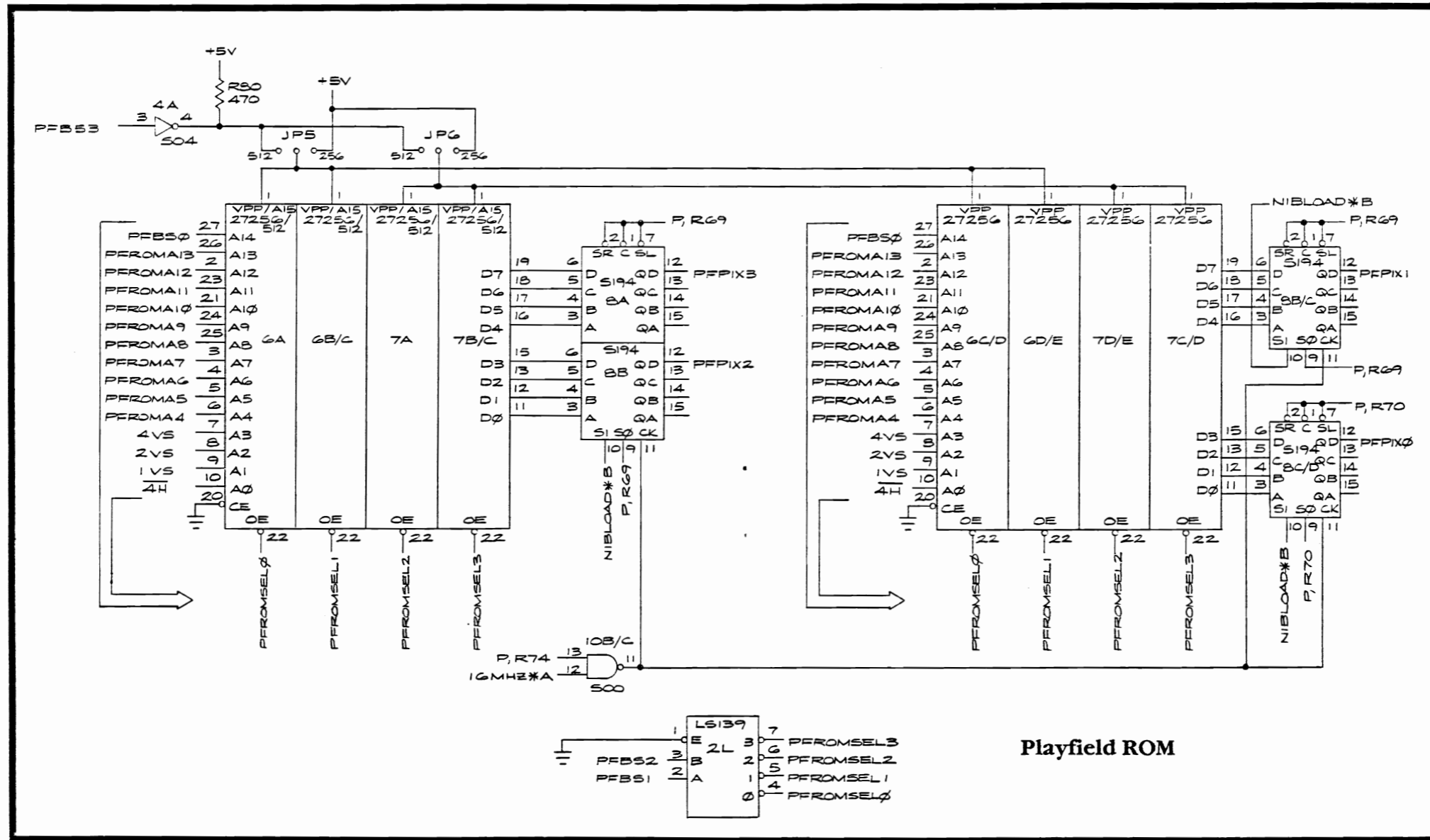
Motion Object ROM



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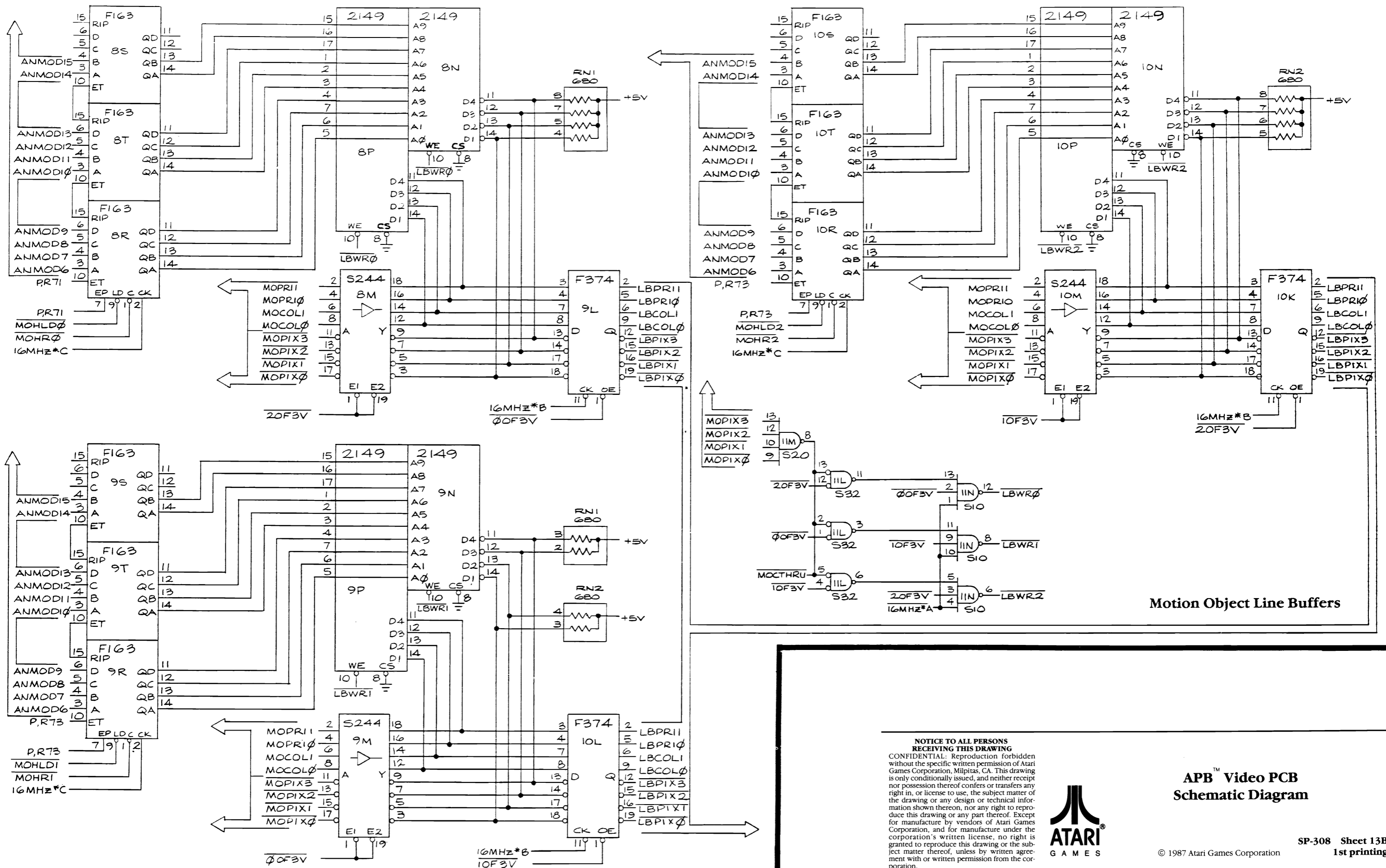


Playfield ROM

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APB™ Video PCB Schematic Diagram



