

NOTES:

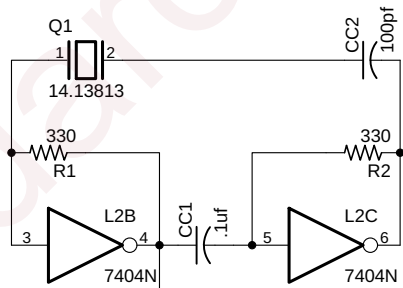
Designed by Alexander K. Haley, KINCAID ARCADE

Diodes are represented with a "DD"

Capacitors are represented with a "CC"

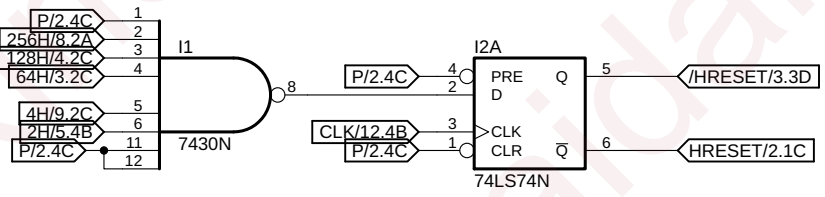
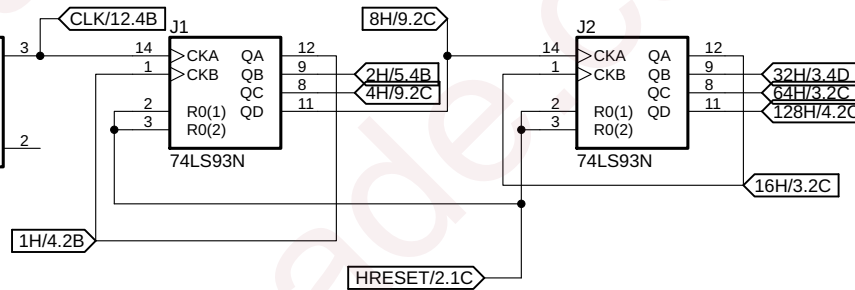
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Updates have been made to fix small mistakes I have made in the notes in the schematic.



Clock Circuit

Horizontal Sync Generator



At first glance, these may look messy like RAMTEK schematics, but these signal names actually have meanings, and they are to make it easier to split up into multiple sheets.

