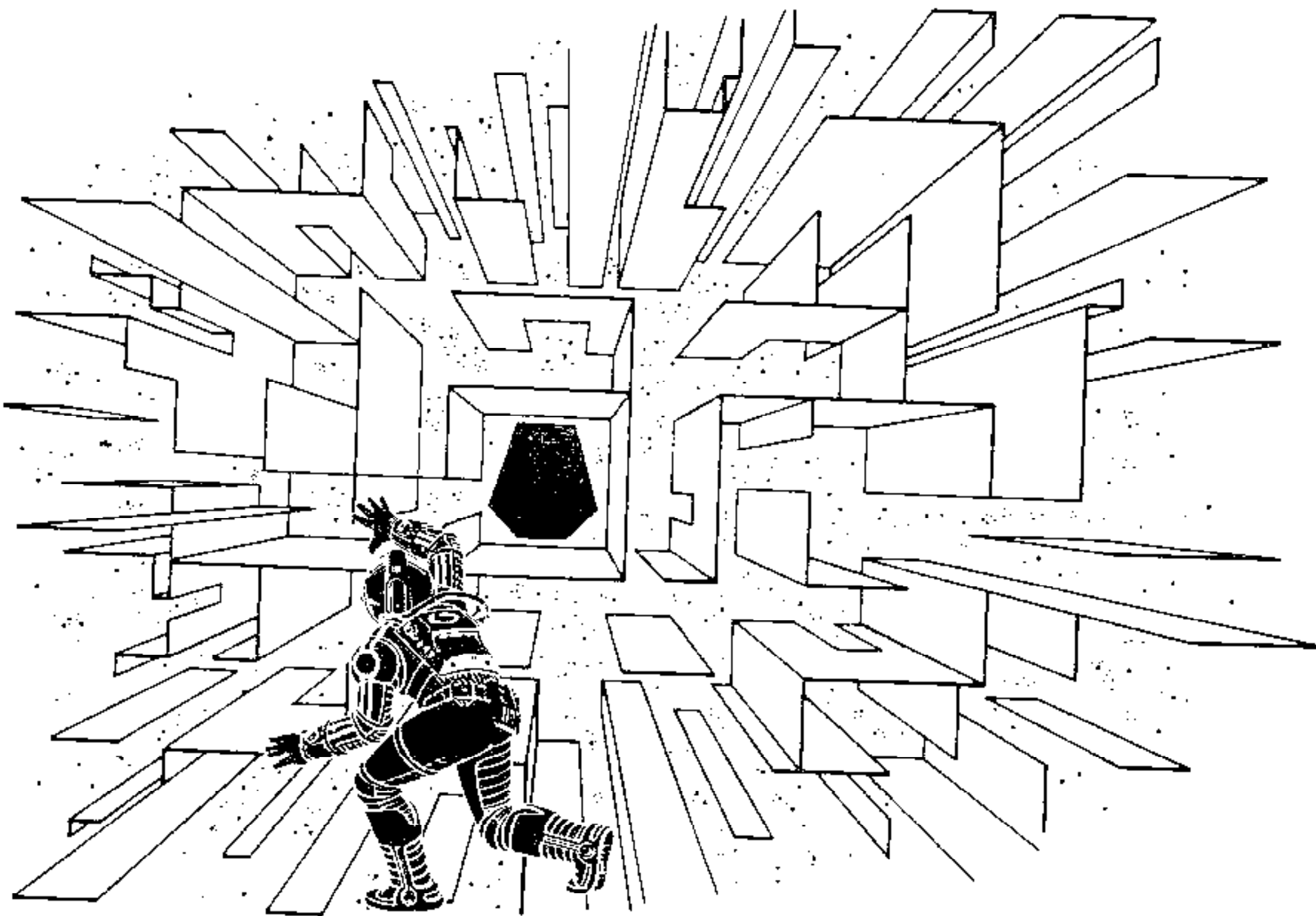


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NOTE
This staple temporarily holds the schematic package
together. Remove the staple before using these
schematics.

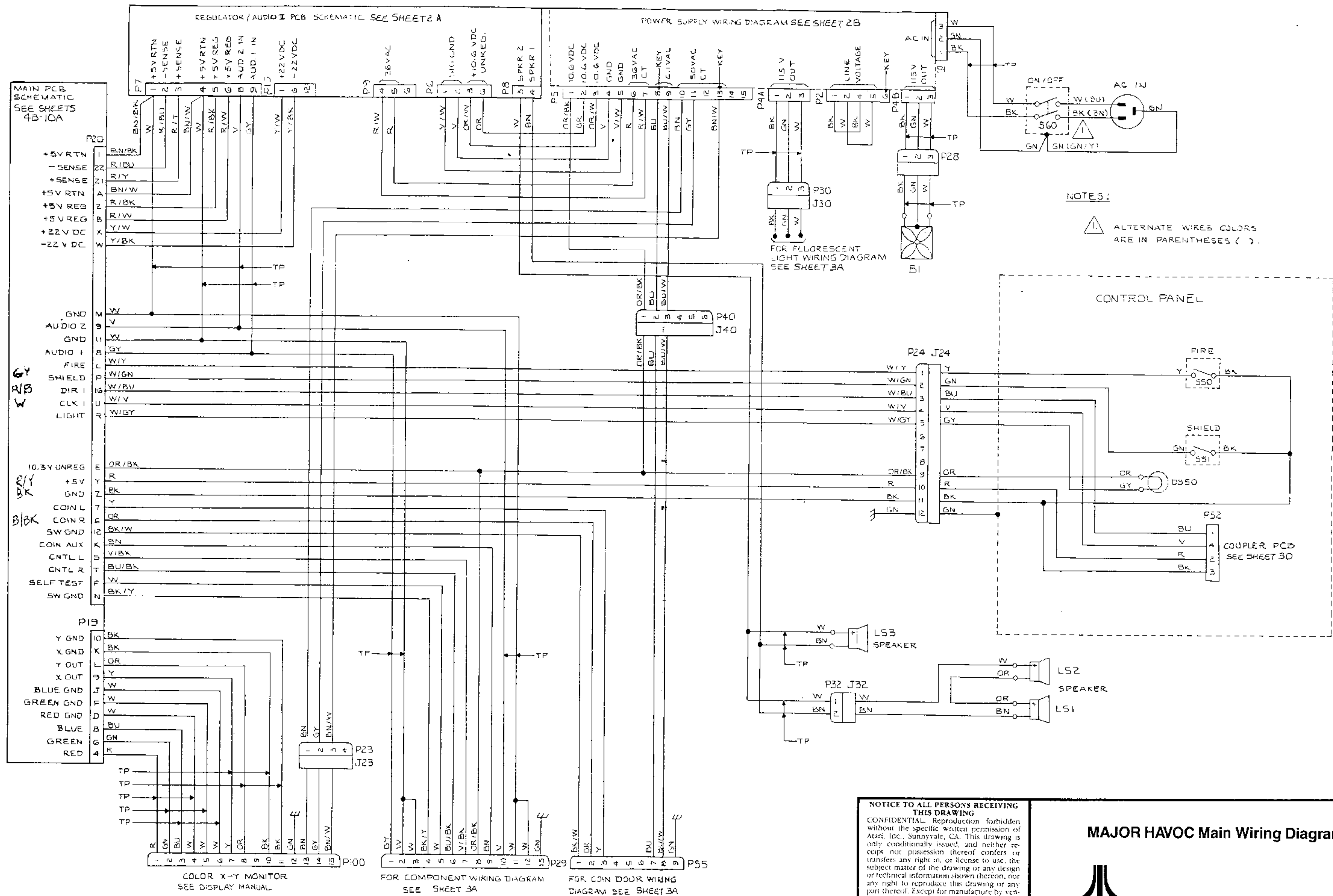


Schematic Package Supplement to

The Adventures of
MAJOR HAVOC

Operators Manual





NOTES:
1. ALTERNATE WIRE COLORS ARE IN PARENTHESES ().

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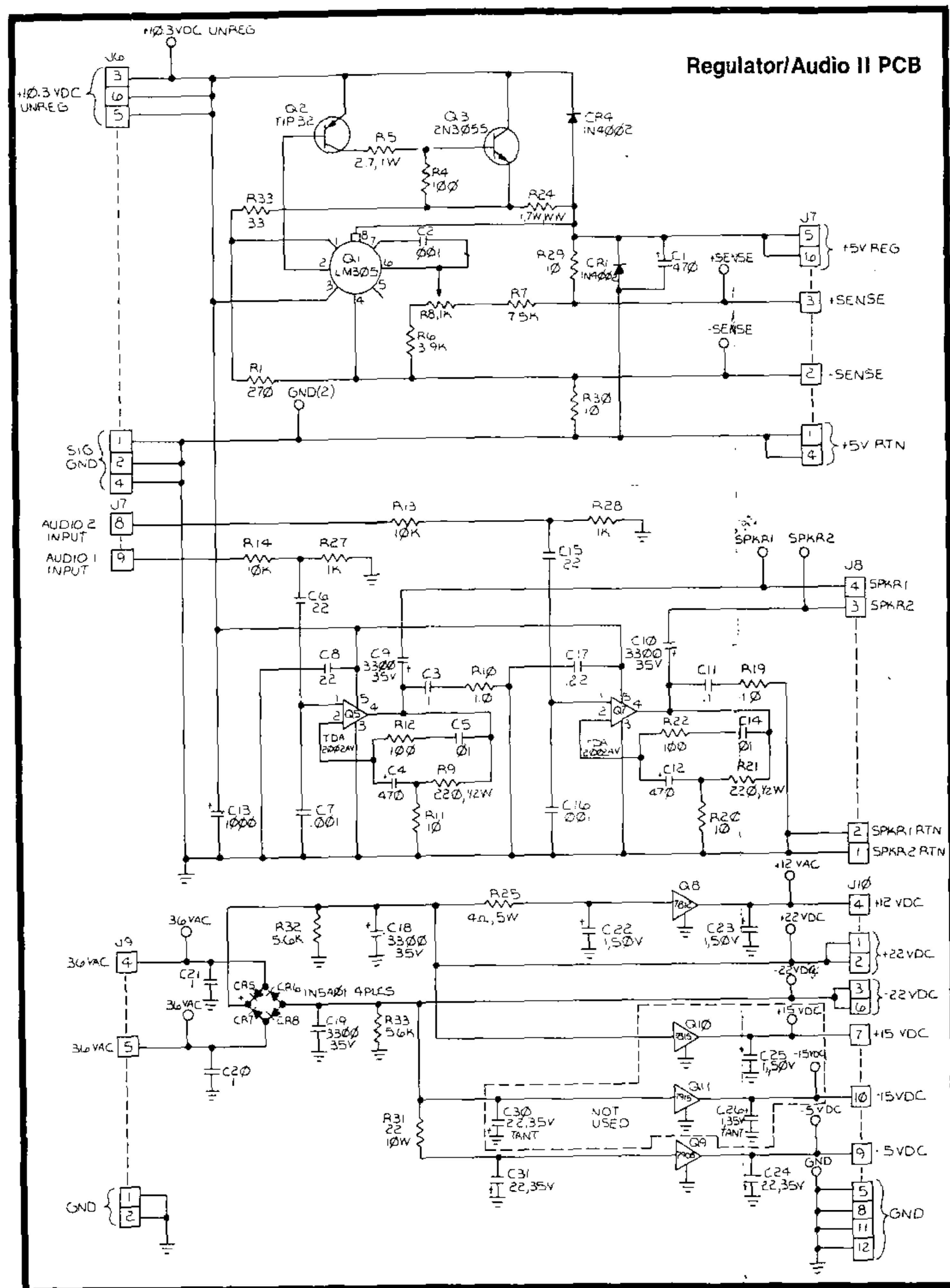
MAJOR HAVOC Main Wiring Diagram



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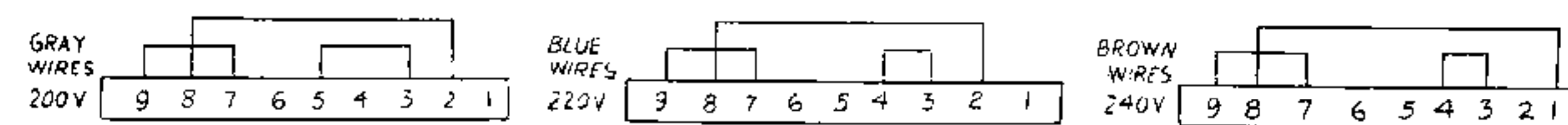
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MAJOR HAVOC Regulator/Audio II PCB Schematic Diagram

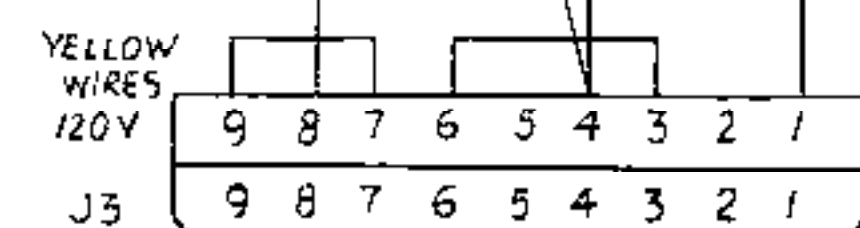
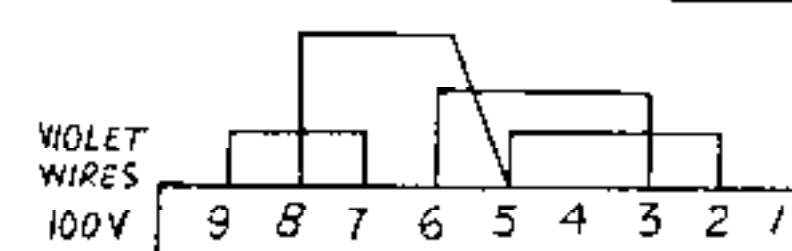


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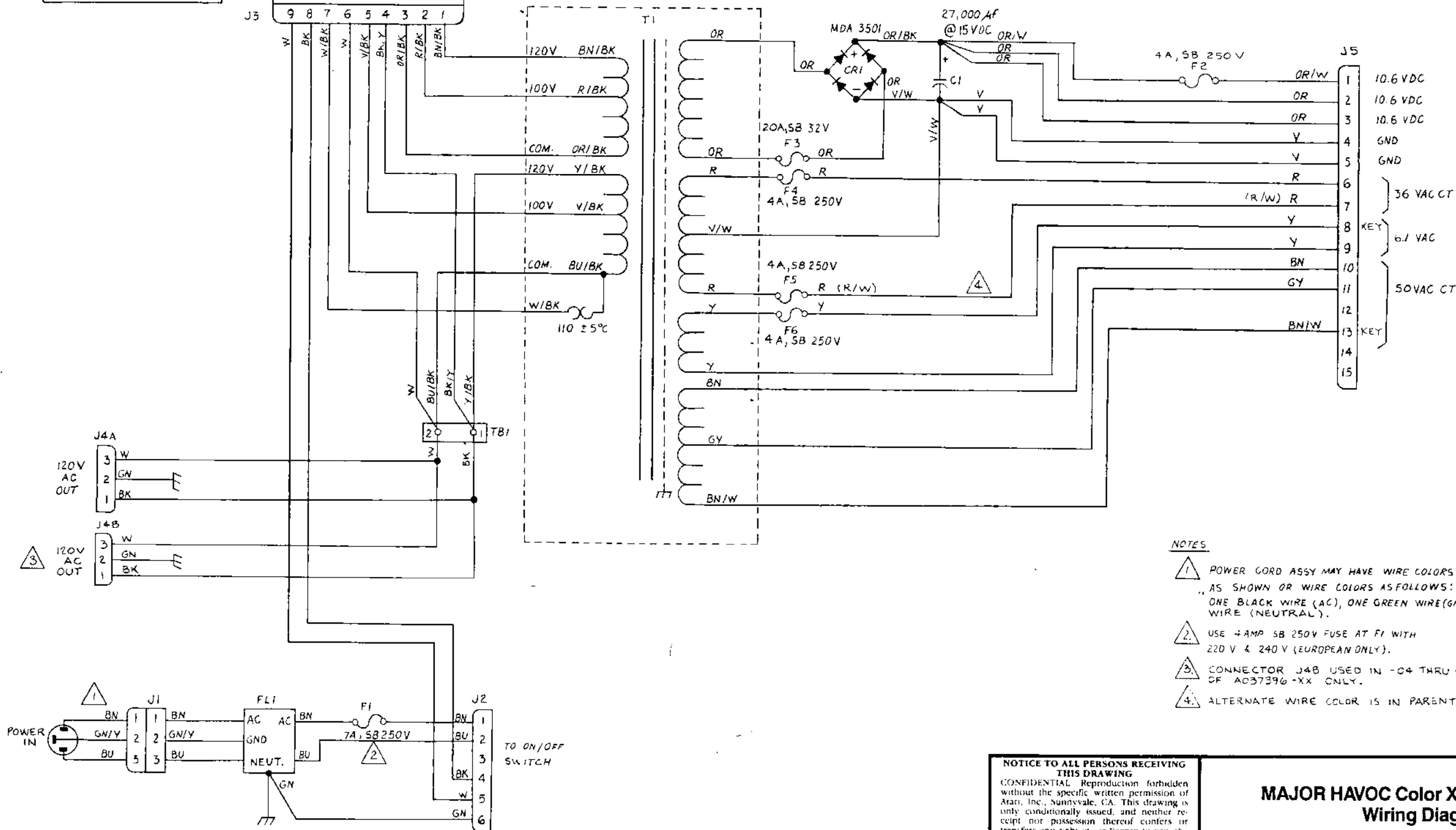
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VOLTAGE SELECTION BLOCKS



Color X-Y Power Supply Wiring Diagram



NOTES

1. POWER CORD ASSY MAY HAVE WIRE COLORS AS SHOWN OR WIRE COLORS AS FOLLOWS: ONE BLACK WIRE (AC), ONE GREEN WIRE (GND), & ONE WHITE WIRE (NEUTRAL).
2. USE 4 AMP SB 250V FUSE AT F1 WITH 220 V & 240 V (EUROPEAN ONLY).
3. CONNECTOR J4B USED IN -04 THRU -06 VERSIONS OF A037396-XX ONLY.
4. ALTERNATE WIRE COLOR IS IN PARENTHESES.