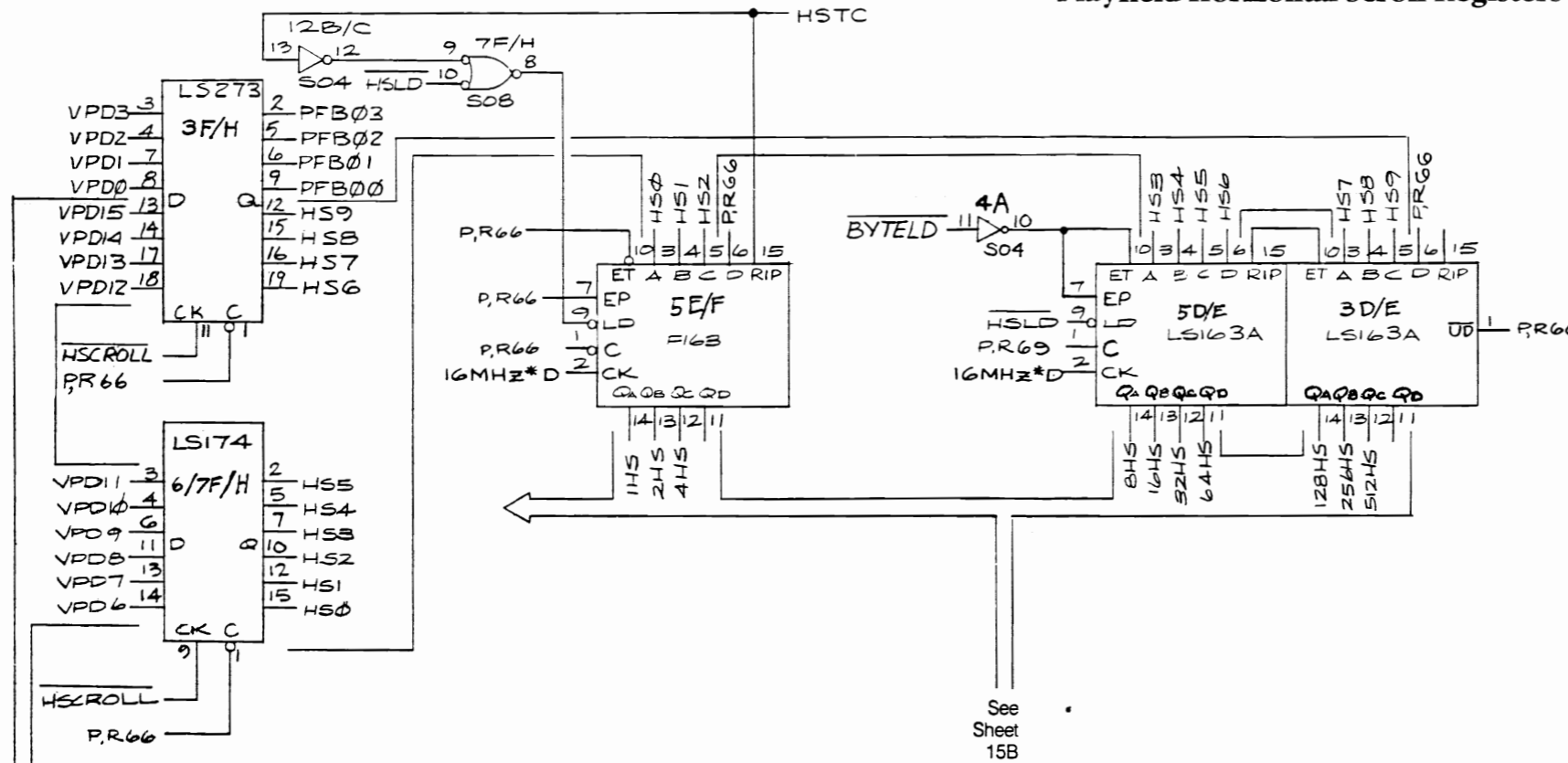
Motion Object Line Buffers

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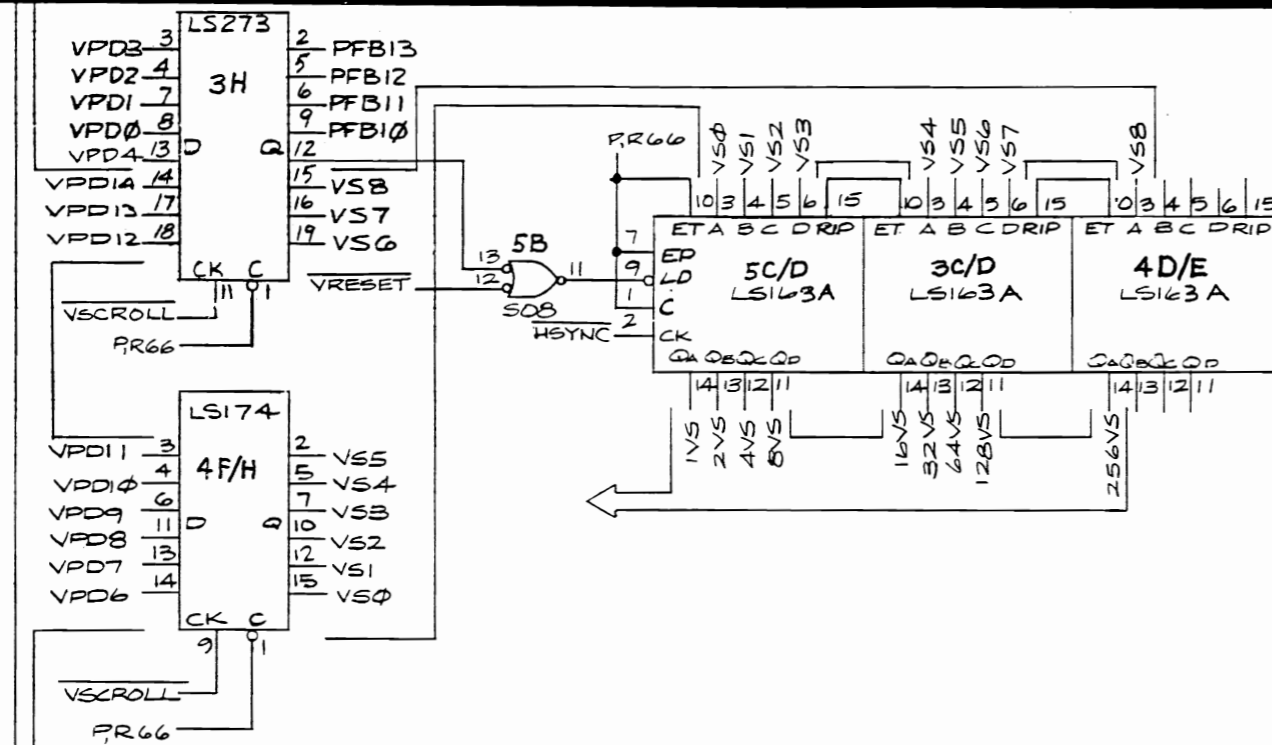


APB™ Video PCB Schematic Diagram