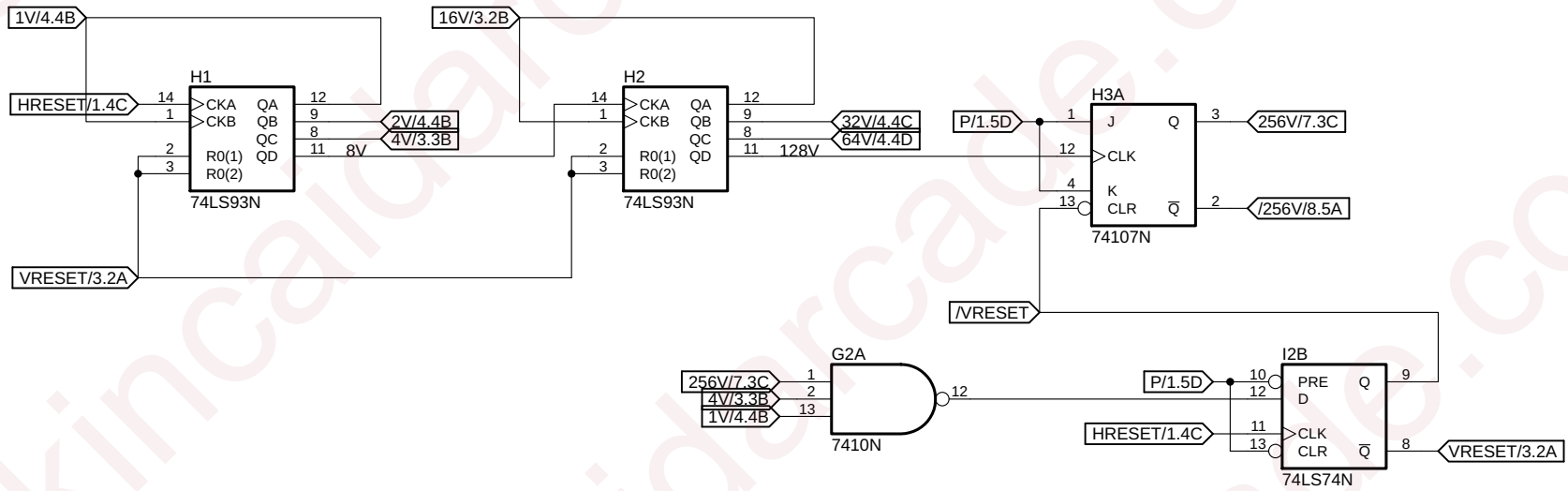
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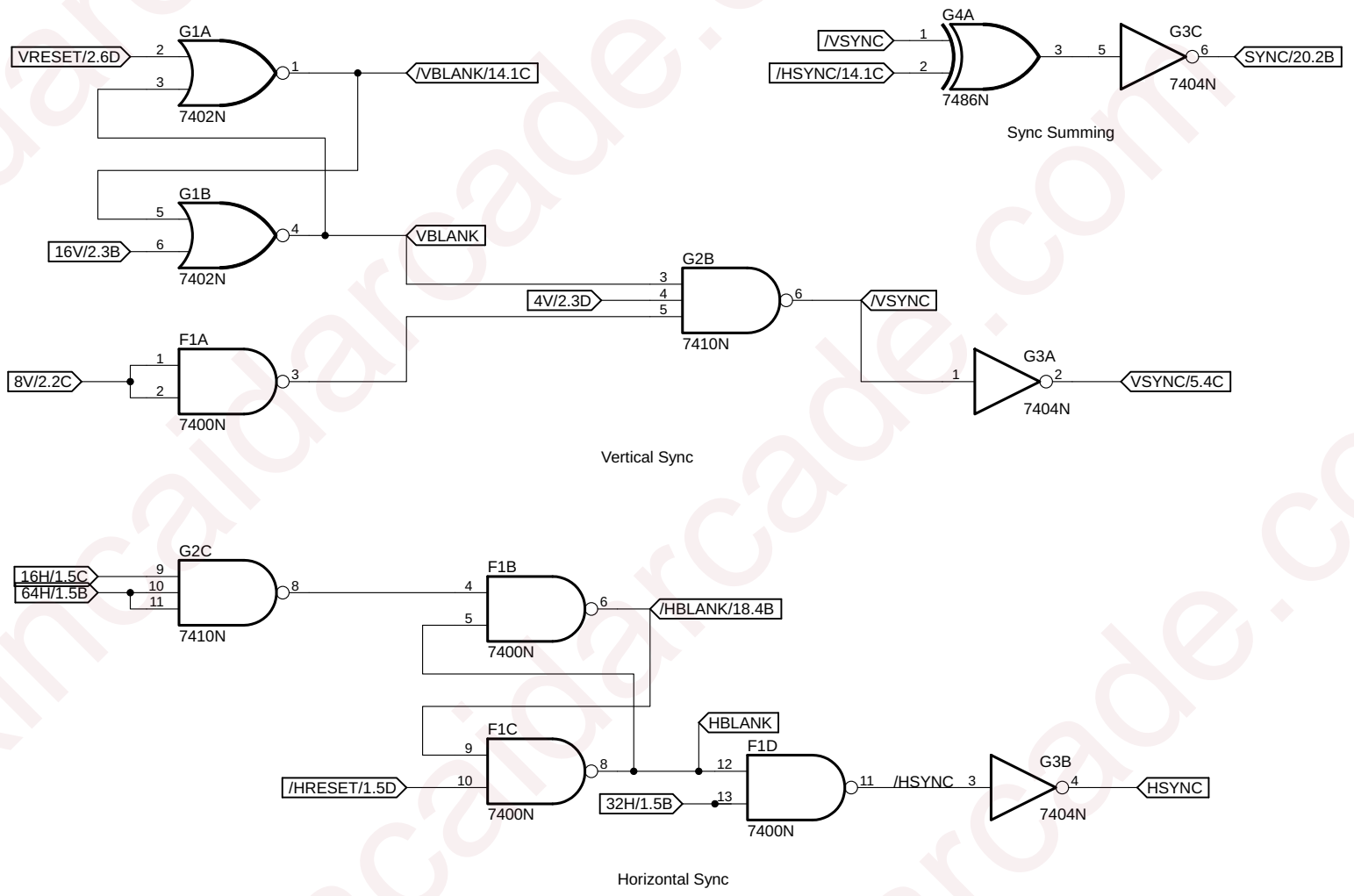
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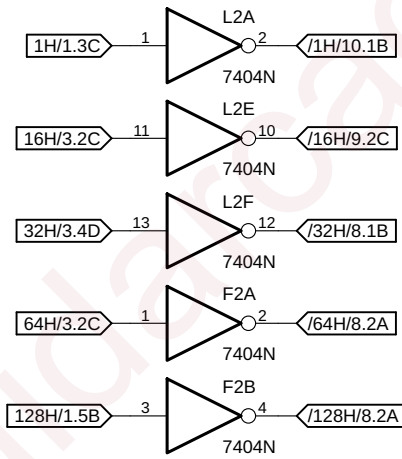