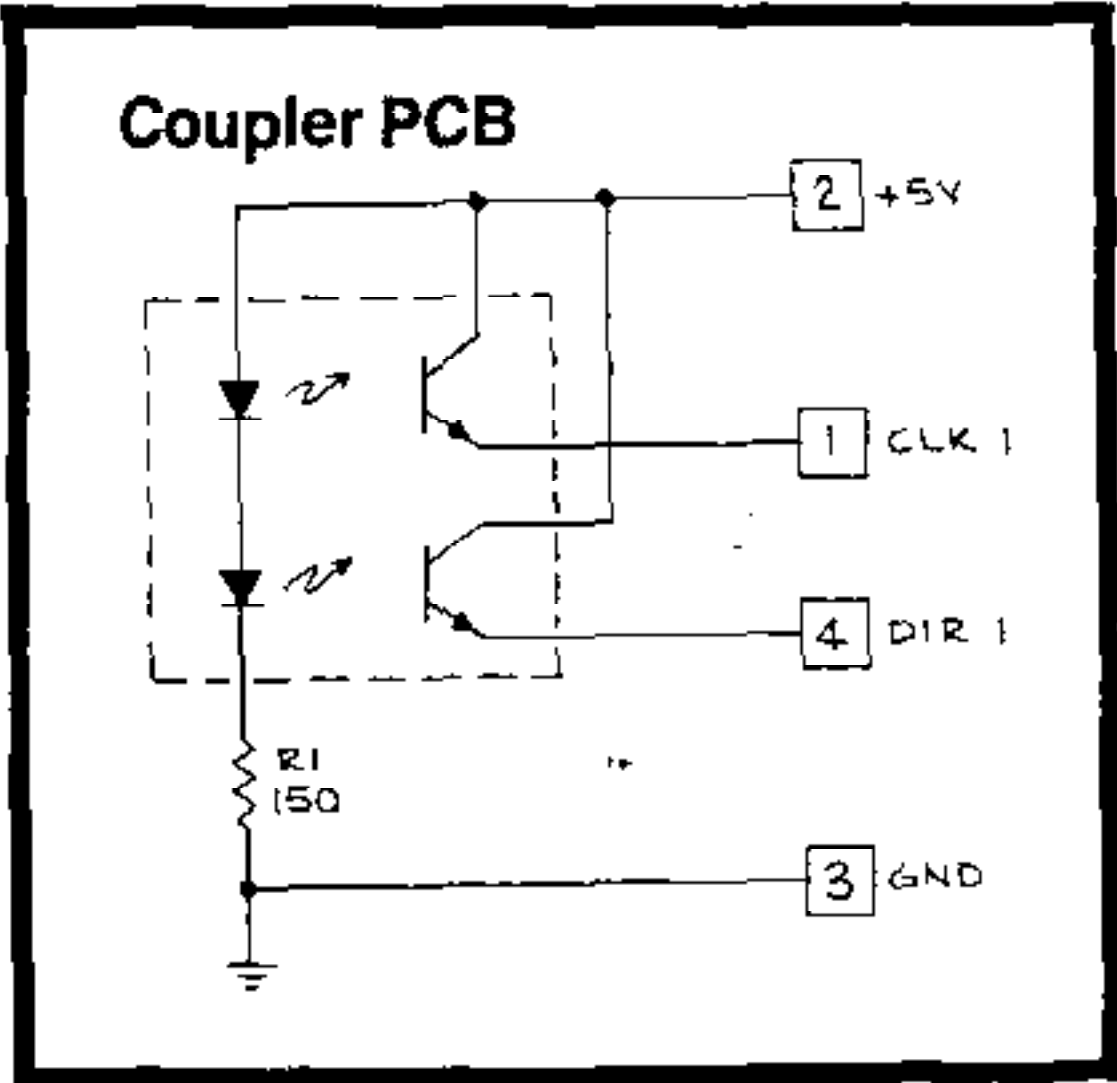
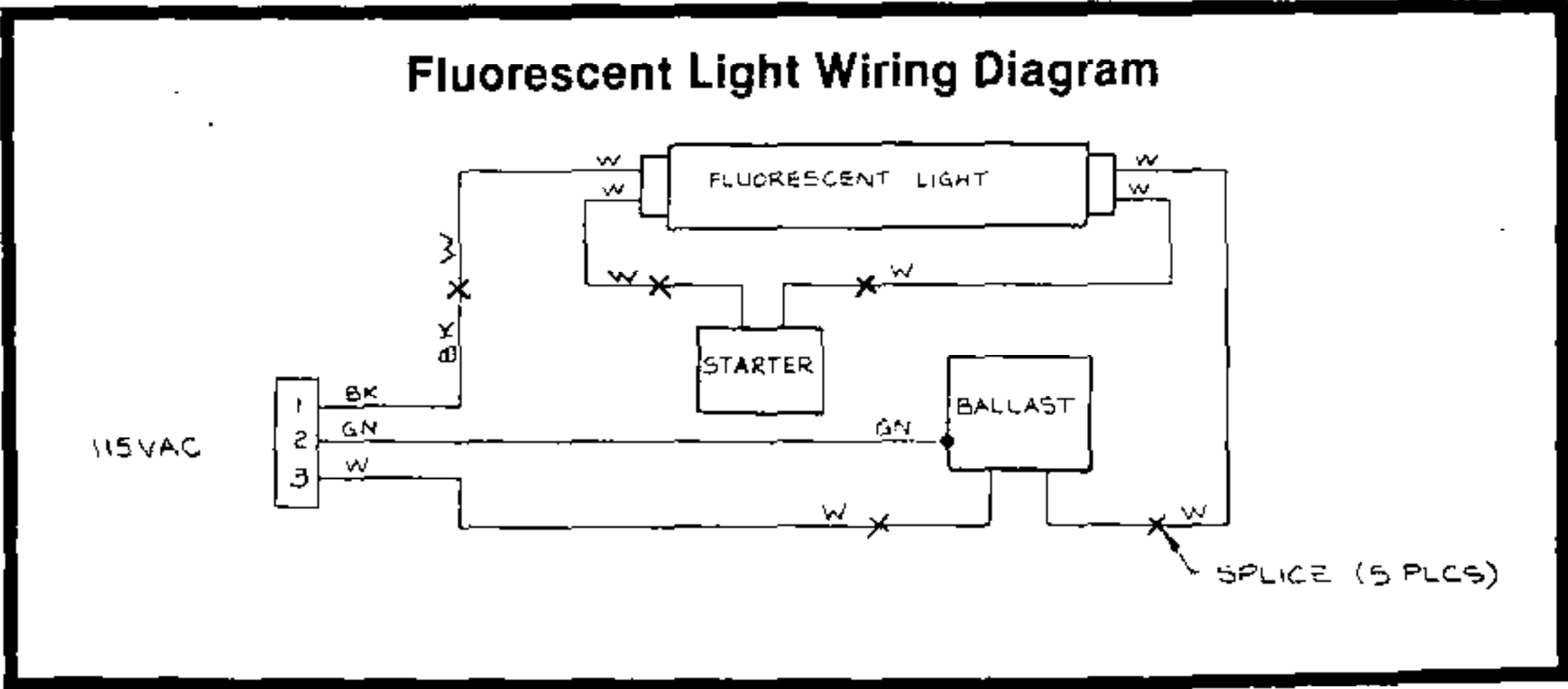
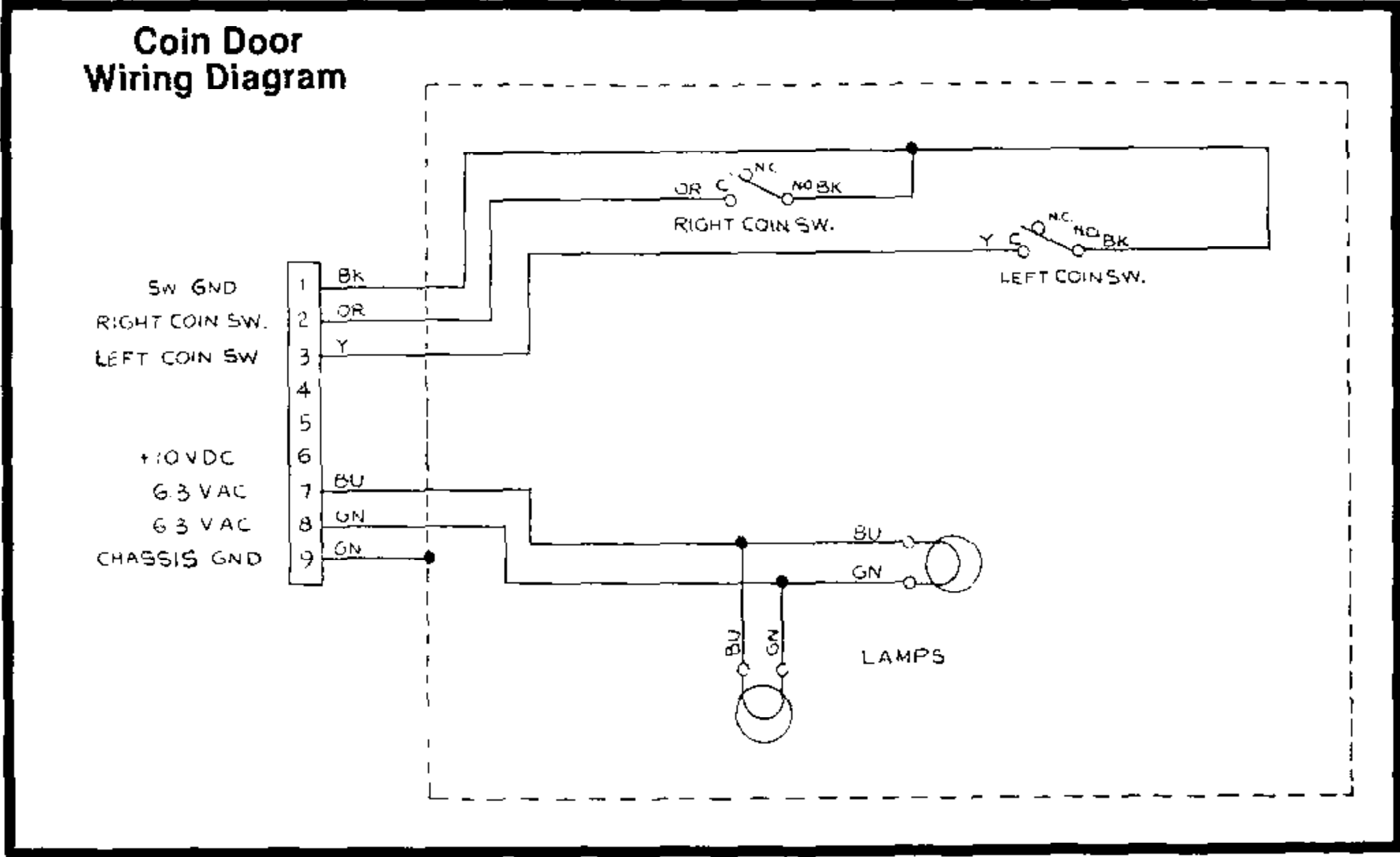
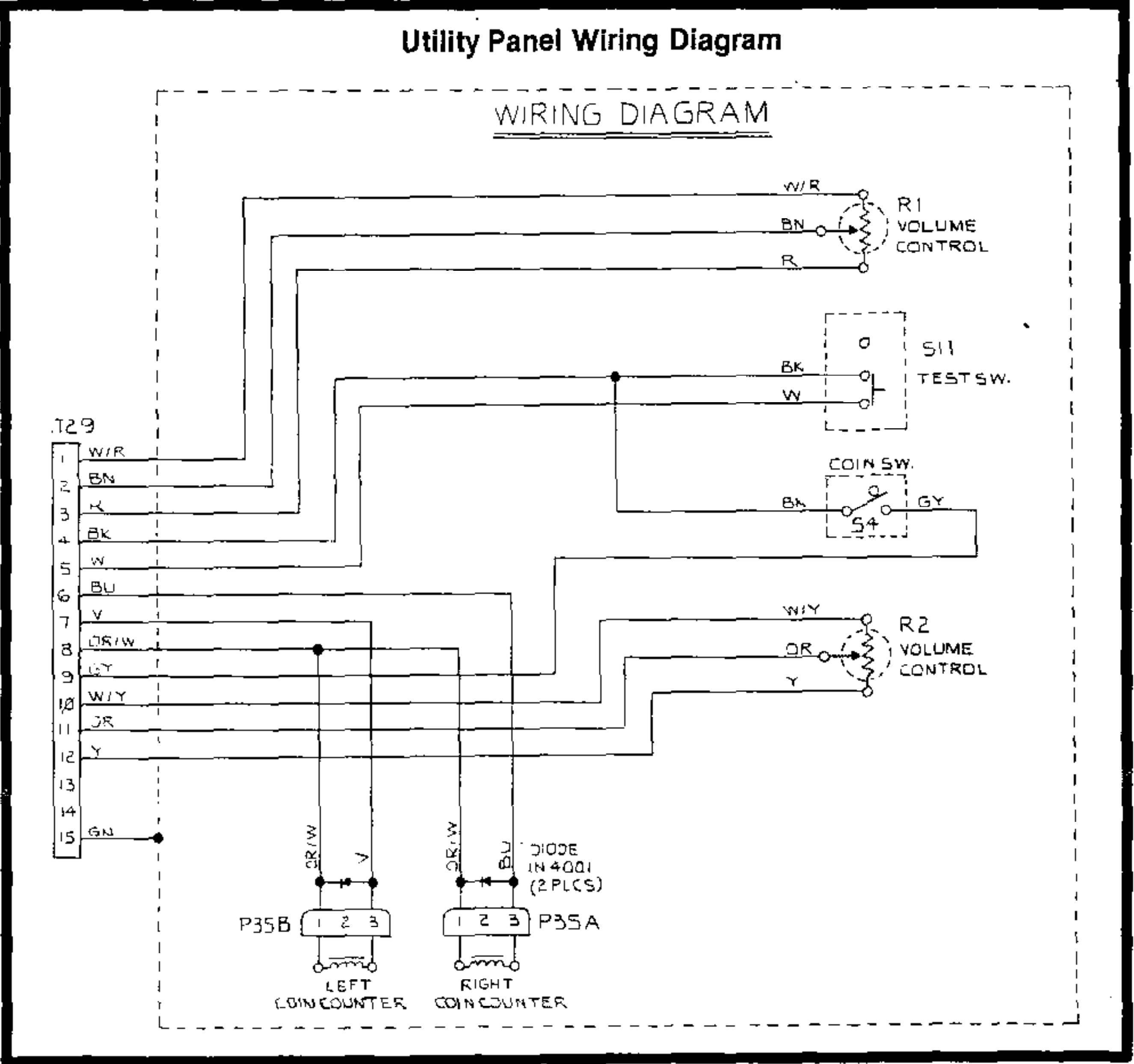
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MAJOR HAVOC Color X-Y Power Supply Wiring Diagram



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MAJOR HAVOC Game Interfaces

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Major Havoc Memory Map
Alpha (α) Microprocessor

HEXA- DECIMAL ADDRESS	ADDRESS BUS SIGNAL LINES															READ/ WRITE	DATA BUS SIGNAL LINES								FUNCTION	
	A15	A14	A13	A12	A11	A10	A9	A8	A7	A6	A5	A4	A3	A2	A1		A0	D7	D6	D5	D4	D3	D2	D1		D0
0000-01FF	0	0	0	0	0	0	0	A	A	A	A	A	A	A	A	A	R/W	D	D	D	D	D	D	D	D	PROGRAM RAM (1/2K)
0200-07FF	0	0	0	0	0	A	A	A	A	A	A	A	A	A	A	A	R/W	D	D	D	D	D	D	D	D	PAGED PROGRAM RAM (3K)
0800-09FF	0	0	0	0	1	0	0	A	A	A	A	A	A	A	A	A	R/W	D	D	D	D	D	D	D	D	PROGRAM RAM (1/2K)
1000	0	0	0	1	0	0	0										R	D	D	D	D	D	D	D	D	GAMMA COMM. READ PORT
1200	0	0	0	1	0	0	1										R	D								RIGHT COIN SW. (PLAYER 1=0)
1200	0	0	0	1	0	0	1										R		D							LEFT COIN SW. (PLAYER 1=0)
1200	0	0	0	1	0	0	1										R			D						AUX. COIN SW. (PLAYER 1=0)
1200	0	0	0	1	0	0	1										R	D								SELFTEST (PLAYER 1=1)
1200	0	0	0	1	0	0	1										R		D							CABINET SW. (PLAYER 1=1)
1200	0	0	0	1	0	0	1										R			D						AUX. COIN SW. (PLAYER 1=1)
1200	0	0	0	1	0	0	1										R					D				GAMMA RCVD FLAG
1200	0	0	0	1	0	0	1										R						D			GAMMA XMTD FLAG
1200	0	0	0	1	0	0	1										R							D		2.4KHz
1200	0	0	0	1	0	0	1										R							D		VEC. GEN. HALT FLAG
1400-141F	0	0	0	1	0	1	0					A	A	A	A		W					D	D	D	D	COLORAM
1600	0	0	0	1	0	1	1	0	0	0							W	D								INVERT Y
1600	0	0	0	1	0	1	1	0	0	0							W		D							INVERT X
1600	0	0	0	1	0	1	1	0	0	0							W			D						PLAYER 1
1600	0	0	0	1	0	1	1	0	0	0							W					D				GAMMA RESET
1600	0	0	0	1	0	1	1	0	0	0							W							D		ROLLER CONTROL LIGHT
1640	0	0	0	1	0	1	1	0	0	1							W									VEC. GEN. GO
1680	0	0	0	1	0	1	1	0	1	0							W									WATCHDOG CLEAR
16C0	0	0	0	1	0	1	1	0	1	1							W									VEC. GEN. RESET
1700	0	0	0	1	0	1	1	1	0	0							W									IRQ ACKNOWLEDGE
1740	0	0	0	1	0	1	1	1	0	1							W									PROGRAM ROM MMU
1780	0	0	0	1	0	1	1	1	1	0							W									PROGRAM RAM SELECT
17C0	0	0	0	1	0	1	1	1	1	1							W									GAMMA COMM. WRITE PORT
2000-3FFF	0	0	1	A	A	A	A	A	A	A	A	A	A	A	A	A	R	D	D	D	D	D	D	D	D	PAGED PROG. ROM (32K)
4000-4FFF	0	1	0	0	A	A	A	A	A	A	A	A	A	A	A	A	R/W	D	D	D	D	D	D	D	D	VEC. GEN. RAM (4K)
5000-5FFF	0	1	0	1	A	A	A	A	A	A	A	A	A	A	A	A	R	D	D	D	D	D	D	D	D	VEC. GEN. ROM (4K)
6000-7FFF	0	1	1	A	A	A	A	A	A	A	A	A	A	A	A	A	R	D	D	D	D	D	D	D	D	PAGED VEC. GEN. ROM (32K)
8000-FFFF	1	A	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 (32K)