Playfield Horizontal Scroll Registers



Playfield Vertical Scroll Registers



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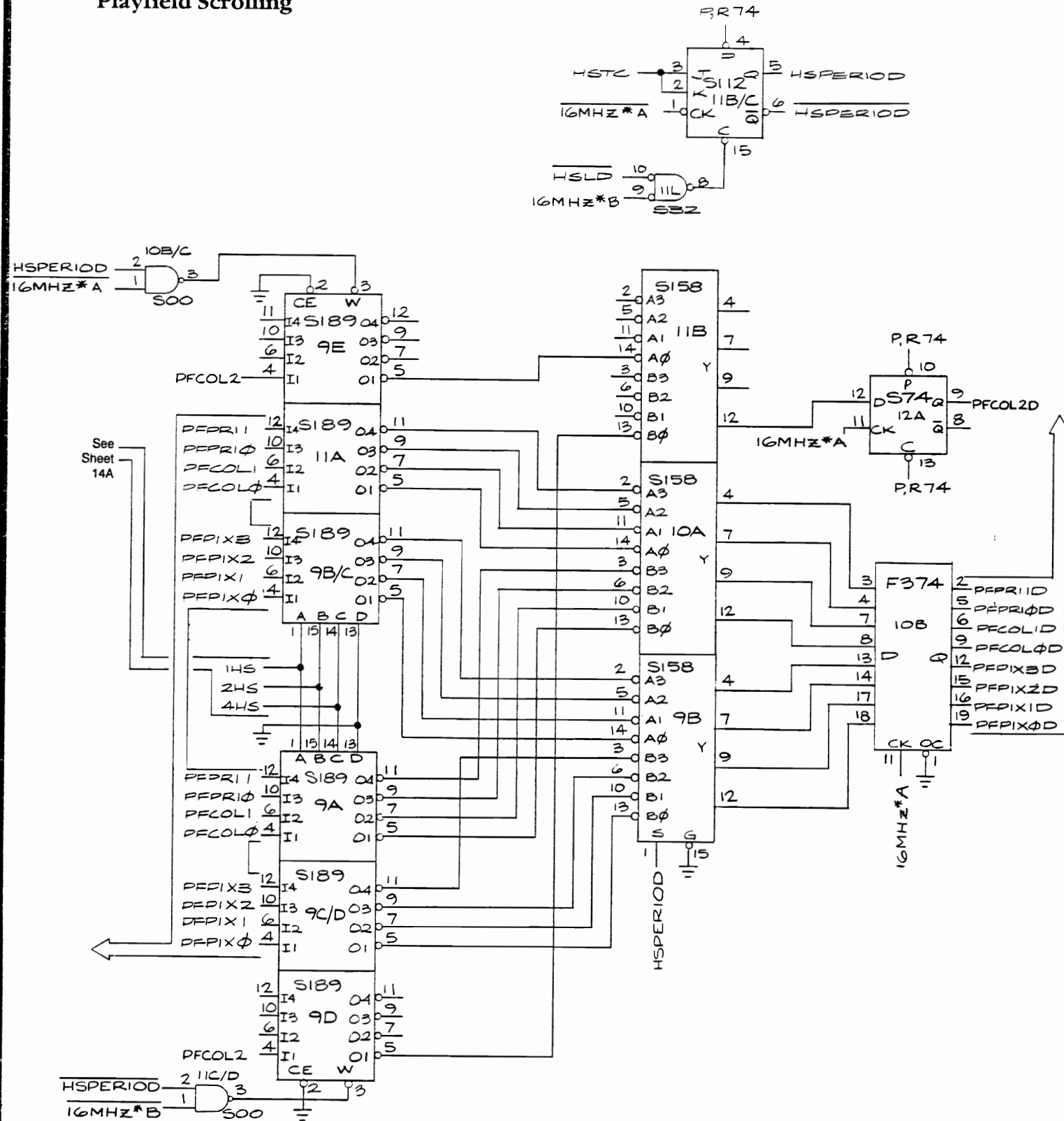