Vertical Sync Generator

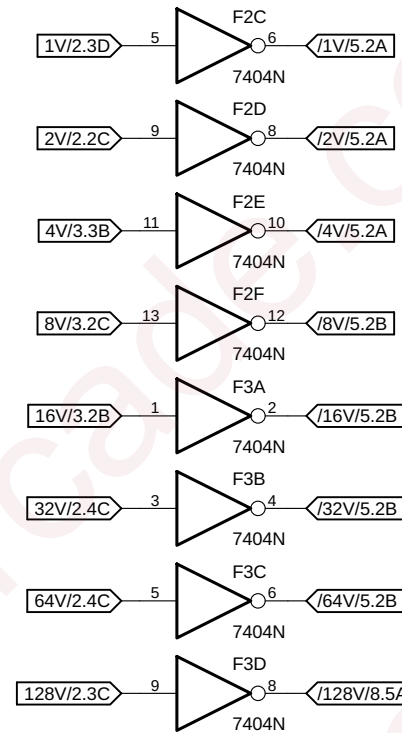
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HORIZONTAL Sync Signal Inversion...



Vertical Sync Inversion

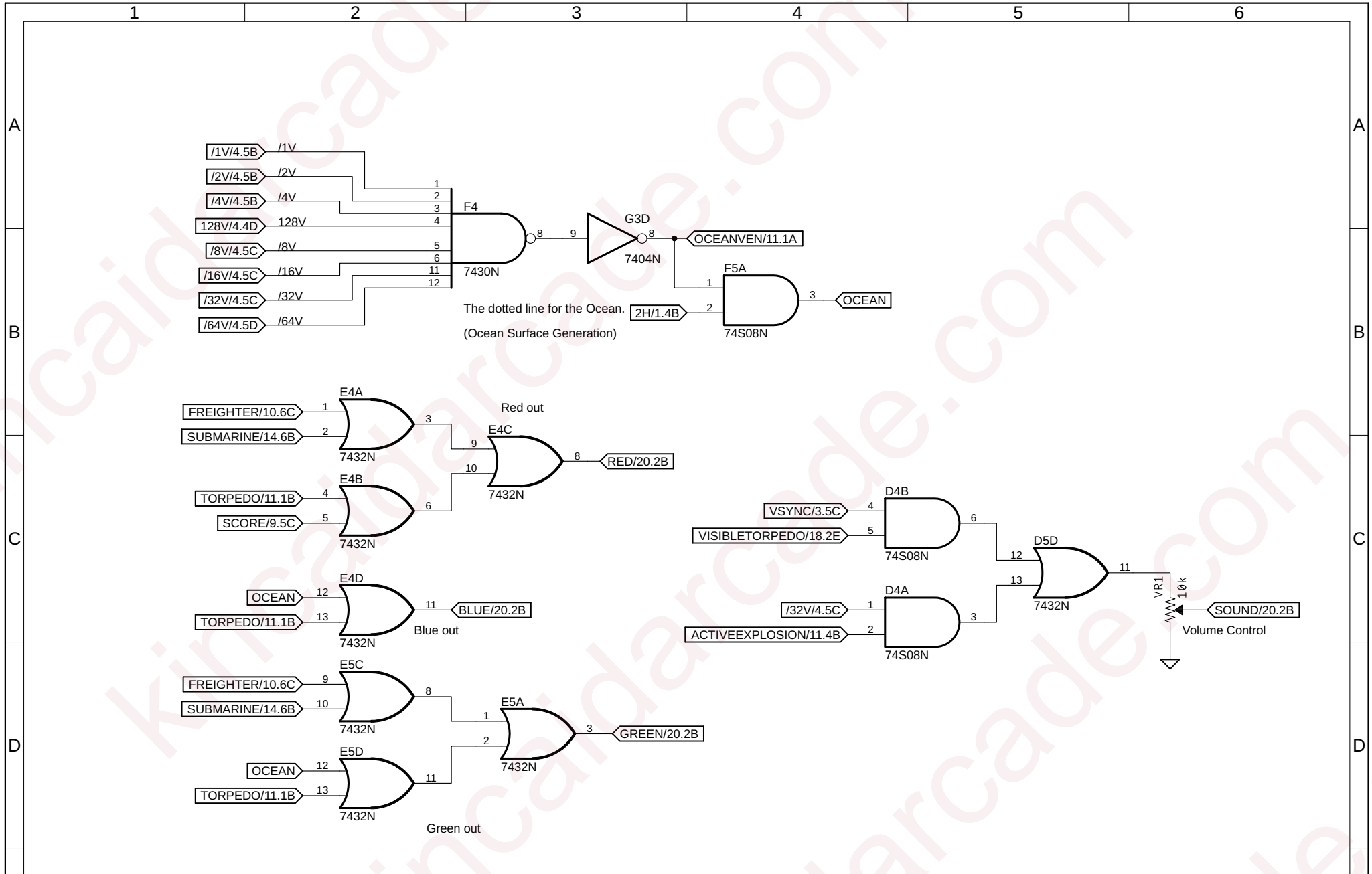