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MAJOR HAVOC Memory Map
Alpha (α) Microprocessor



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Major Havoc Memory Map
Gamma (γ) Microprocessor

HEXA- DECIMAL ADDRESS	ADDRESS BUS SIGNAL LINES																READ/ WRITE	DATA BUS SIGNAL LINES								FUNCTION
	A15	A14	A13	A12	A11	A10	A9	A8	A7	A6	A5	A4	A3	A2	A1	A0		D7	D6	D5	D4	D3	D2	D1	D0	
0000-07FF	0	0	0			A	A	A	A	A	A	A	A	A	A	A	R/W	D	D	D	D	D	D	D	D	PROGRAM RAM (2K) QUAD. CUSTOM I/O
2000-203F	0	0	1	0	0						A	A	A	A	A	A	R/W	D	D	D	D	D	D	D	D	
2800	0	0	1	0	1												R	D							FIRE 1 SWITCH SHIELD 1 SWITCH FIRE 2 SWITCH SHIELD 2 SWITCH ALPHA RCVD FLAG ALPHA XMTD FLAG	
2800	0	0	1	0	1												R		D							
2800	0	0	1	0	1												R			D						
2800	0	0	1	0	1												R				D					
2800	0	0	1	0	1												R						D			
2800	0	0	1	0	1												R							D		
3000	0	0	1	1	0												R	D	D	D	D	D	D	D	ALPHA COMM. READ PORT	
3800-3803	0	0	1	1	1										A	A	R	D	D	D	D	D	D	D	D	ROLLER CONTROL INPUT DIP SW #2 IRQ ACKNOWLEDGE LEFT COIN COUNTER RIGHT COIN COUNTER ALPHA COMM. WRITE PORT
4000	0	1	0	0	0												R	D	D	D	D	D	D	D		
4800	0	1	0	0	1												W									
4800	0	1	0	0	1												W							D		
5000	0	1	0	1	0												W	D	D	D	D	D	D	D	EEROM PROGRAM ROM	
6000-61FF	0	1	1					A	A	A	A	A	A	A	A	A	R/W	D	D	D	D	D	D	D		D
8000-BFFF	1		A	A	A	A	A	A	A	A	A	A	A	A	A	A	R	D	D	D	D	D	D	D	D	

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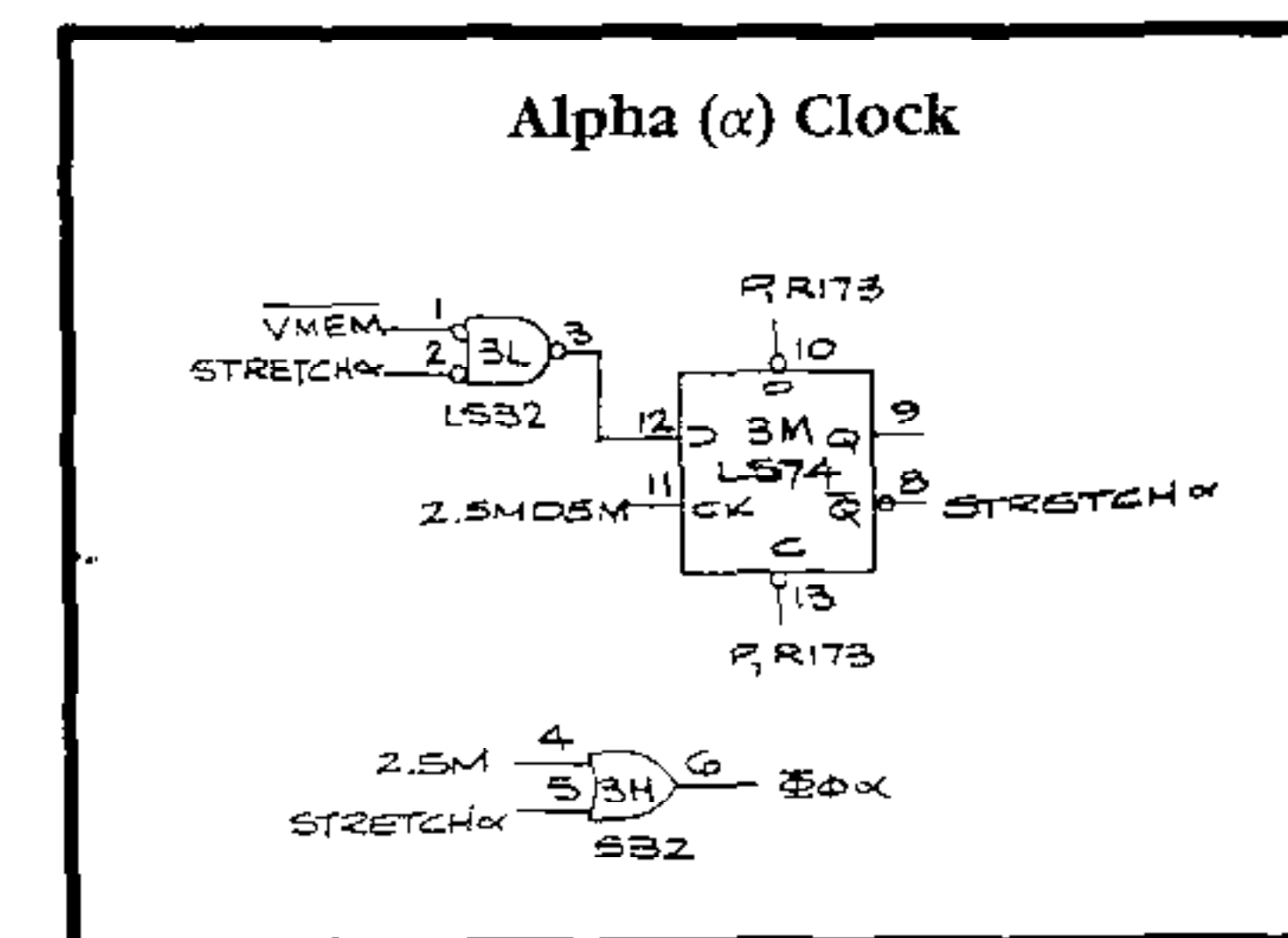
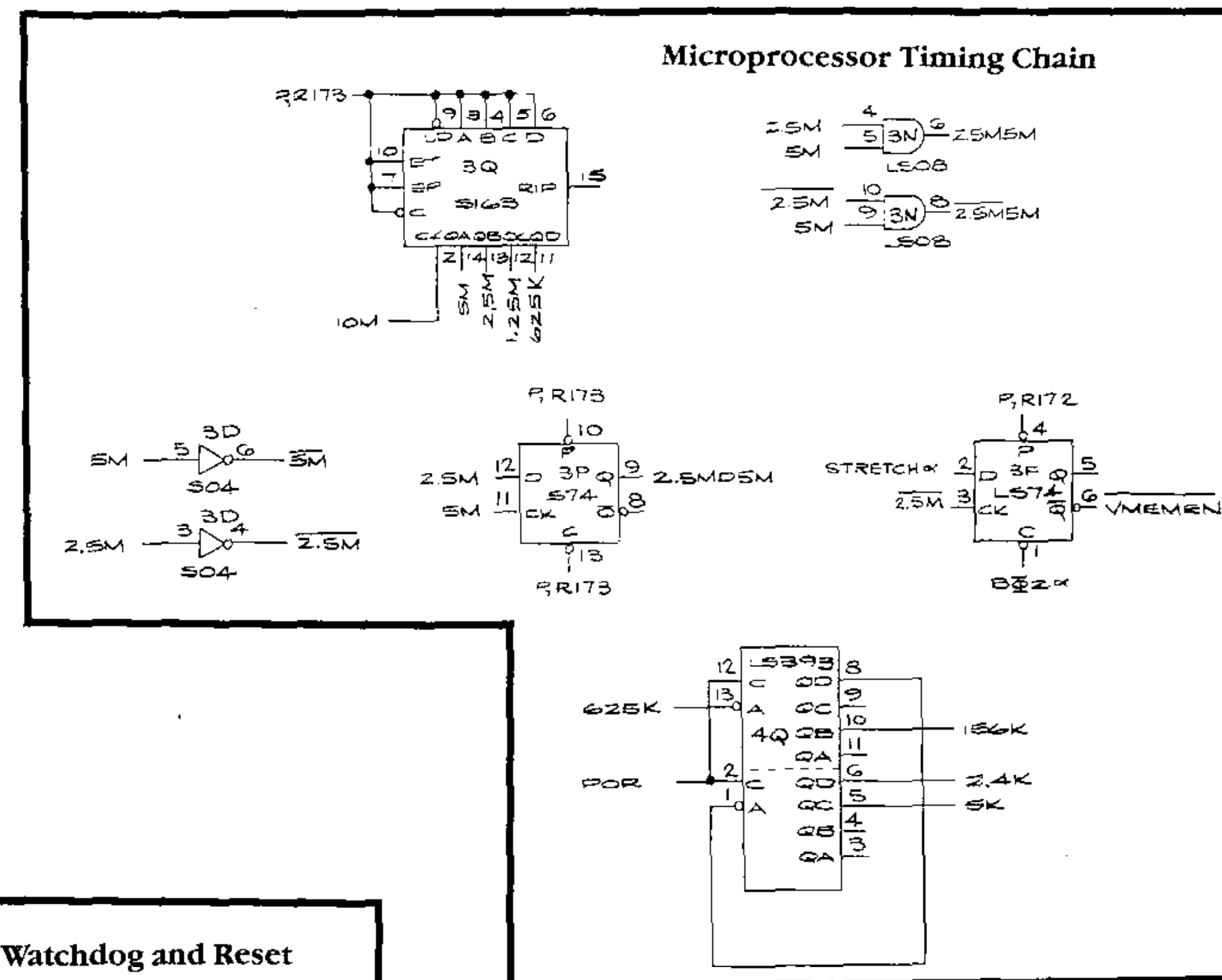
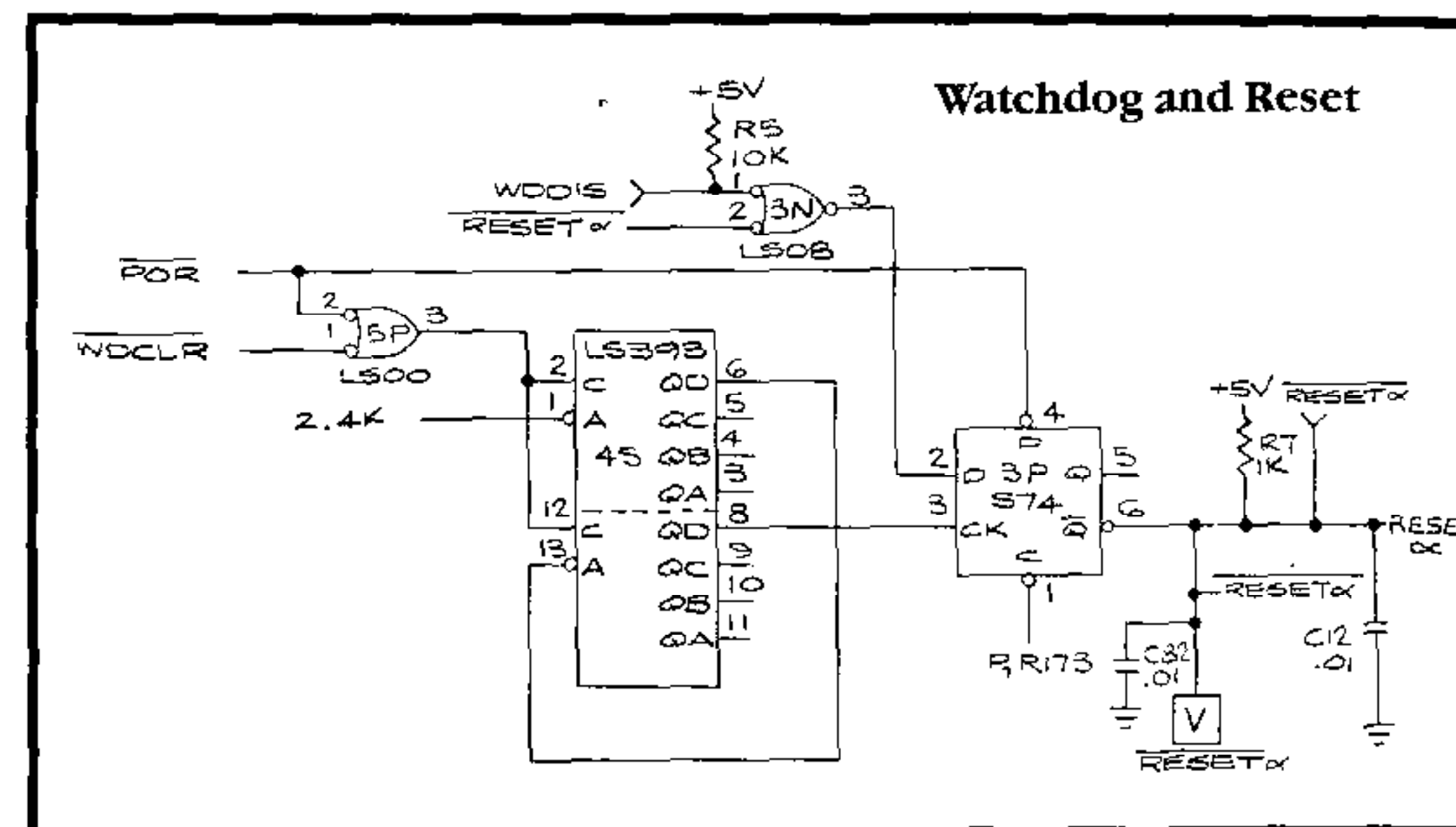
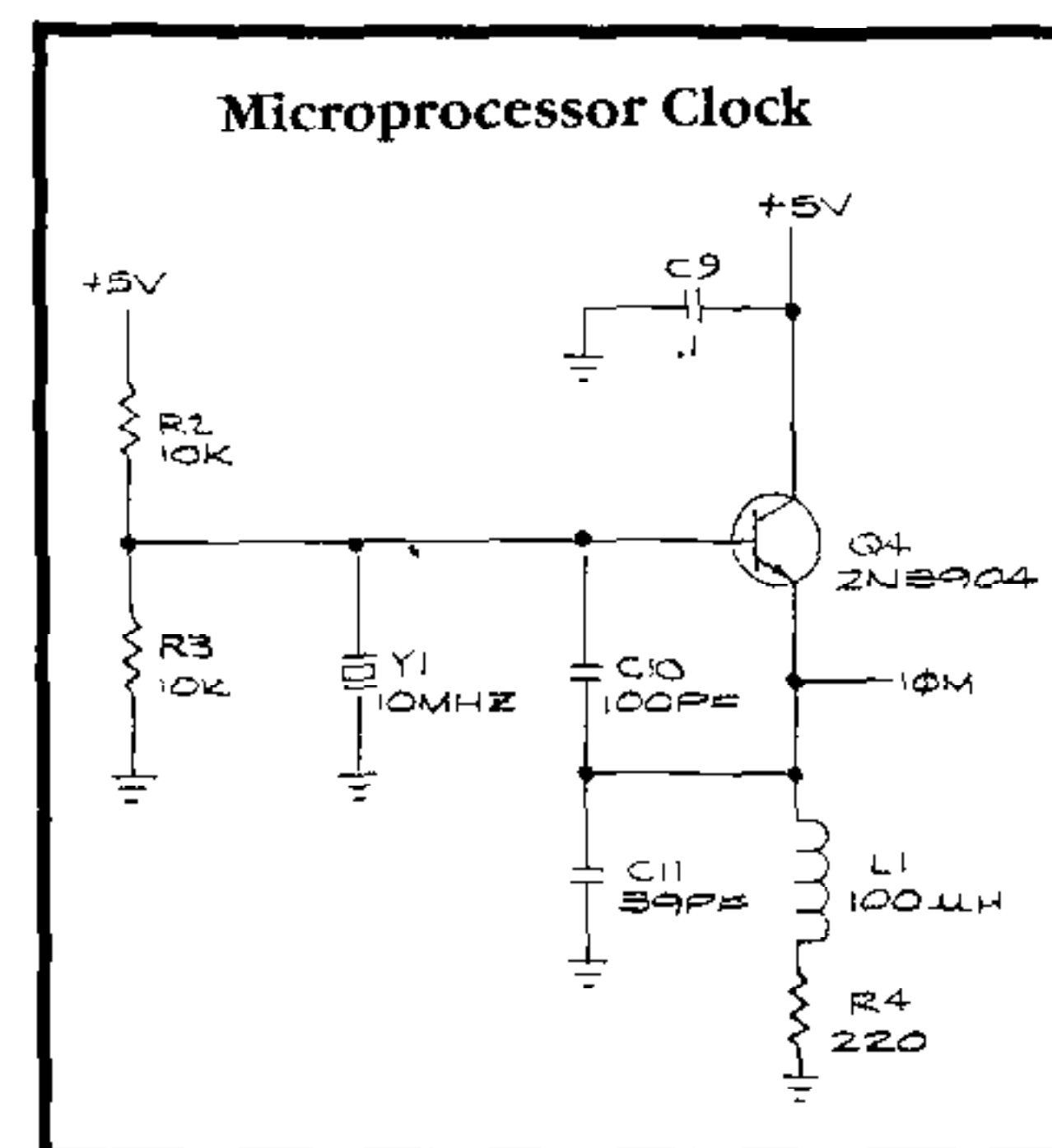
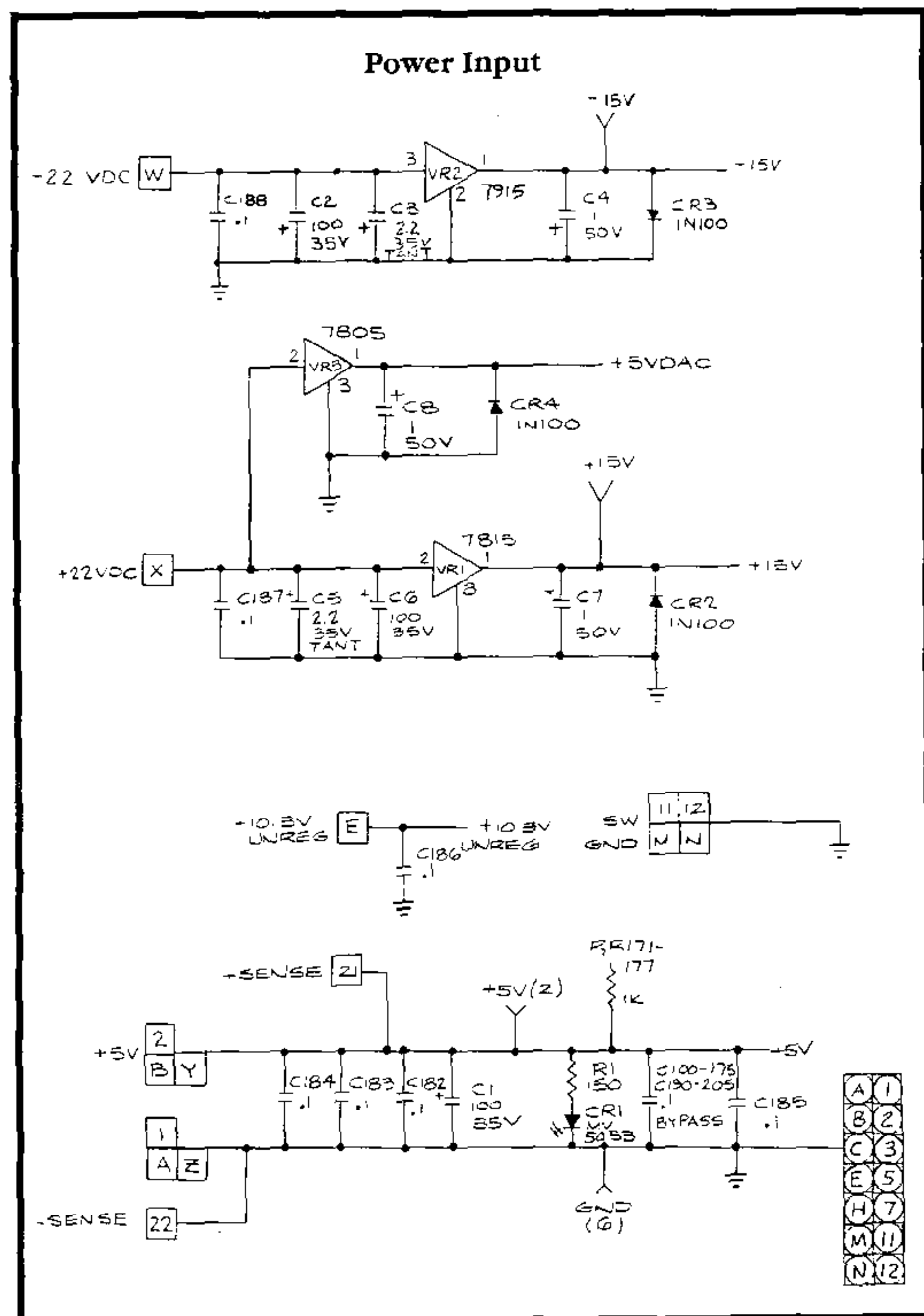