APB™ Video PCB Schematic Diagram

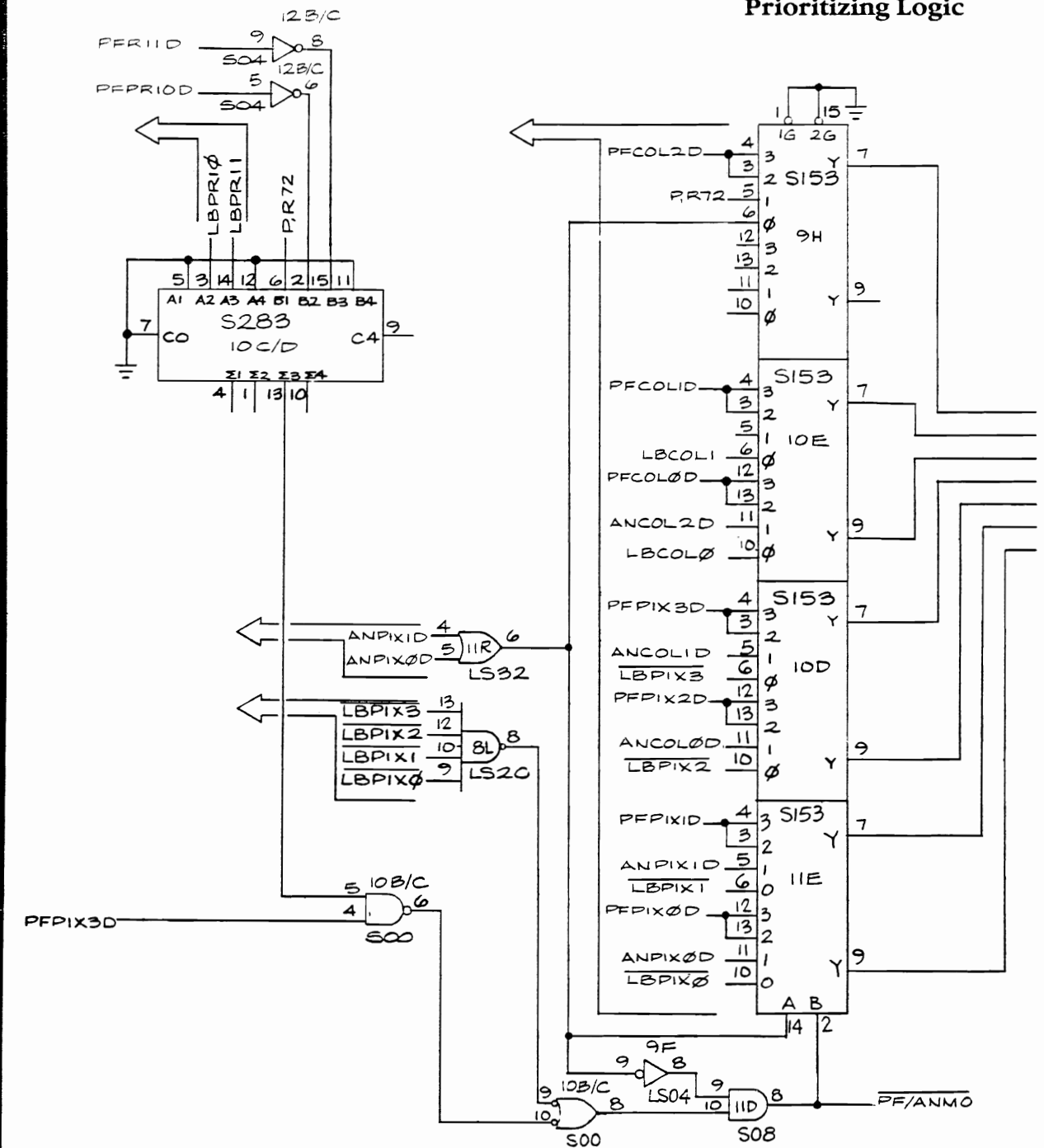
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Playfield Scrolling