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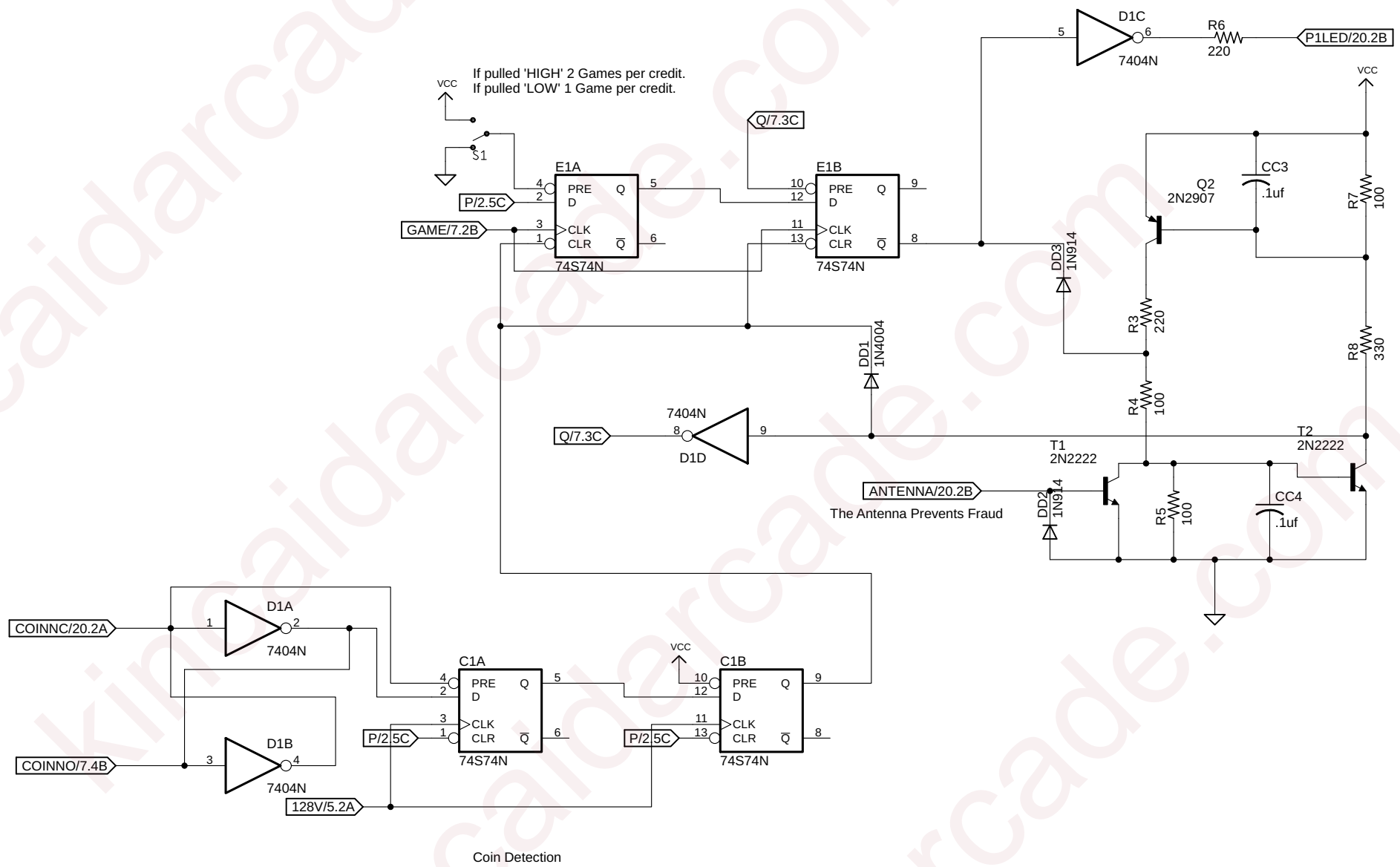
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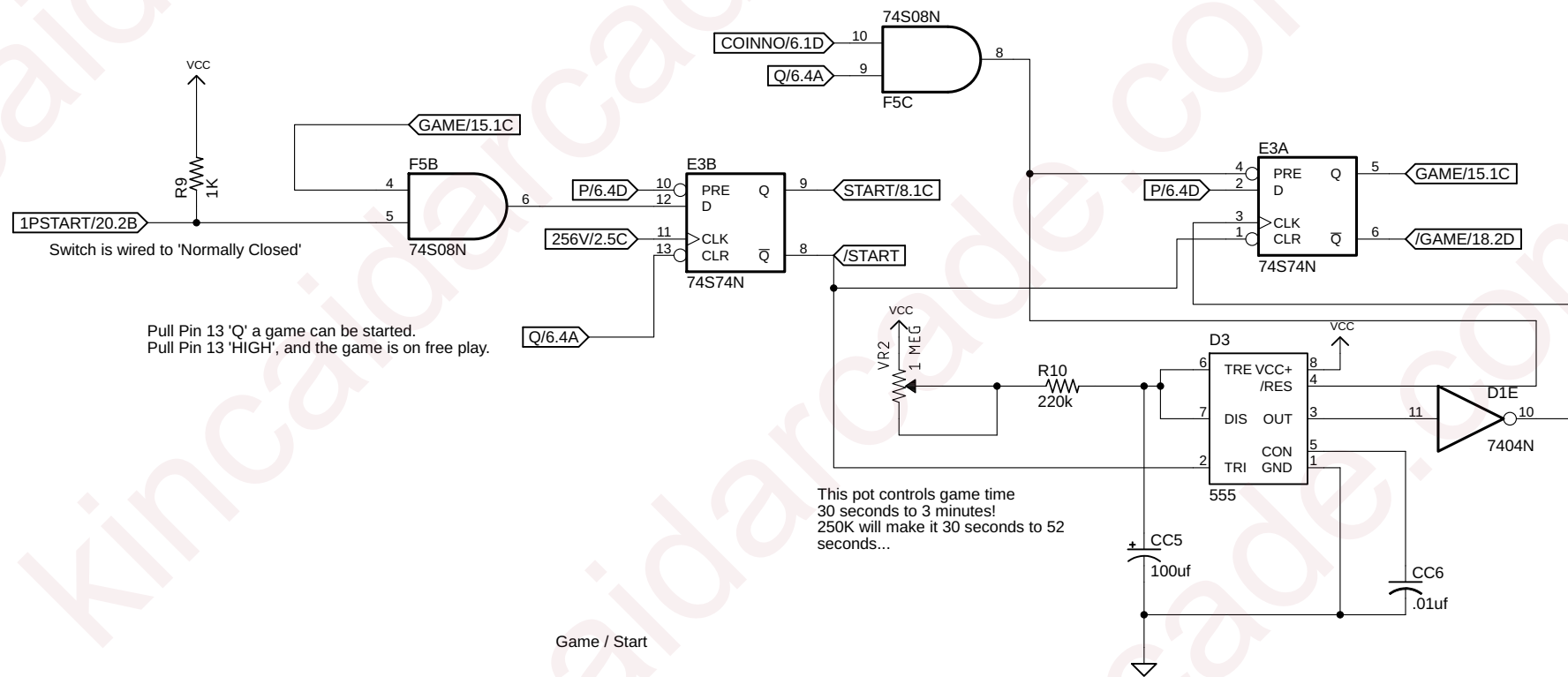
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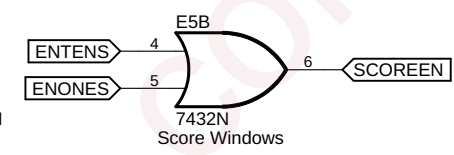