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MAJOR HAVOC Memory Map
Gamma (γ) Microprocessor

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MAJOR HAVOC Main PCB Schematic Diagram



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Alpha (α) Input/Output

The Alpha (α) Input/Output circuit is divided into three main sections: Coin Inputs, Light Indicator, and Display Driver.

Coin Inputs: This section uses an LS257 15-line display driver. It has three coin input buttons: SELFTEST (F), COIN R (6), COIN L (7), and COIN AUX (K). These inputs are connected to the A inputs of the LS257. The LS257's Y outputs (4, 7, 9, 12) are connected to the 807, 806, 805, and 804 lines of the 15-line display. The LS257's OE input (5) is connected to the 807 line. The LS257's inputs are also connected to the 807, 806, 805, and 804 lines of the 15-line display.

Light Indicator: This section uses a 2N6044 transistor. The LIGHT input is connected to the base of the transistor through a 1K resistor. The emitter is grounded, and the collector is connected to the 807 line through a 1K resistor. A 0.1 capacitor is connected between the collector and ground.

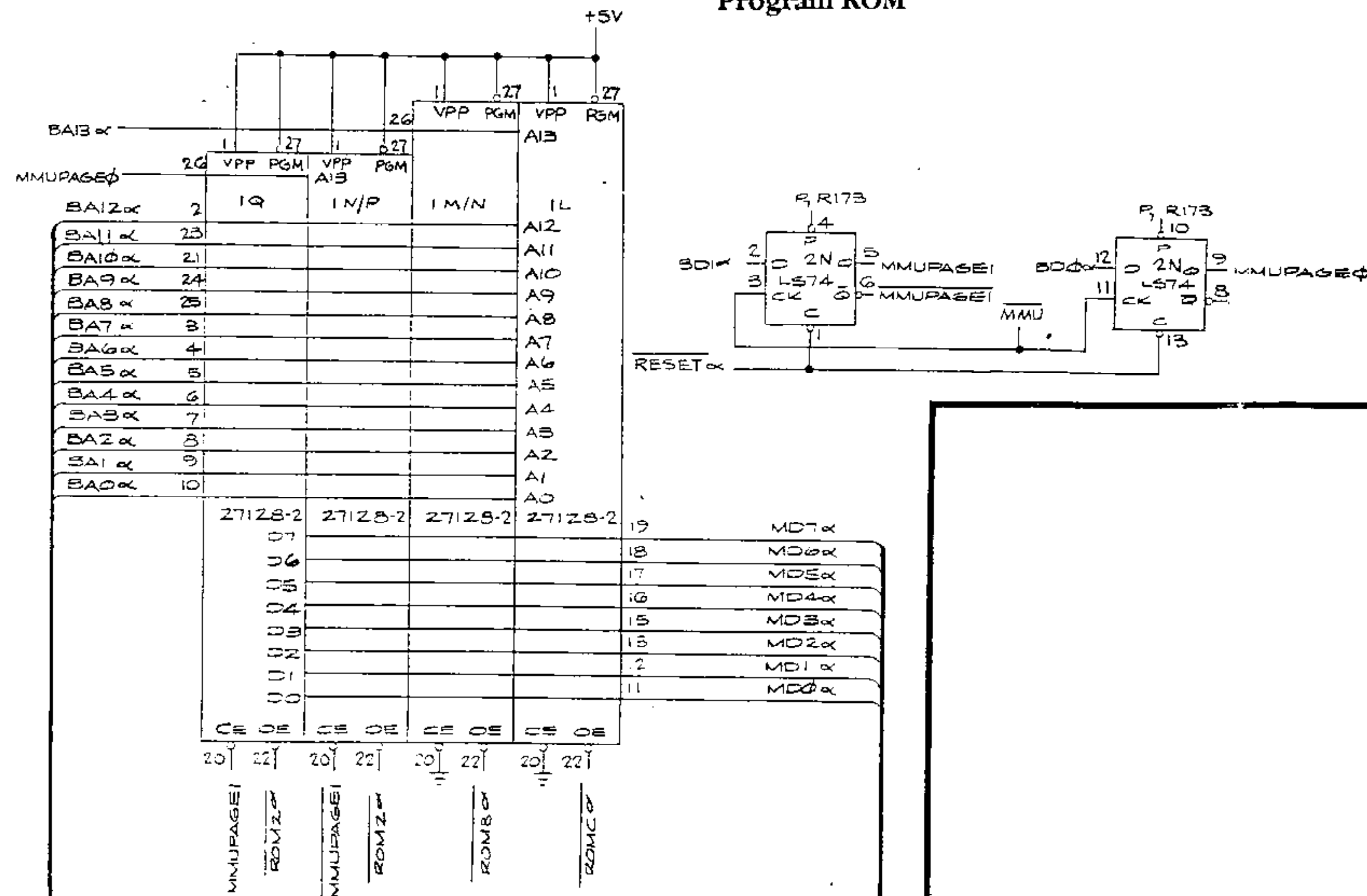
Display Driver: This section uses an LS273 15-line display driver. It has 15 inputs (A, B, C, D, E, F, G, H, I, J, K, L, M, N, O) connected to the 807, 806, 805, 804, 803, 802, 801, 800, 799, 798, 797, 796, 795, 794, and 793 lines of the 15-line display. The LS273's Q output (12) is connected to the 807 line. The LS273's RESET inputs (15, 16) are connected to the 807 and 806 lines. The LS273's A input (11) is connected to the 807 line. The LS273's C input (13) is connected to the 807 line. The LS273's B input (14) is connected to the 807 line. The LS273's D input (17) is connected to the 807 line. The LS273's E input (18) is connected to the 807 line. The LS273's F input (19) is connected to the 807 line. The LS273's G input (2) is connected to the 807 line. The LS273's H input (3) is connected to the 807 line. The LS273's I input (4) is connected to the 807 line. The LS273's J input (5) is connected to the 807 line. The LS273's K input (6) is connected to the 807 line. The LS273's L input (7) is connected to the 807 line. The LS273's M input (8) is connected to the 807 line. The LS273's N input (9) is connected to the 807 line. The LS273's O input (10) is connected to the 807 line.

Power-Up Reset

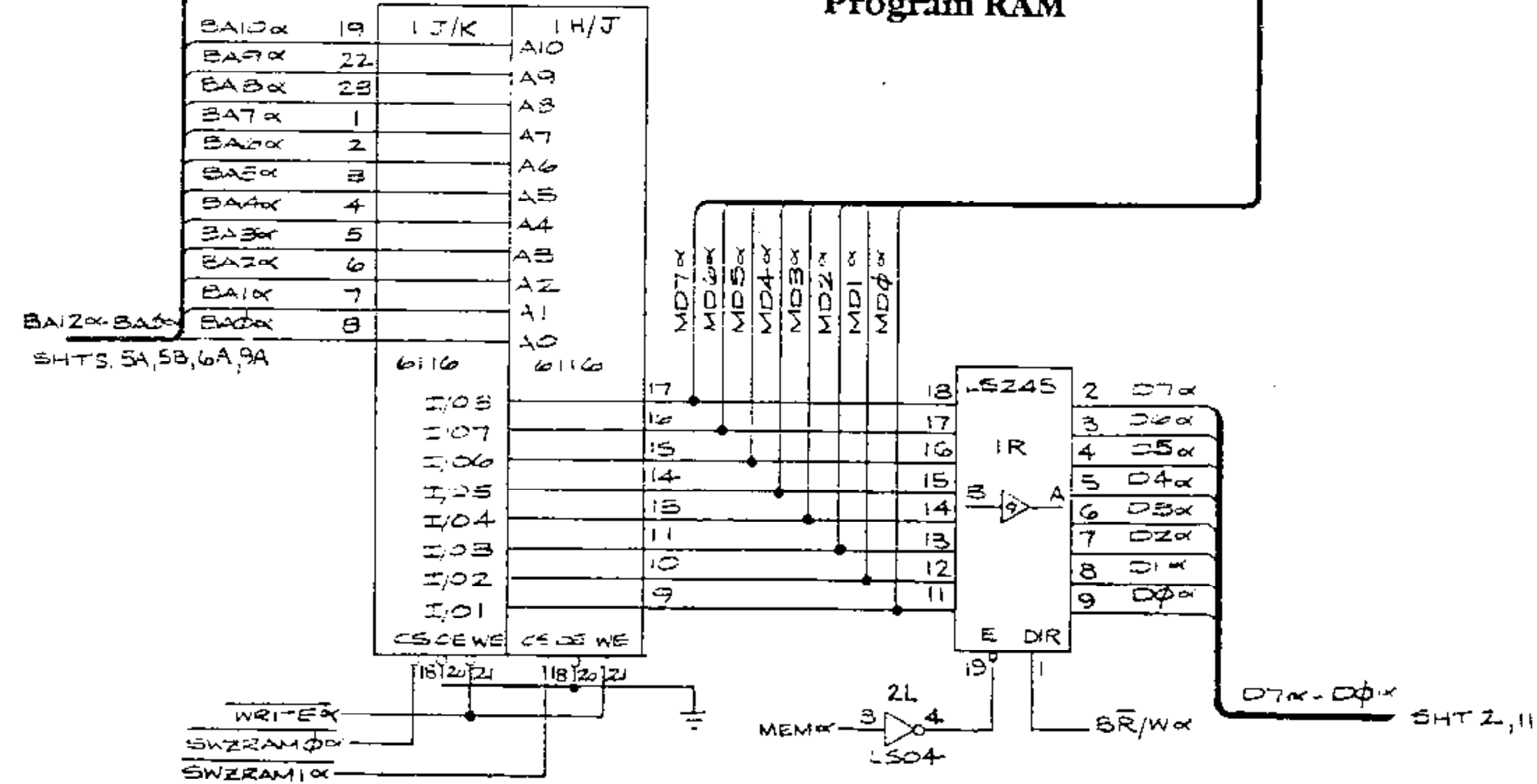
The diagram illustrates a Power-Up Reset circuit. It features a +10.5V supply connected to a 5.6K resistor (R20) and a 10K resistor (R21) to ground. The node between R20 and R21 is connected to pin 3 of an LMS324 op-amp. Pin 2 is connected to a +5V supply. Pin 4 is connected to a +10.5V supply. Pin 1 is connected to a 1K resistor (R22) and the non-inverting input of a 4P L504 comparator. The other end of R22 is connected to a +5V supply through a CR5 1N100 diode. The inverting input of the comparator is connected to a RESET signal. The output of the comparator (pin 4) is connected to a PDR signal through a 4P L504 comparator. The output of this second comparator is connected to a PDR signal through a 4P L504 comparator. The output of the final comparator is connected to a PDR signal through a 4P L504 comparator.

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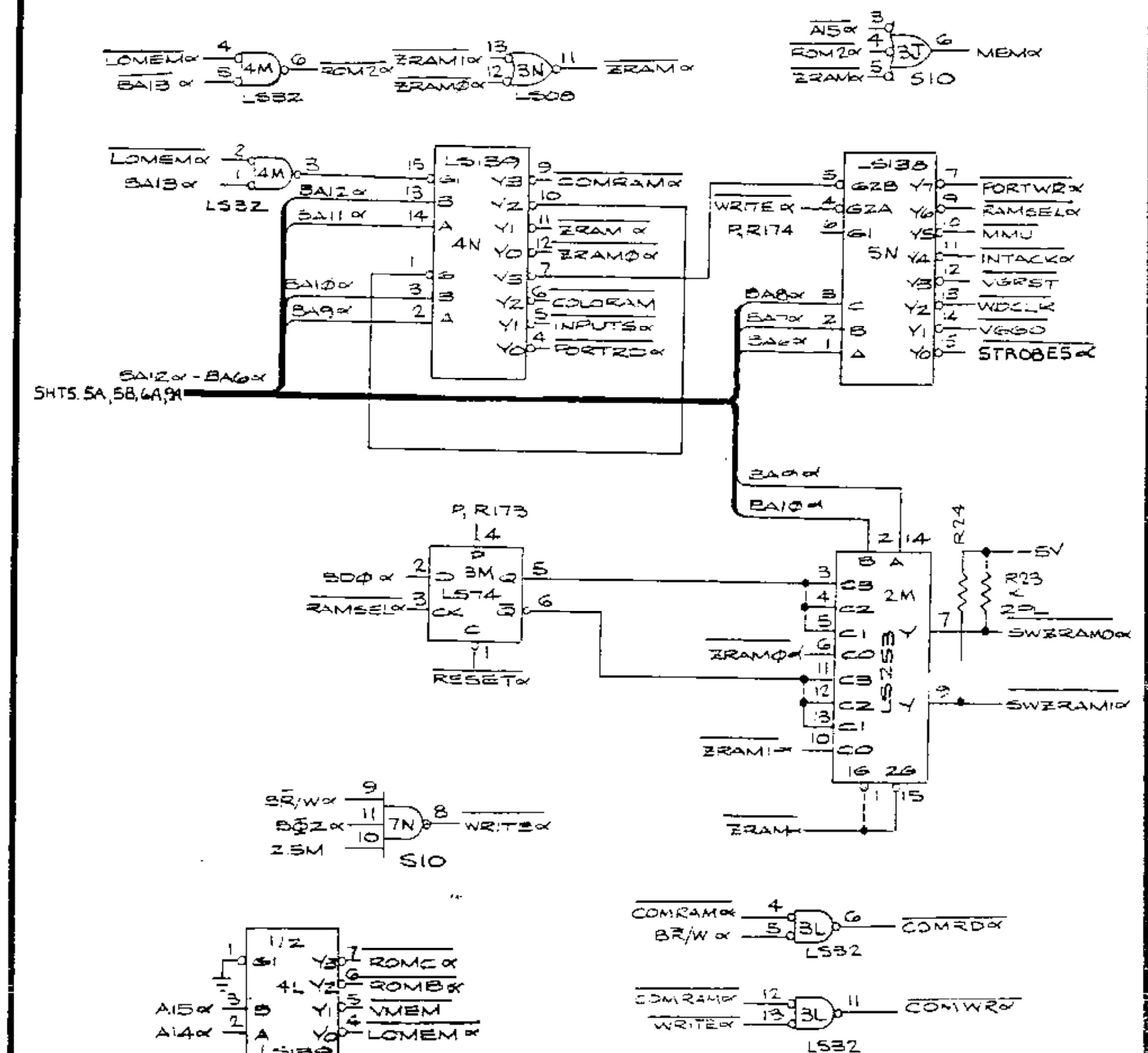
Program ROM