Prioritizing Logic



Continued on Sheet 15A

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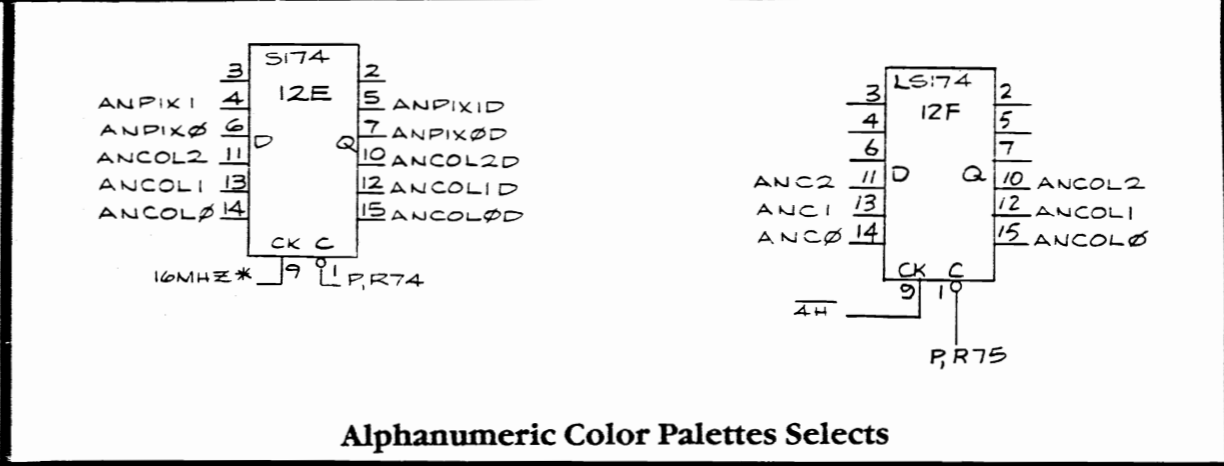