Program RAM



Decoder



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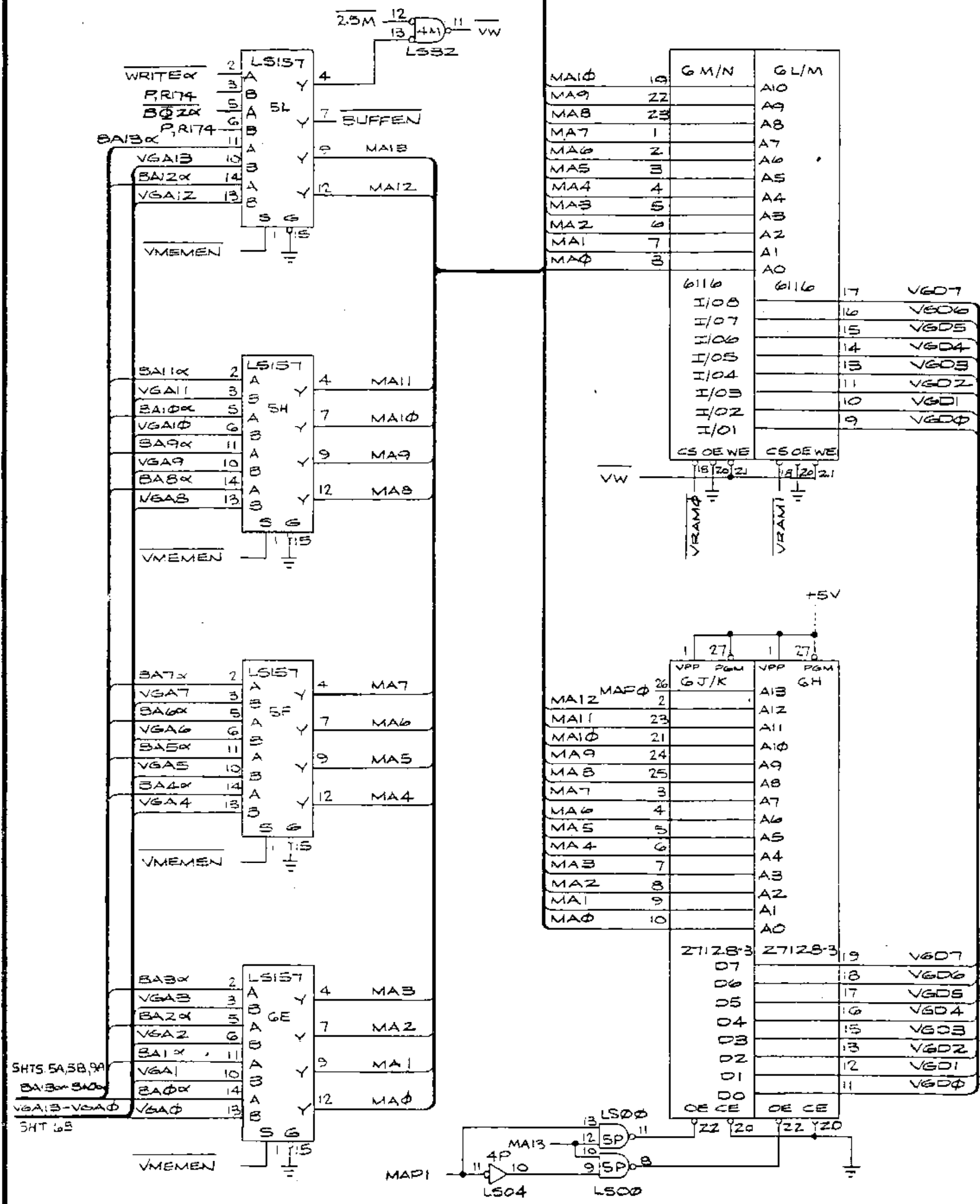
MAJOR HAVOC Main PCB Schematic Diagram



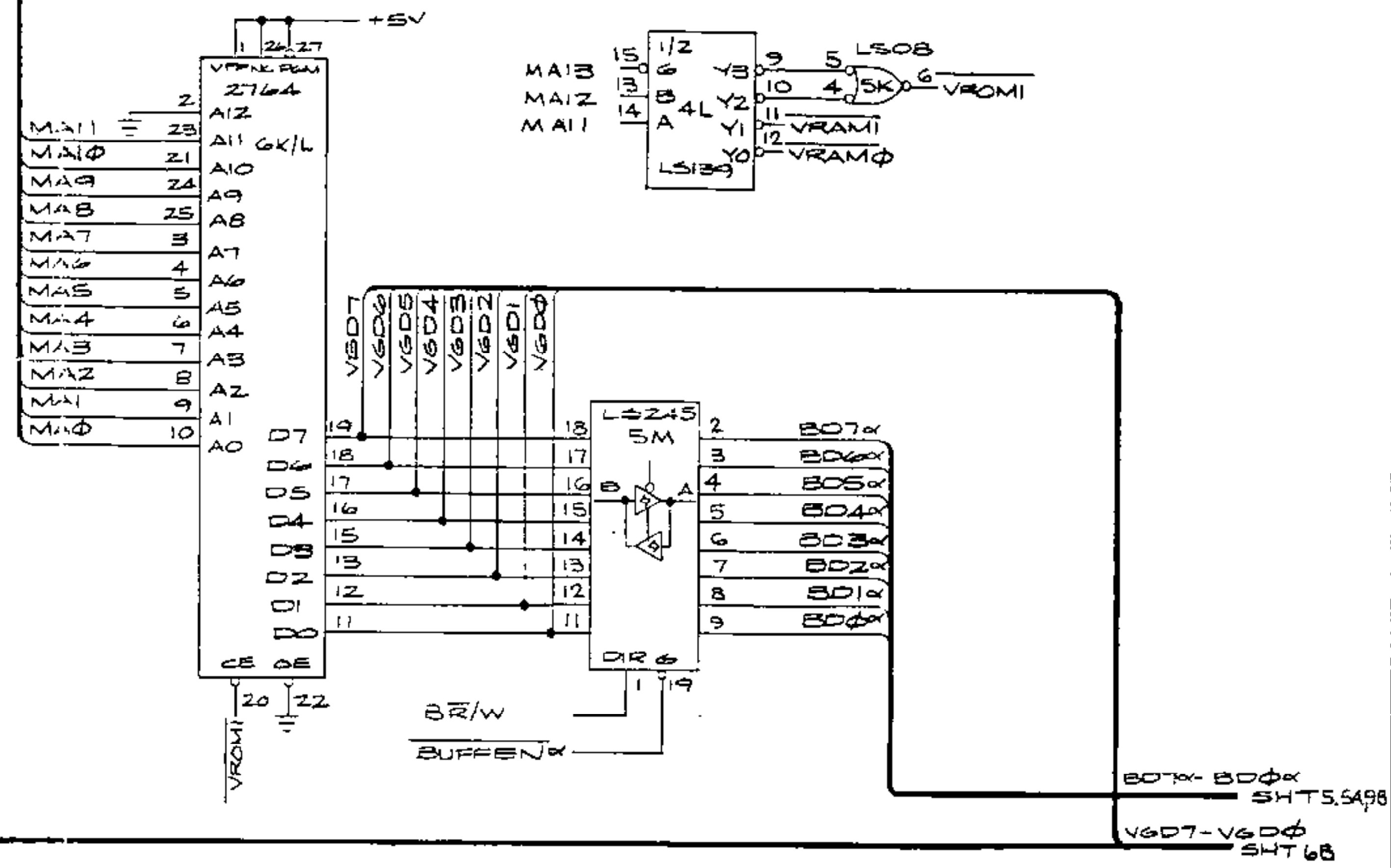
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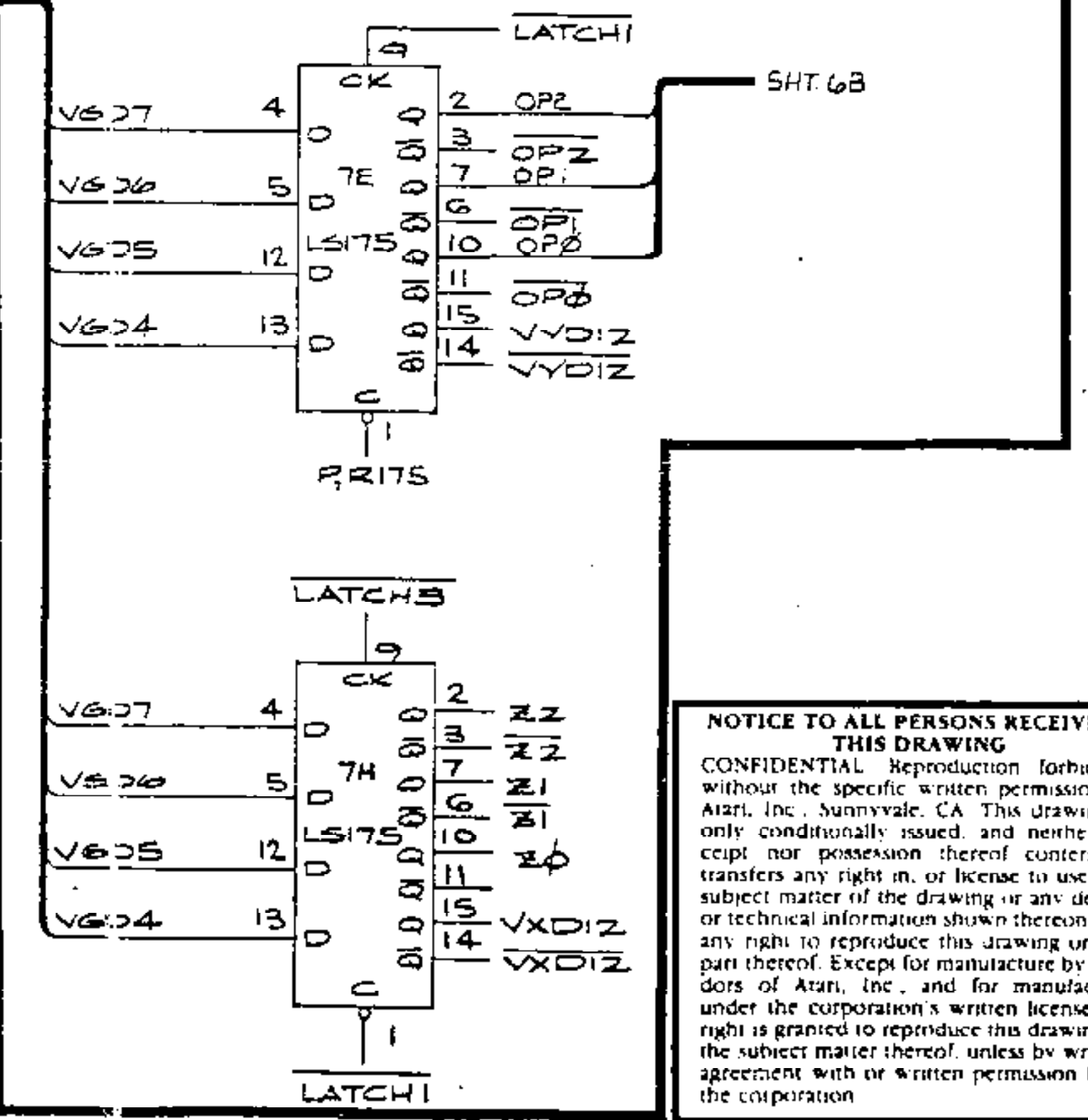
Vector Generator Memory



MA13-MA0 SHT 6B



OP Code and Intensity Latches



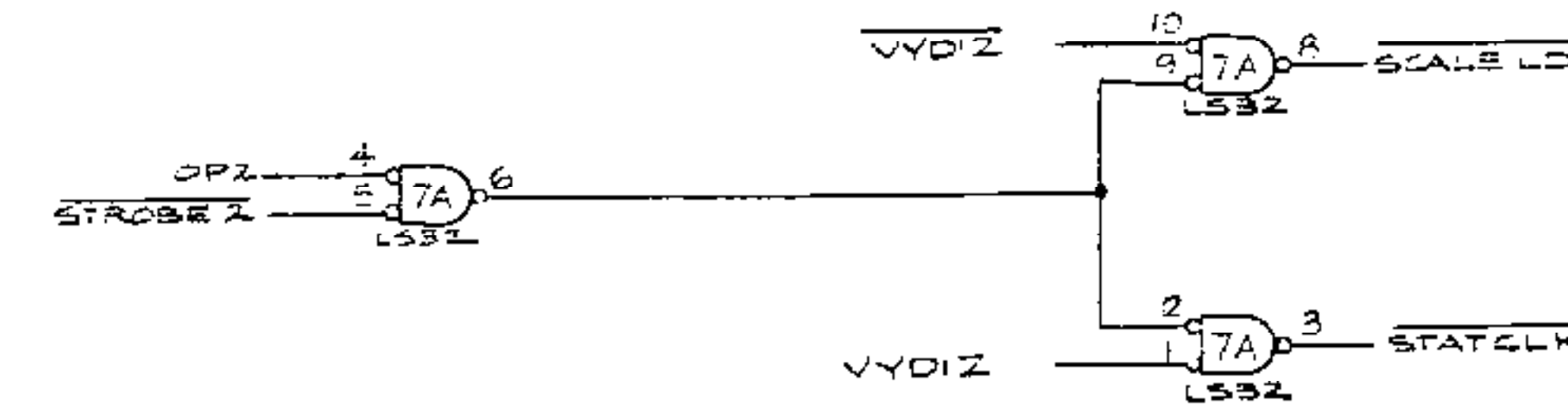
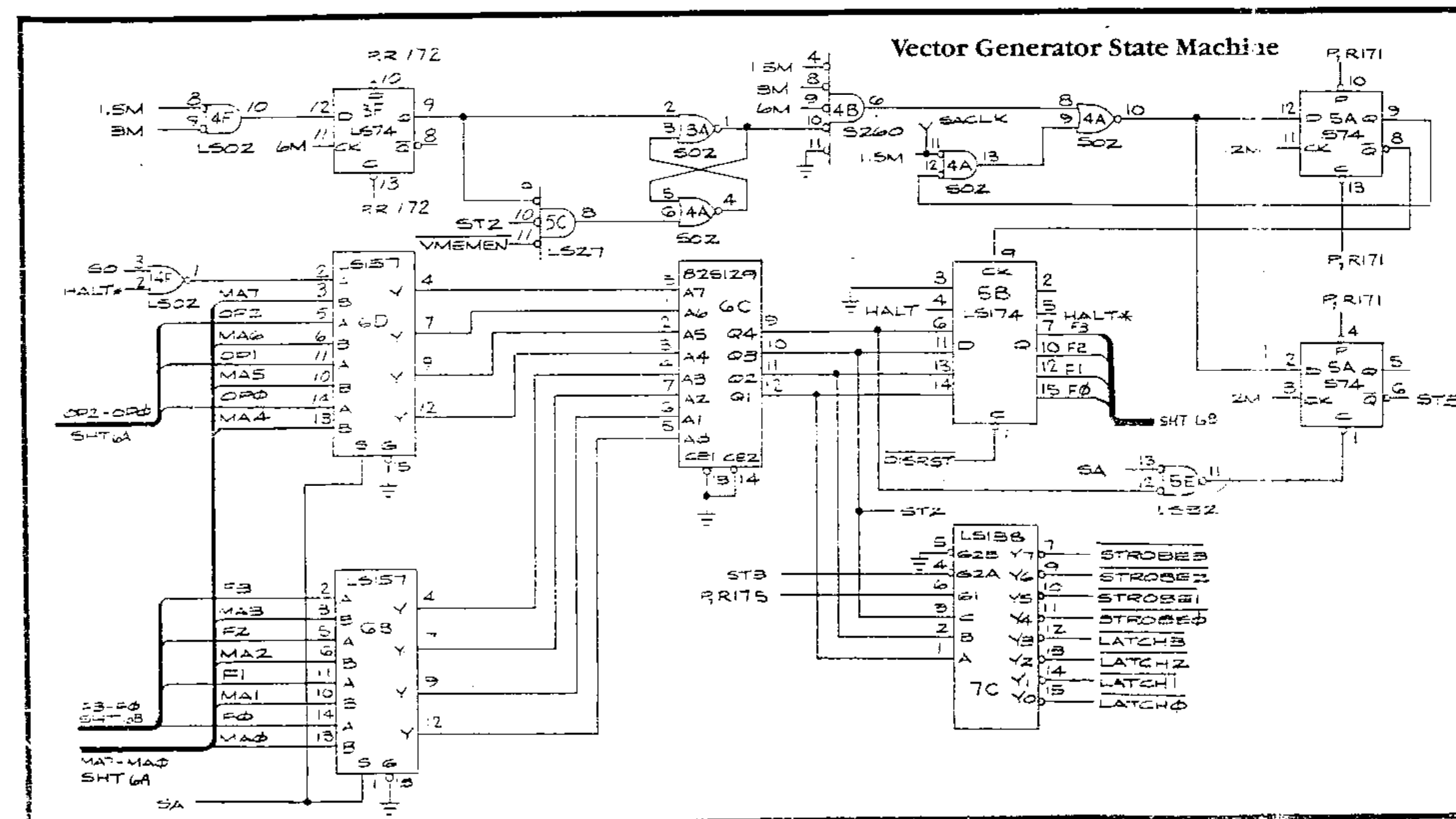
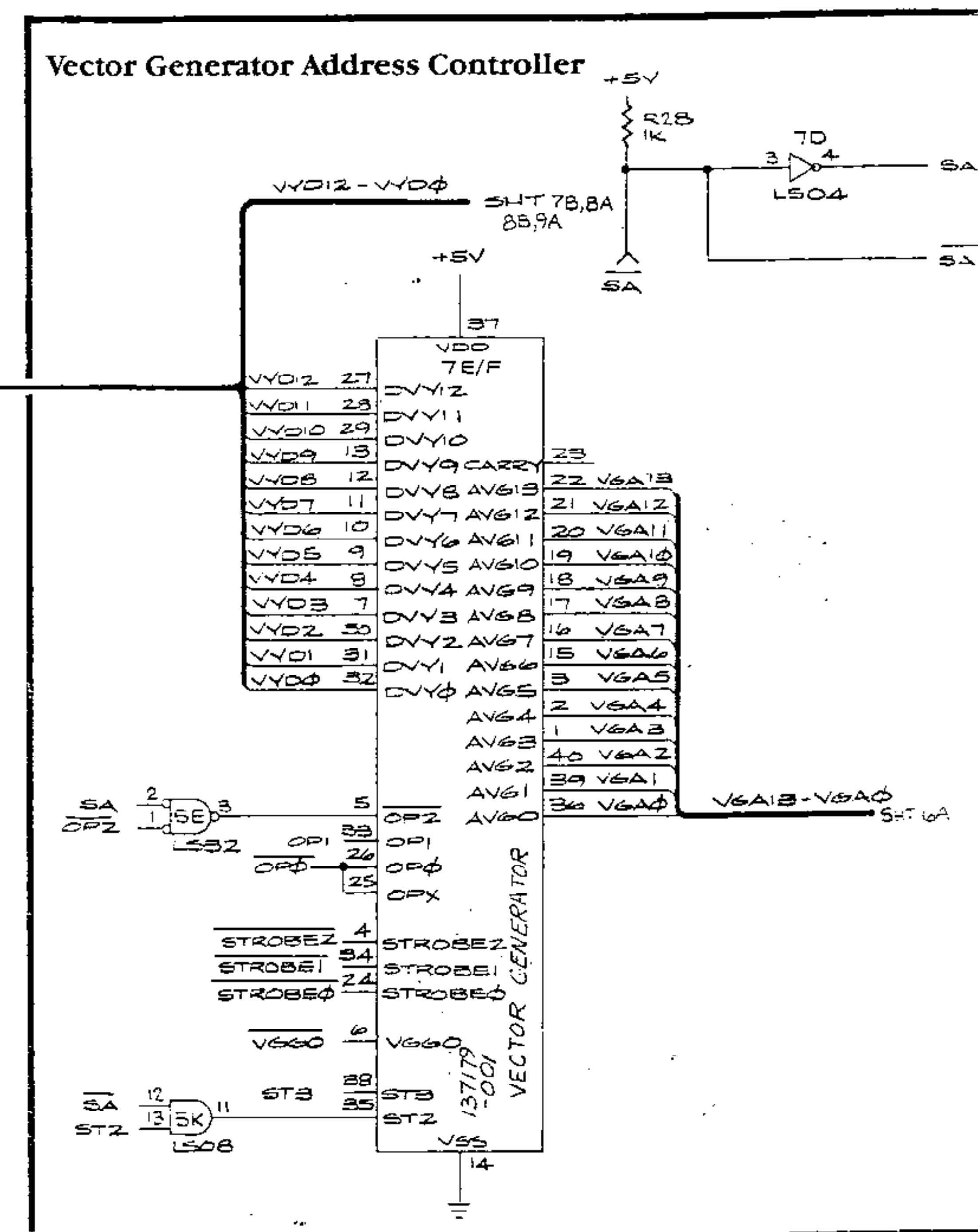
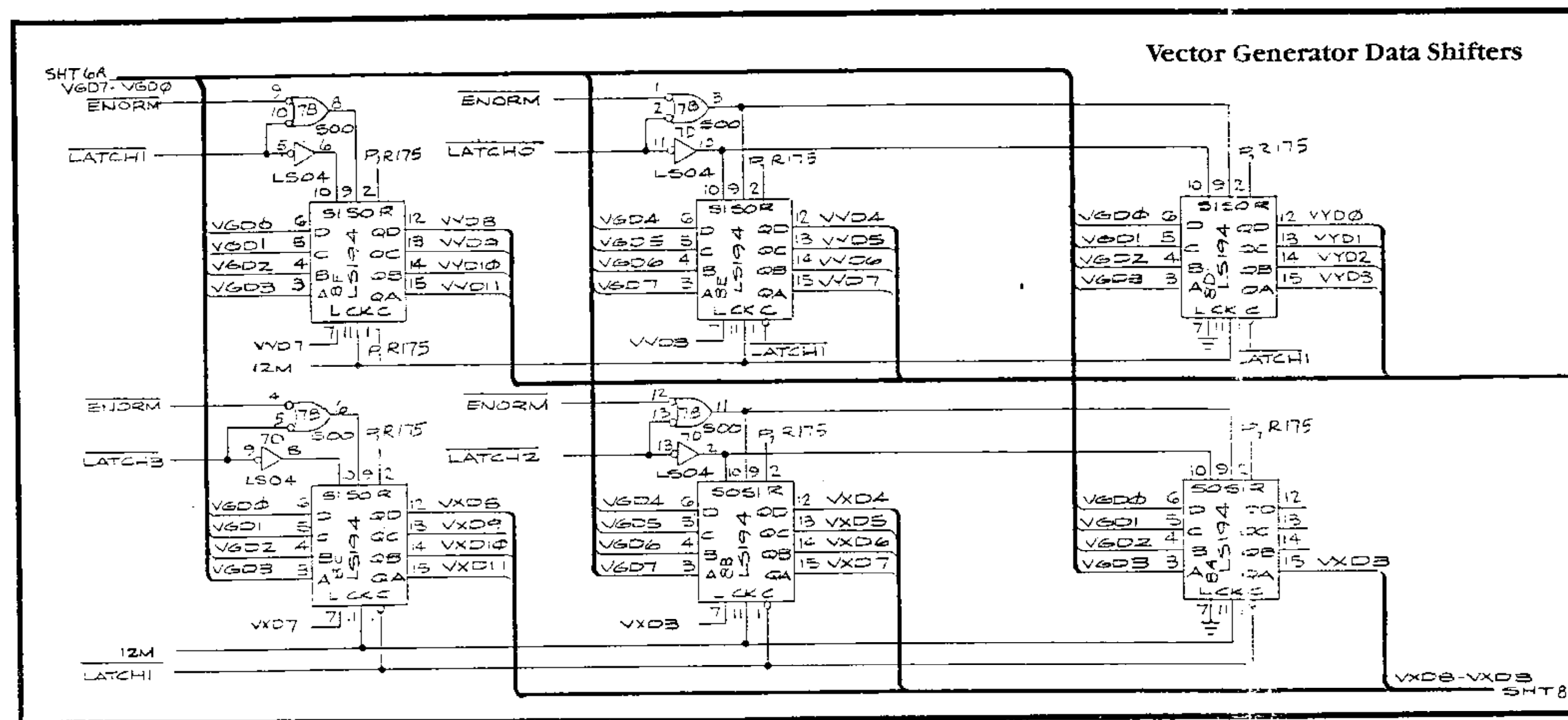
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MAJOR HAVOC Main PCB Schematic Diagram



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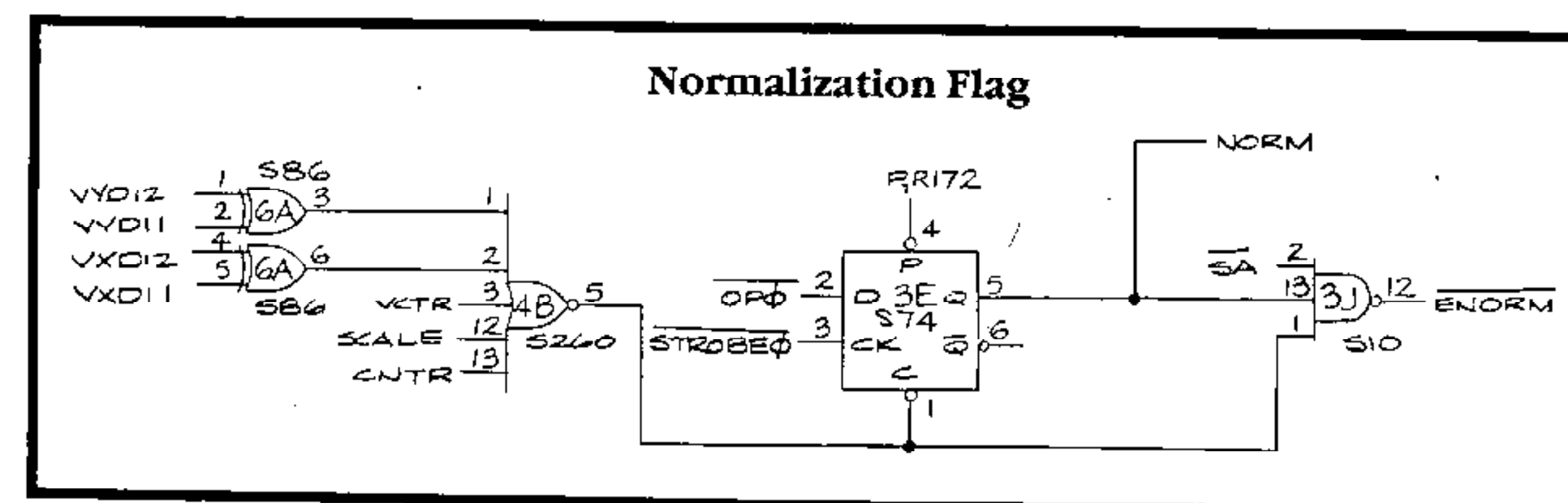
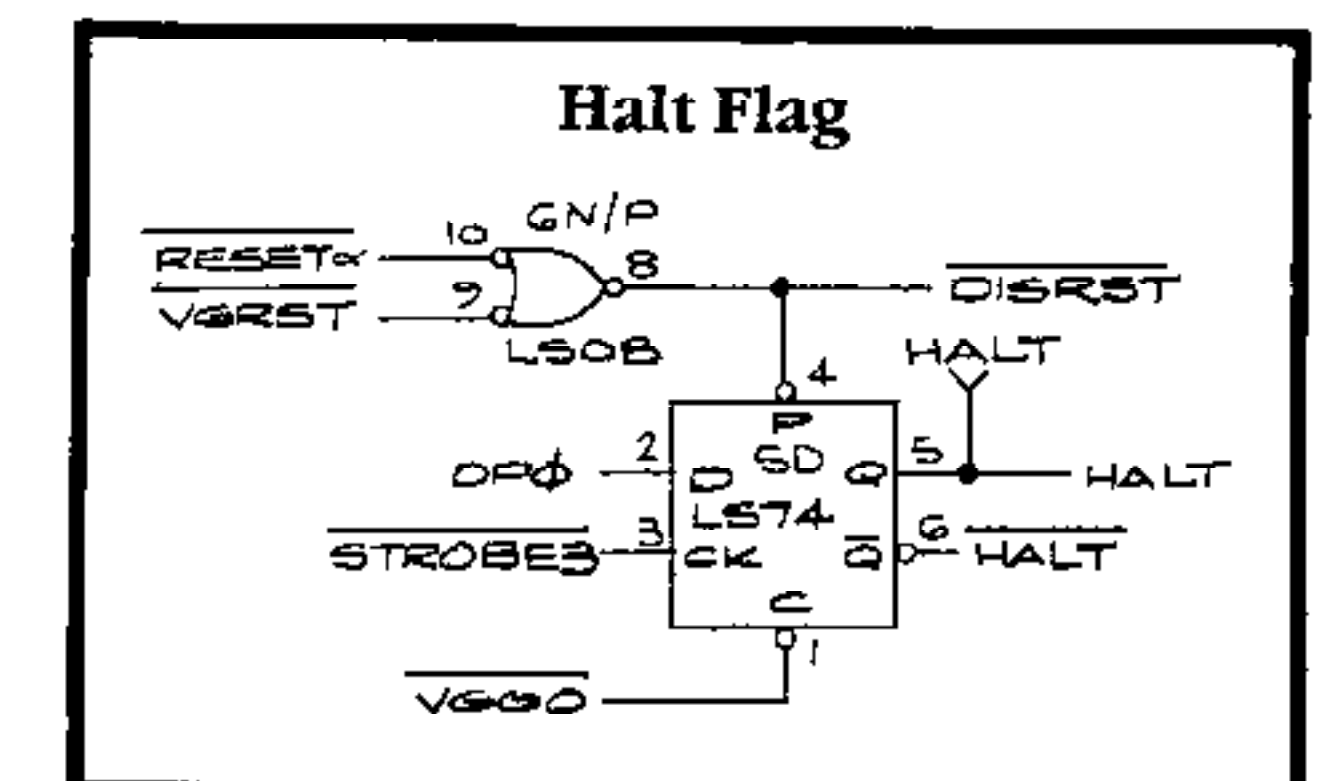
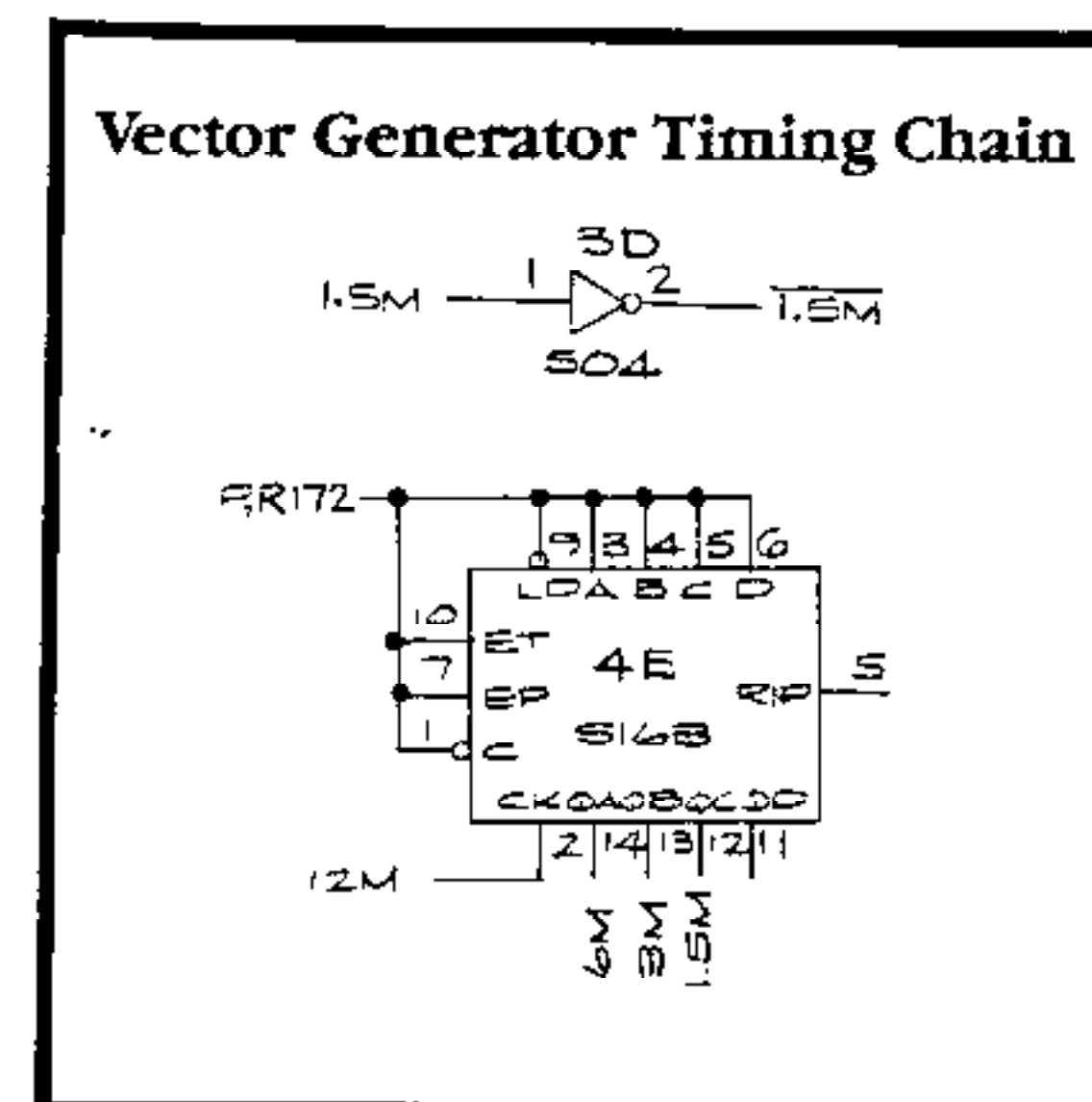
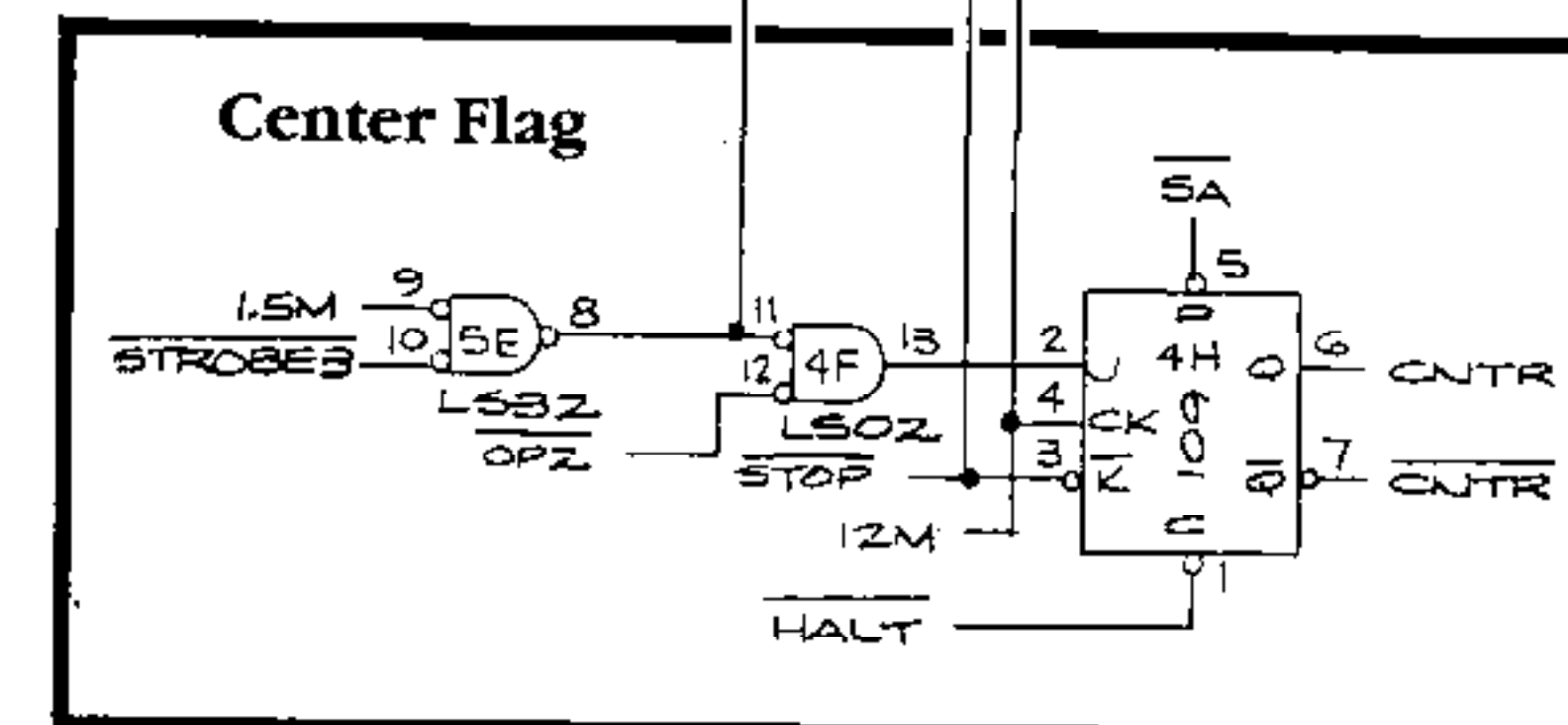
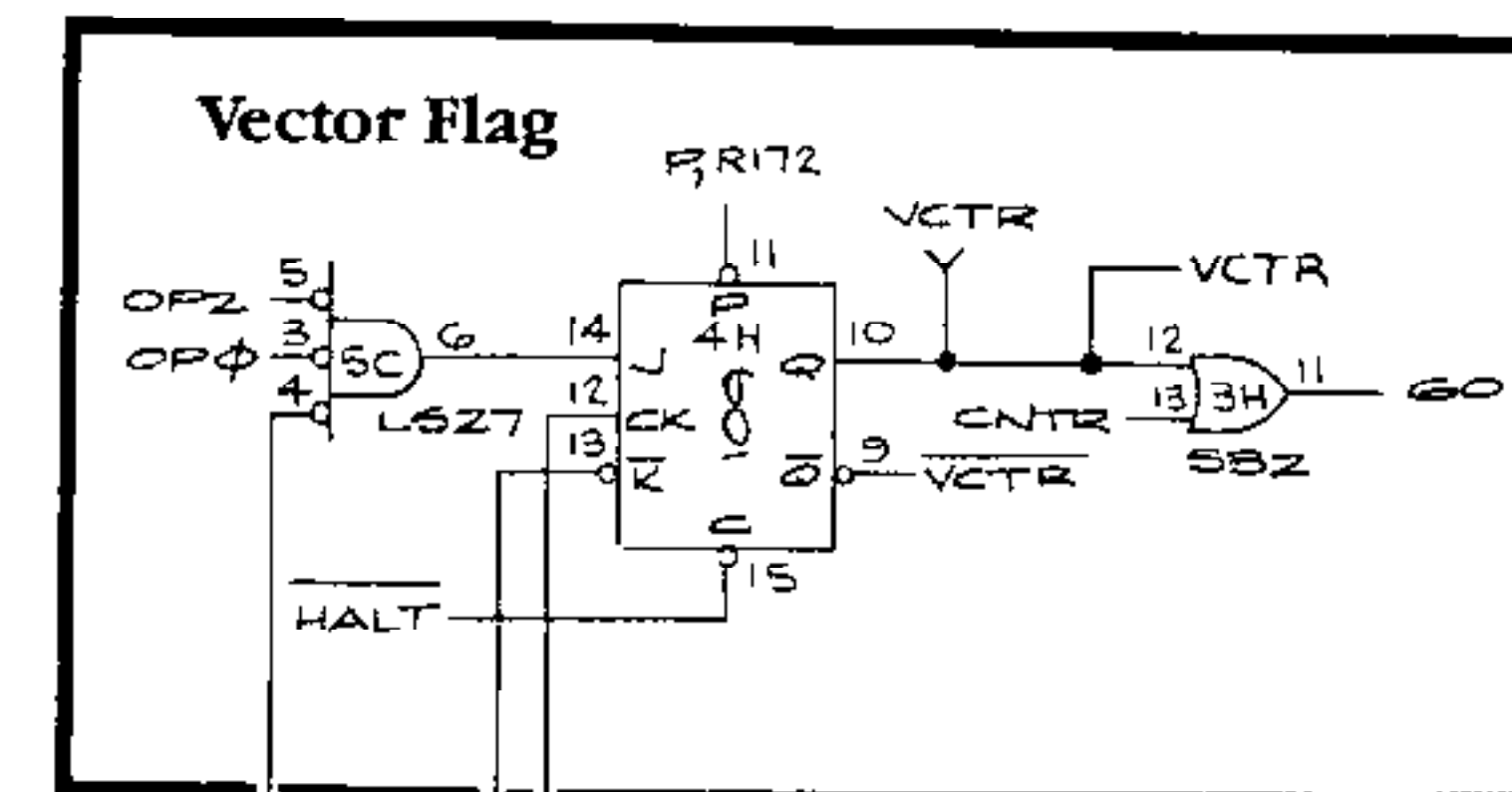
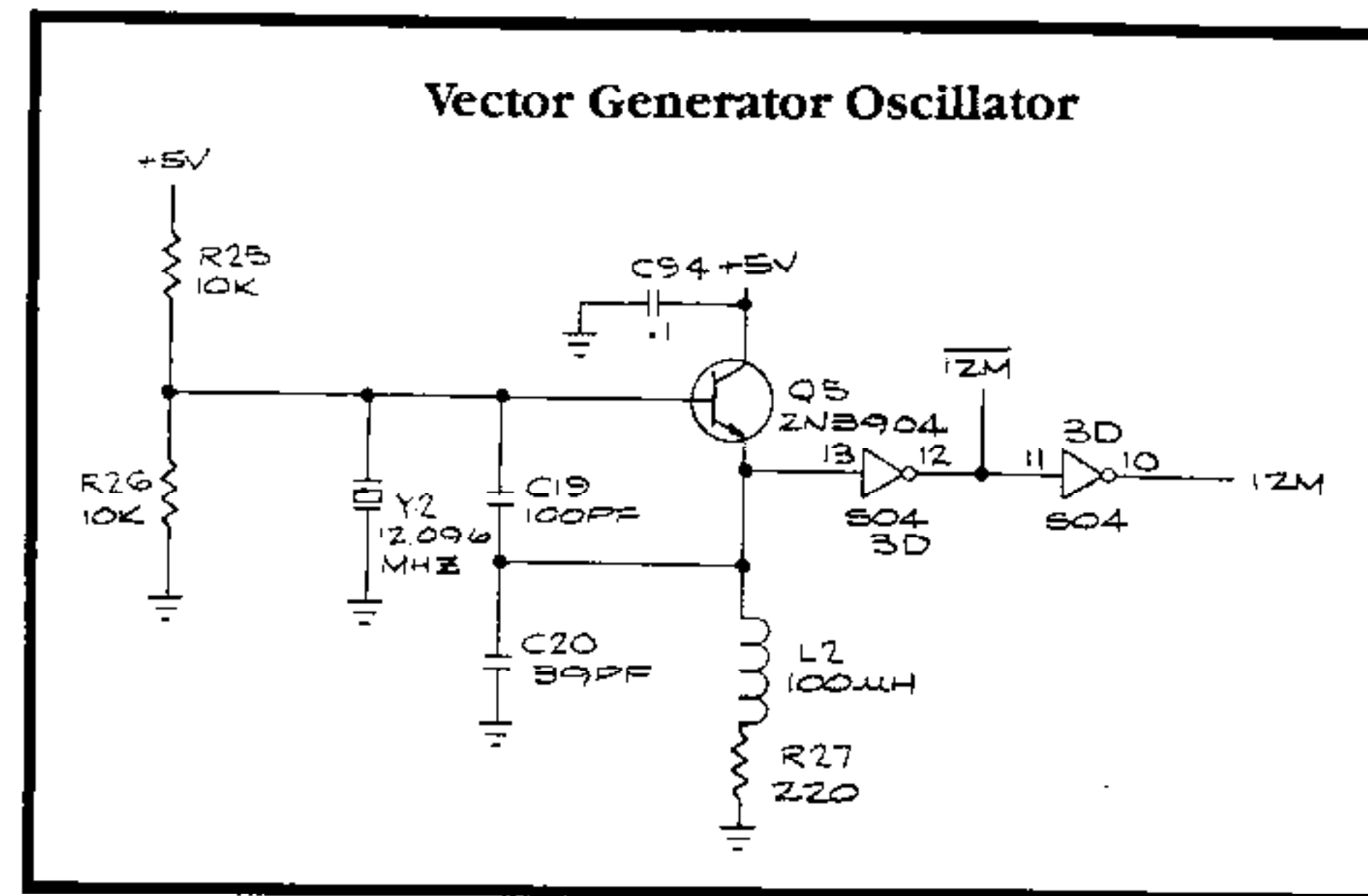
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MAJOR HAVOC Main PCB Schematic Diagram