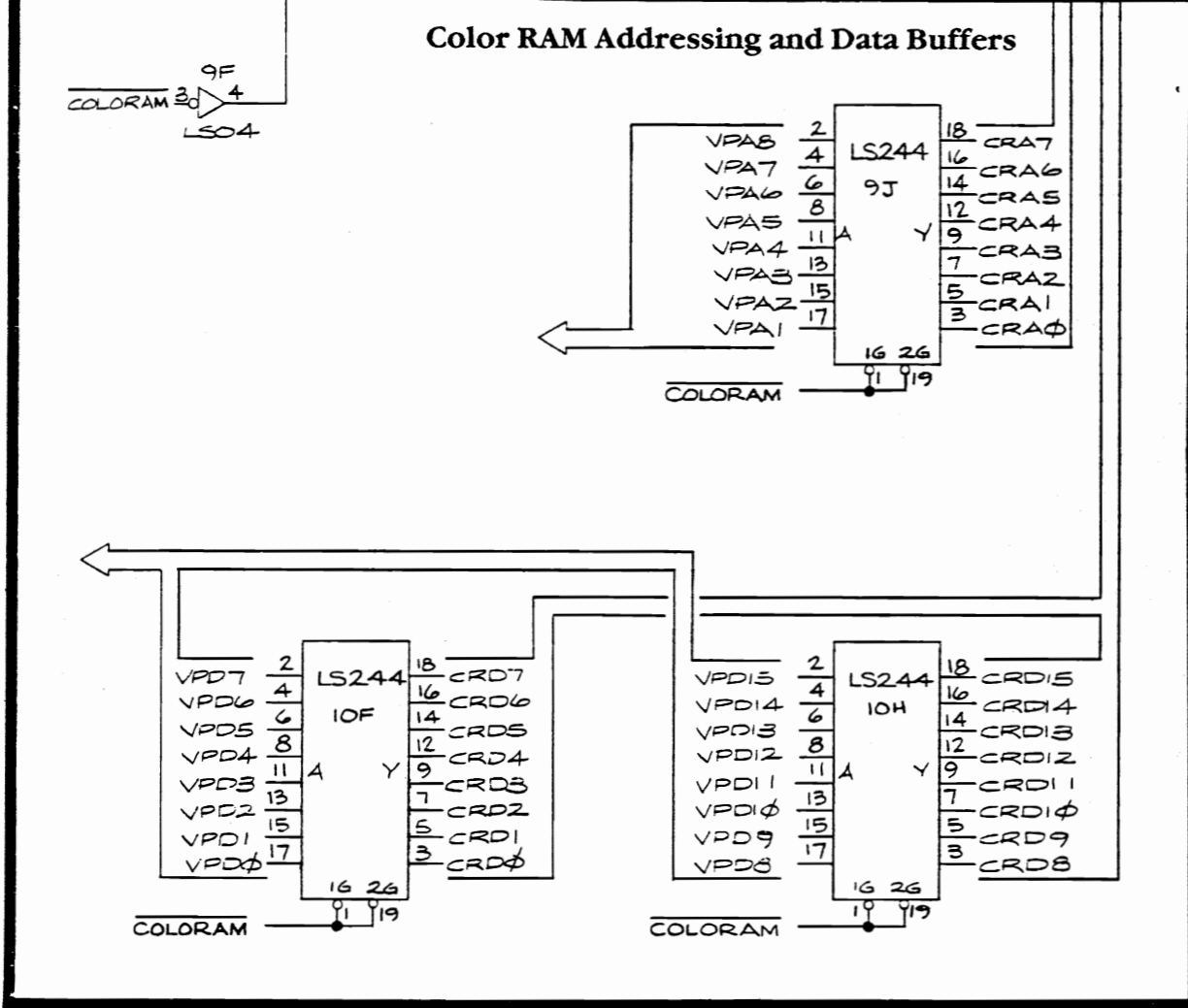
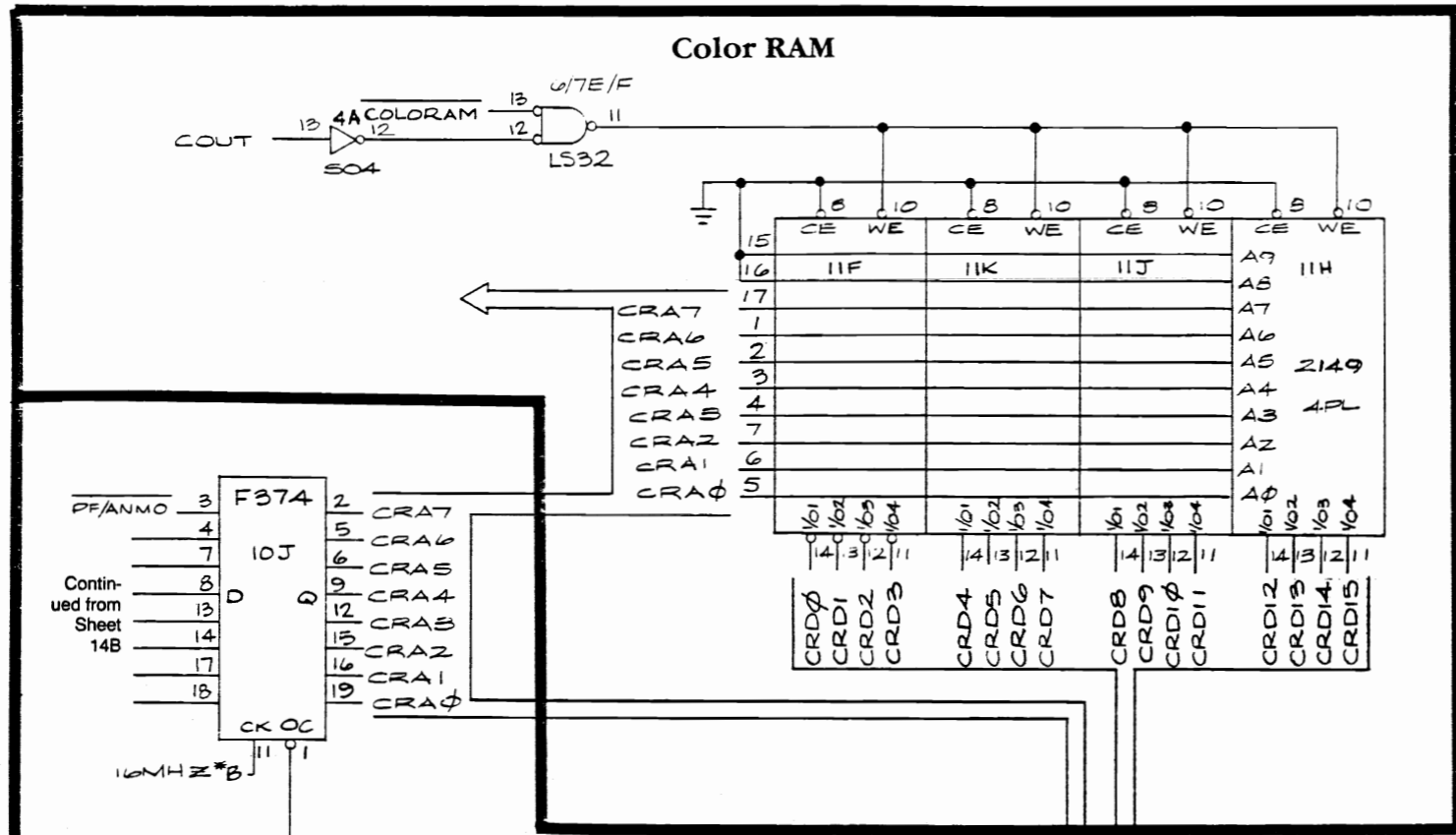
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