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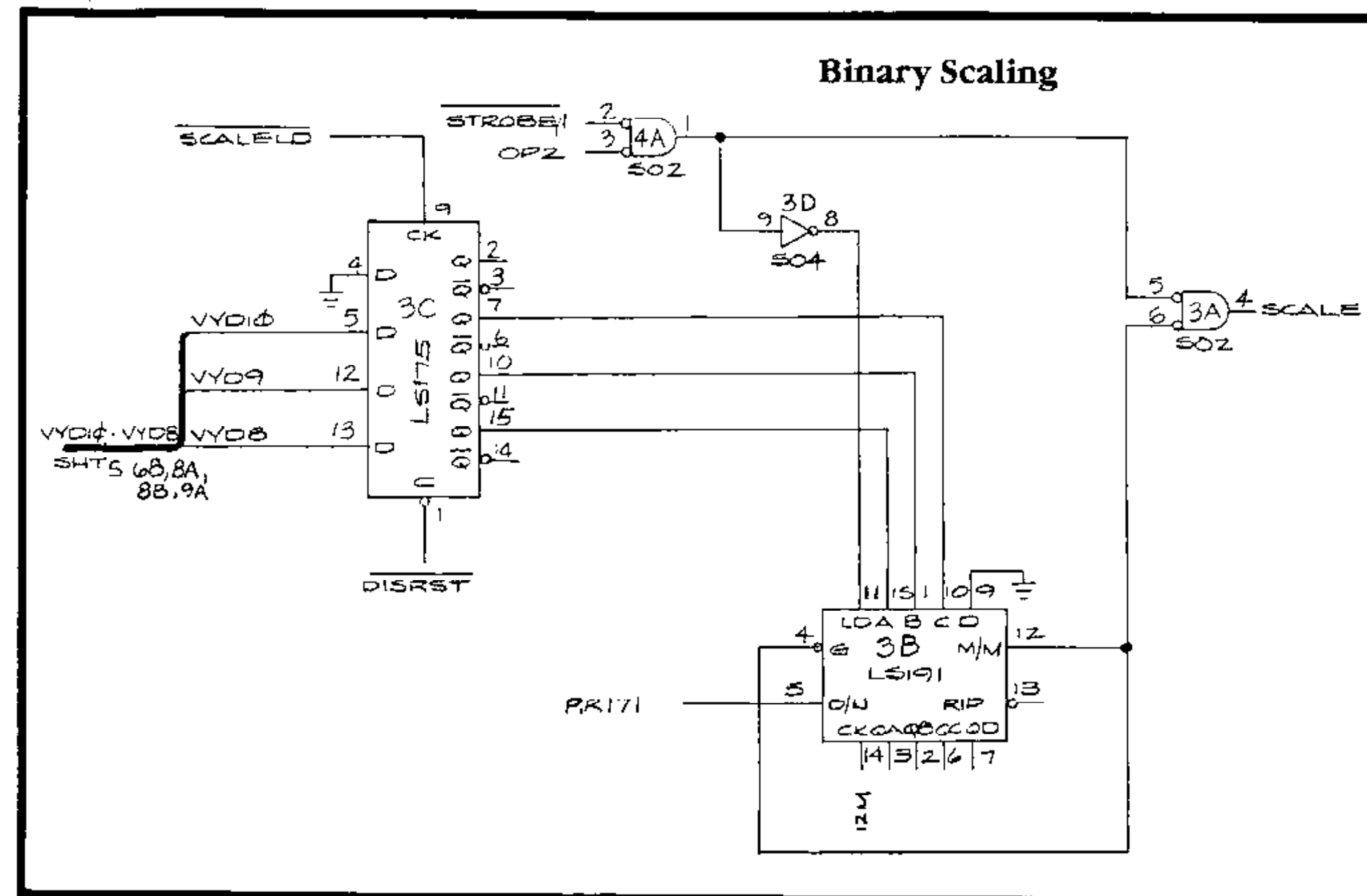
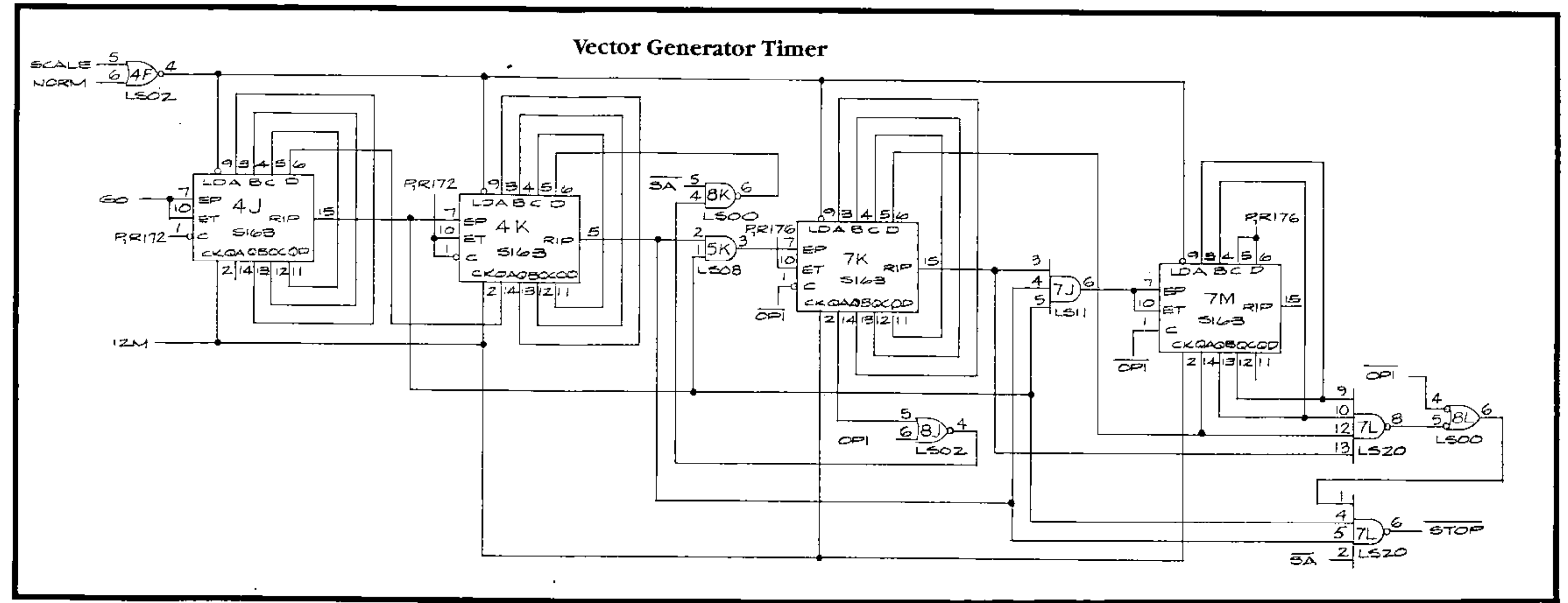
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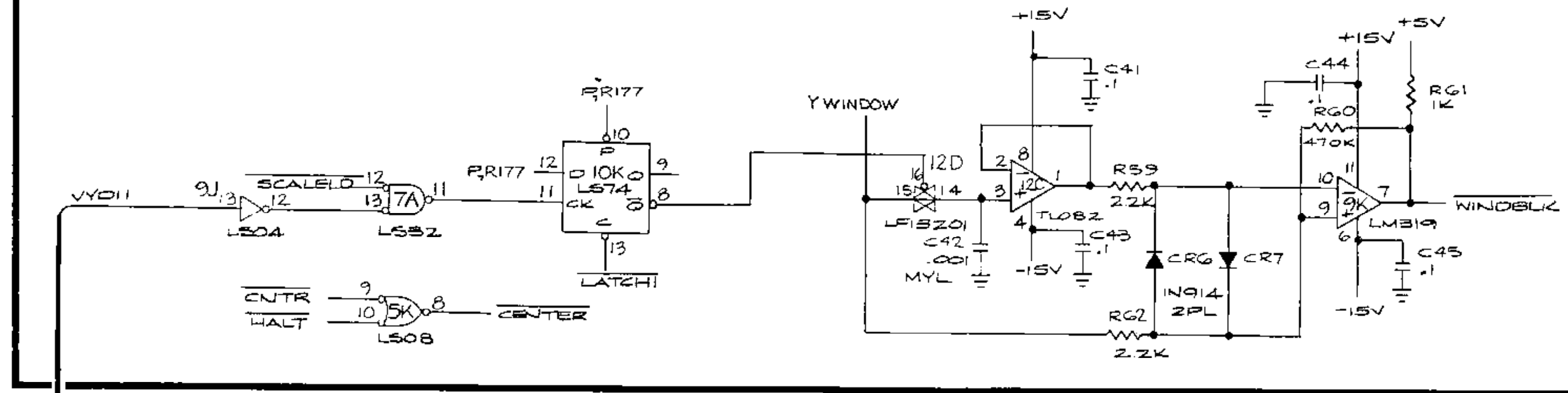
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Window