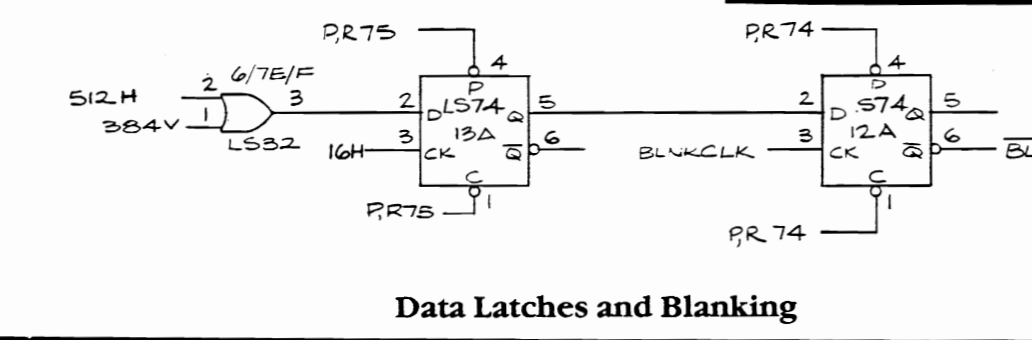
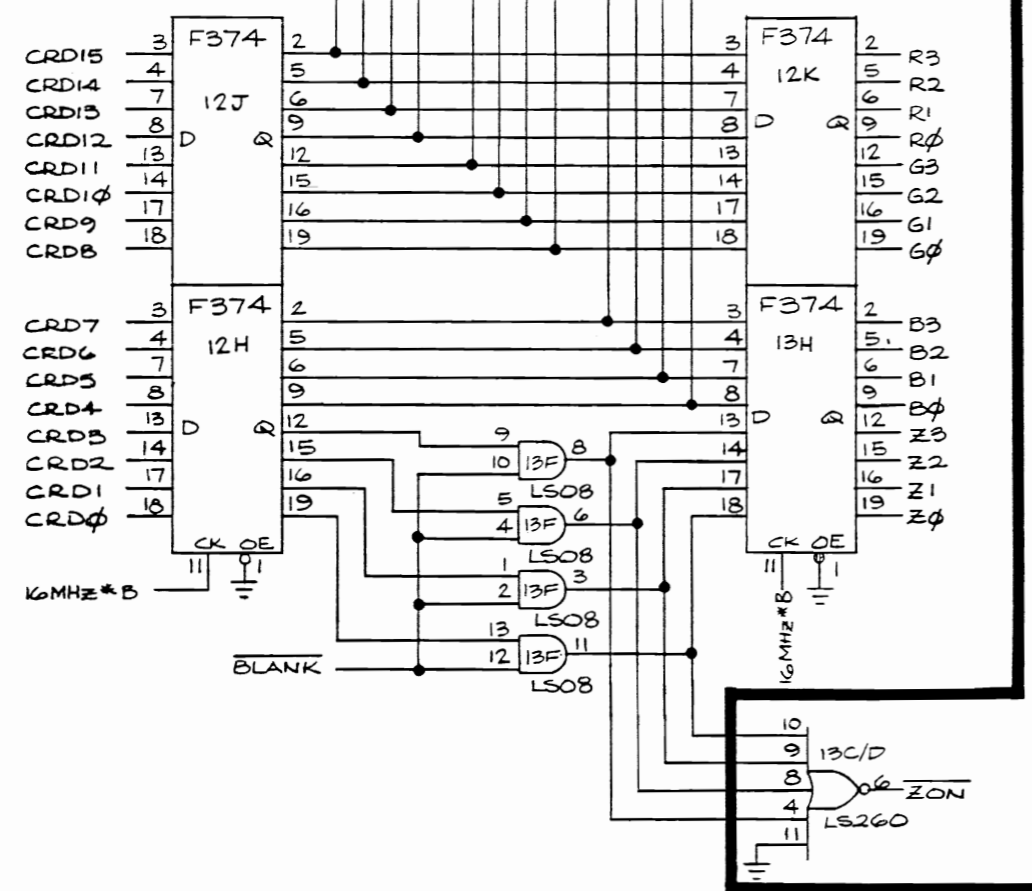
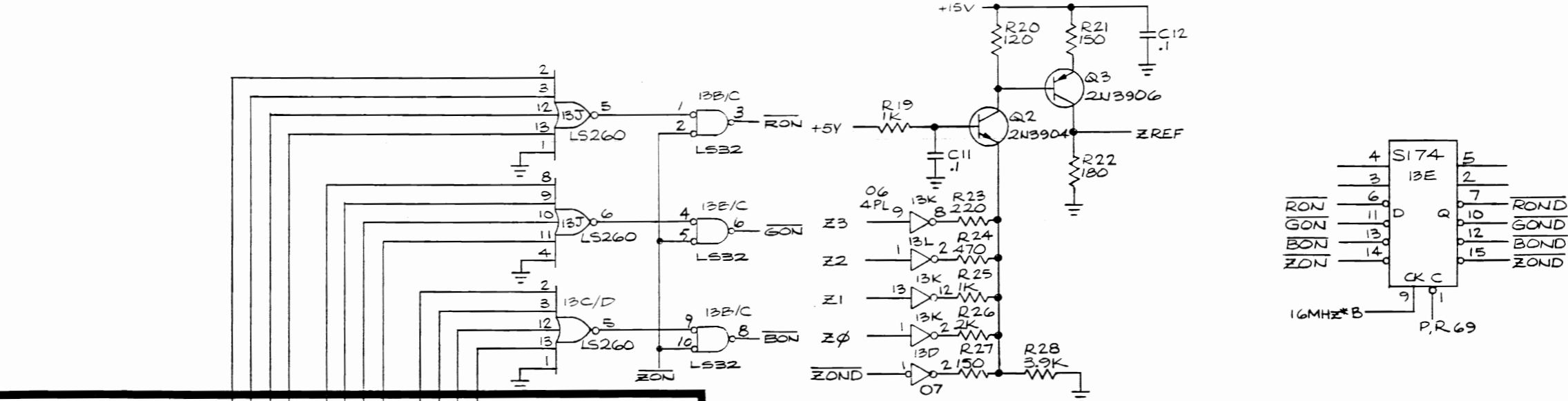