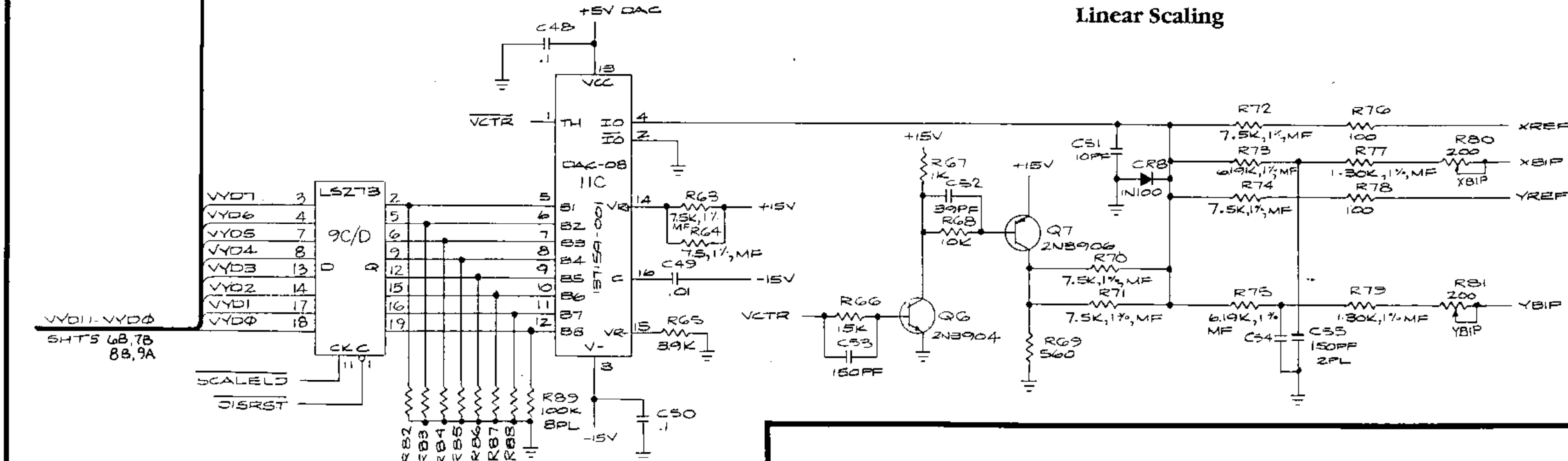


Bipolar Offset Adjustments

Perform the following procedure to adjust the bipolar offset current:

1. Set the game to the SelfTest Mode and select the Bipolar Offset Test Display as described in Chapter 2 of the game manual.
2. Adjust XBIP (R80) and YBIP (R81) so that the lines in the center of the screen cleanly overlap to form a single orange square. The upper right-hand corner of the orange square is the critical adjustment point.

Linear Scaling



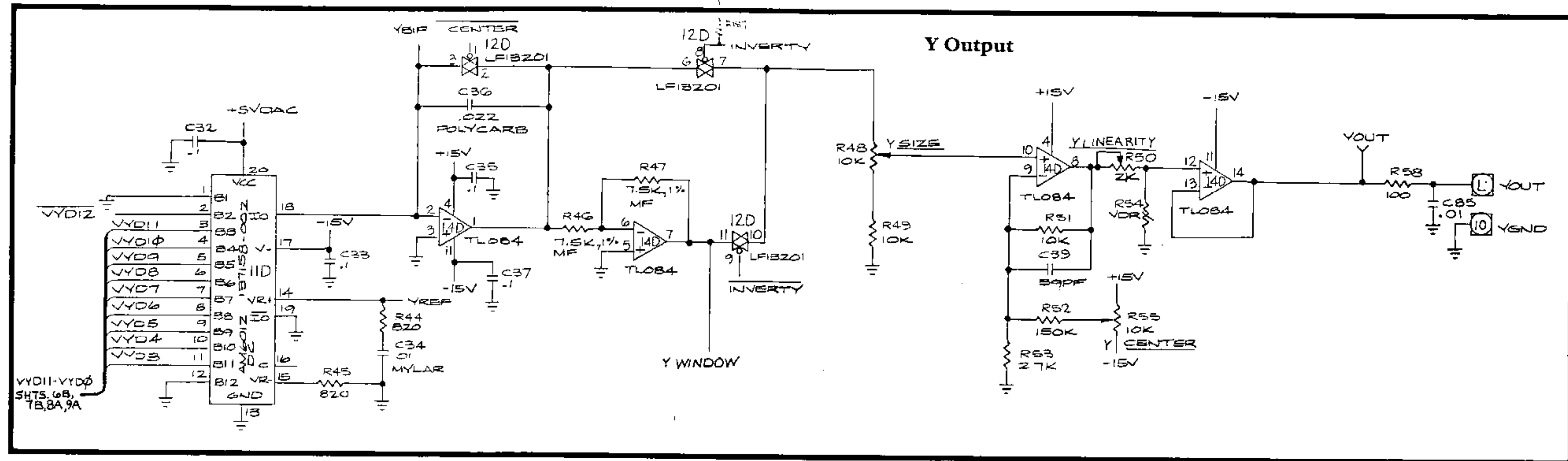
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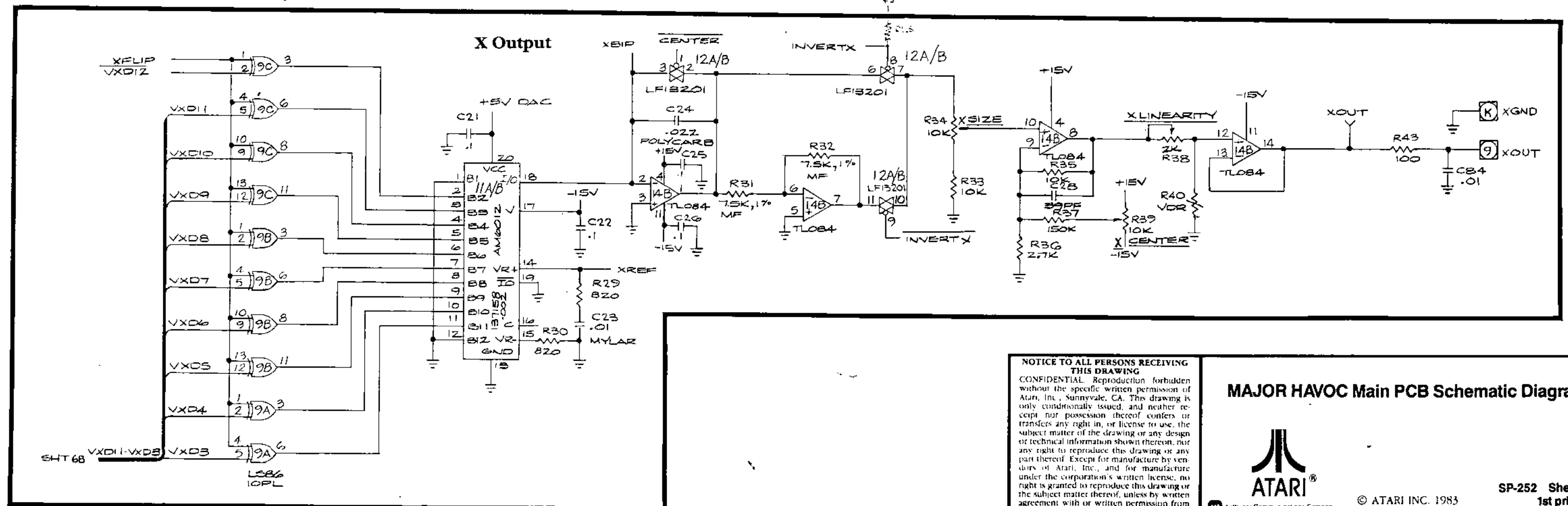
X and Y Video Adjustments

Perform the following procedure to adjust the display size, centering, and linearity:

1. Set the game to the Self-Test Mode and select the Crosshatch Pattern Display as described in Chapter 2 of the game manual.

2. Adjust XCENTER (R39) and YCENTER (R55) so that the crosshatch pattern is centered on the screen.
3. Adjust XSIZE (R34) and YSIZE (R48) so that all four corners of the red outline are off the screen and all four corners of the white outline are completely visible.

4. Adjust XLINEARITY (R38) and YLINEARITY (R50) so that the diagonal lines are straight and the diamond-shaped squares are symmetrical. Since the linearity potentiometers change the size of the display, it may be necessary to repeat step 3 to obtain the correct display.



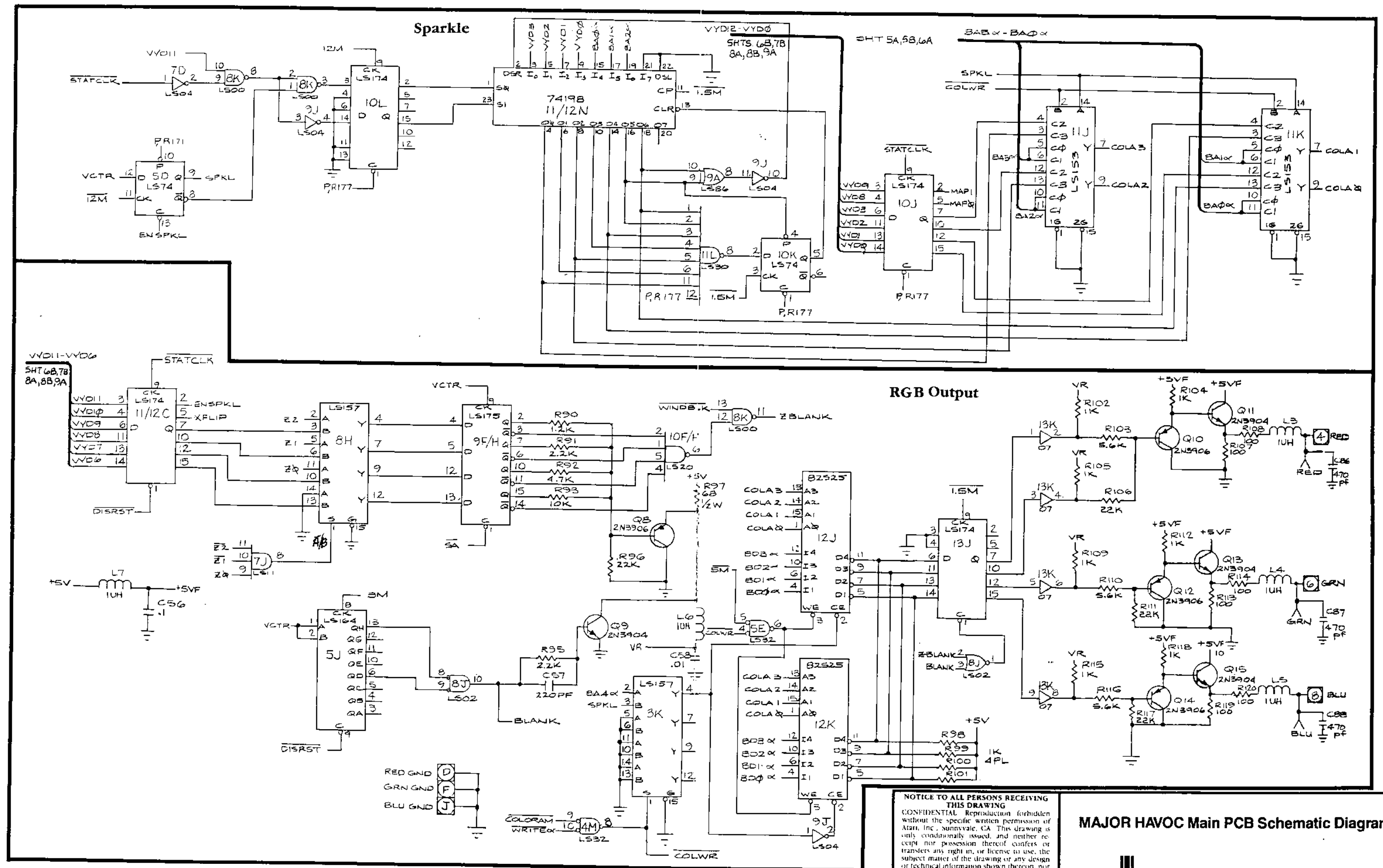
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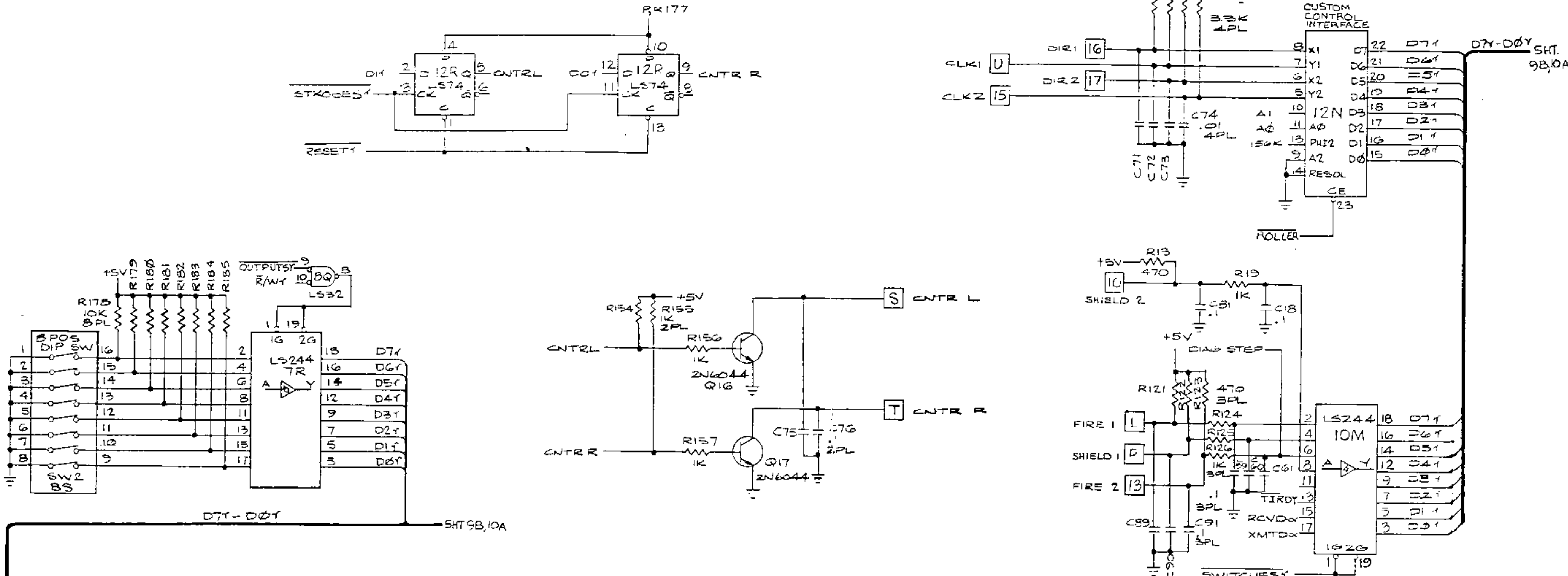
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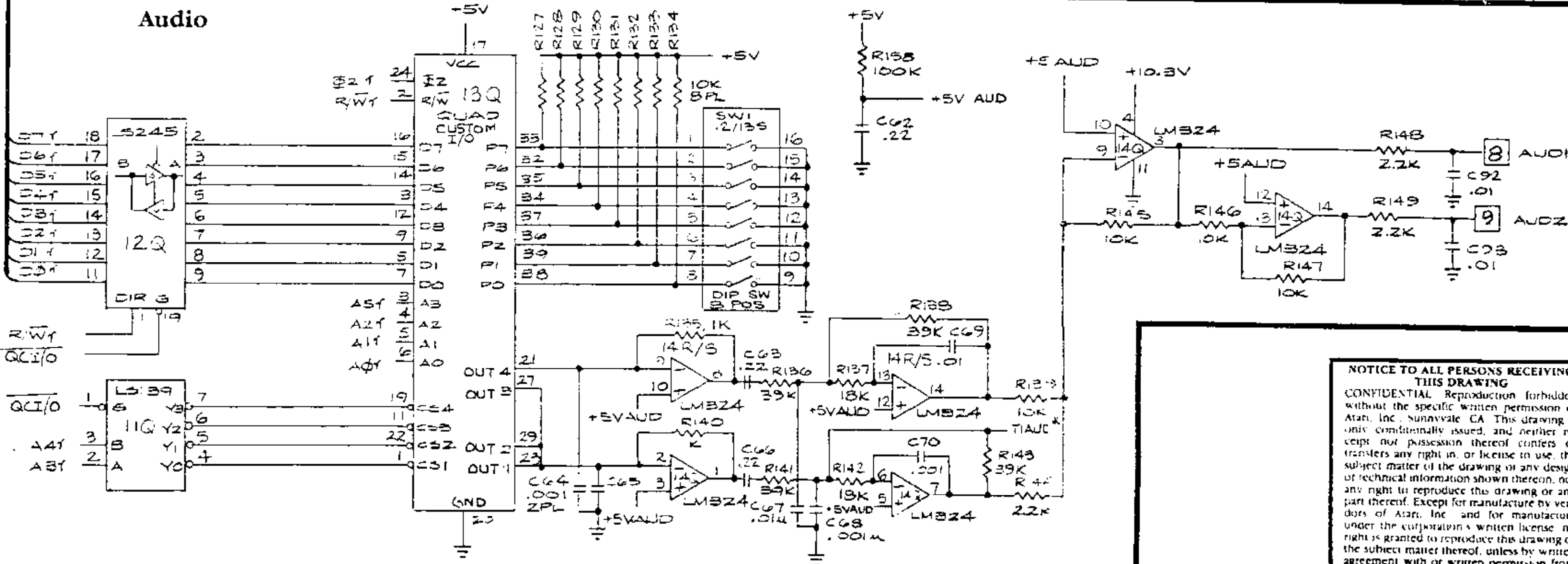
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Gamma (γ) Input/Output



Audio



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