APB™ Video PCB Schematic Diagram

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Video Intensity Control and Driver Enables



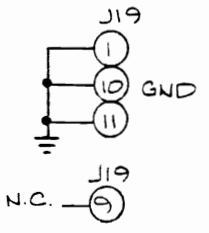
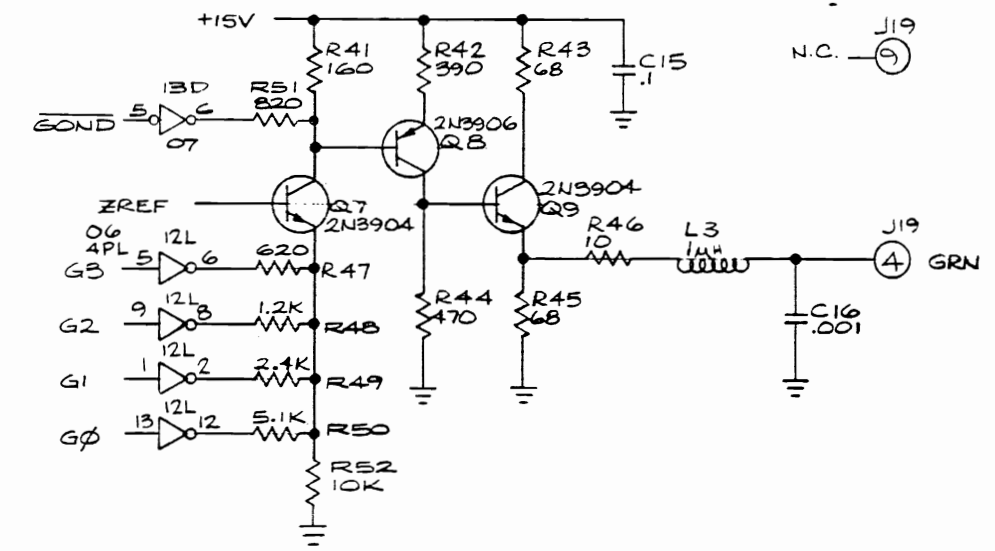
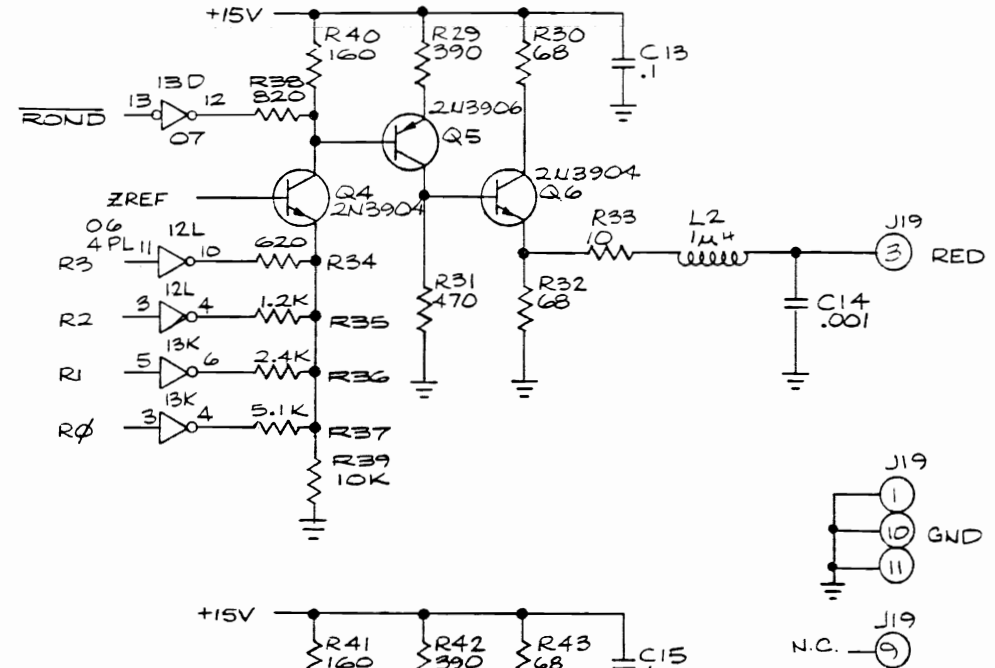
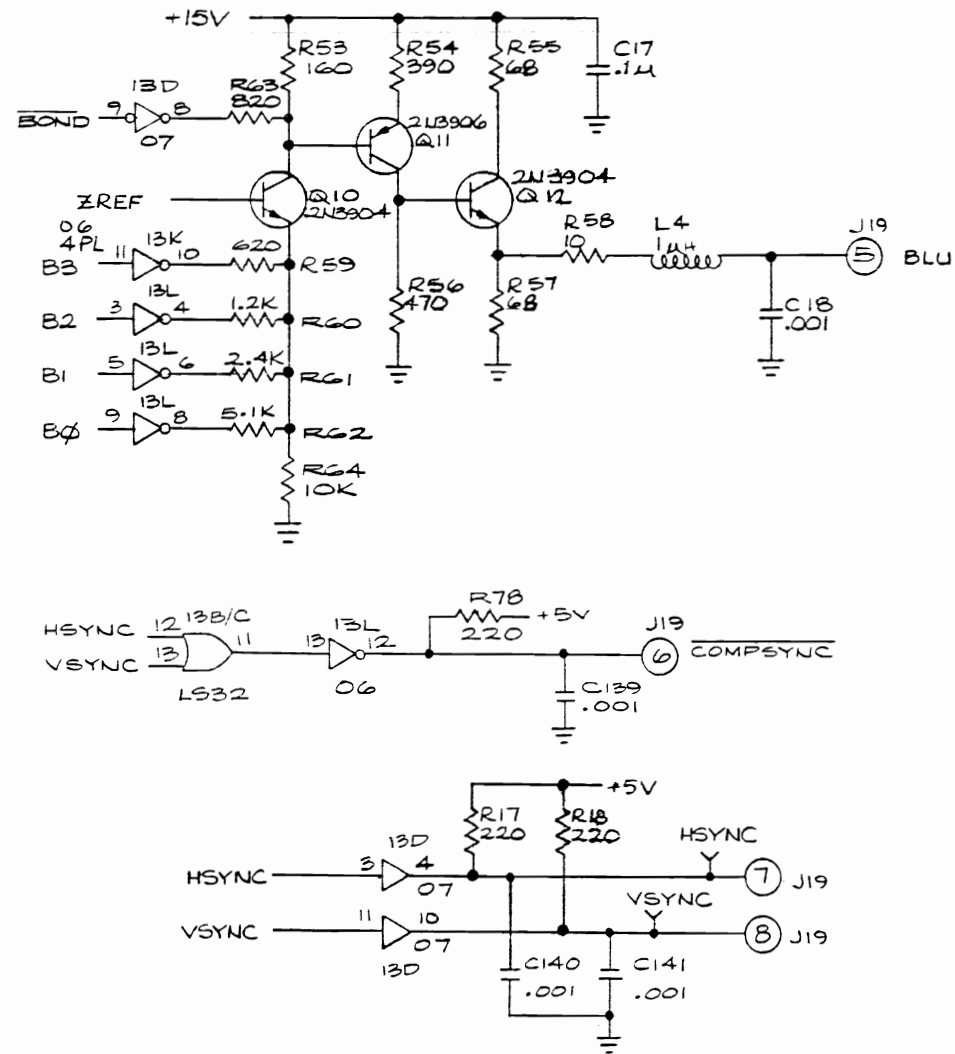
Data Latches and Blanking

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APB™ Video PCB Schematic Diagram

Output Drivers



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APB™ Video PCB Schematic Diagram

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