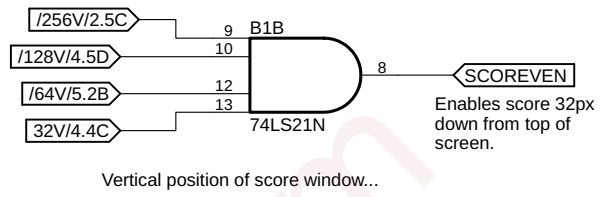
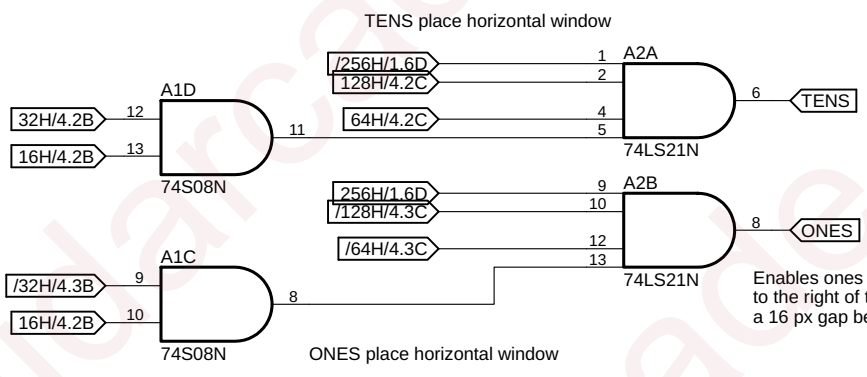
Pull Pin 13 'Q' a game can be started.
Pull Pin 13 'HIGH', and the game is on free play.

This pot controls game time
30 seconds to 3 minutes!
250K will make it 30 seconds to 52
seconds...

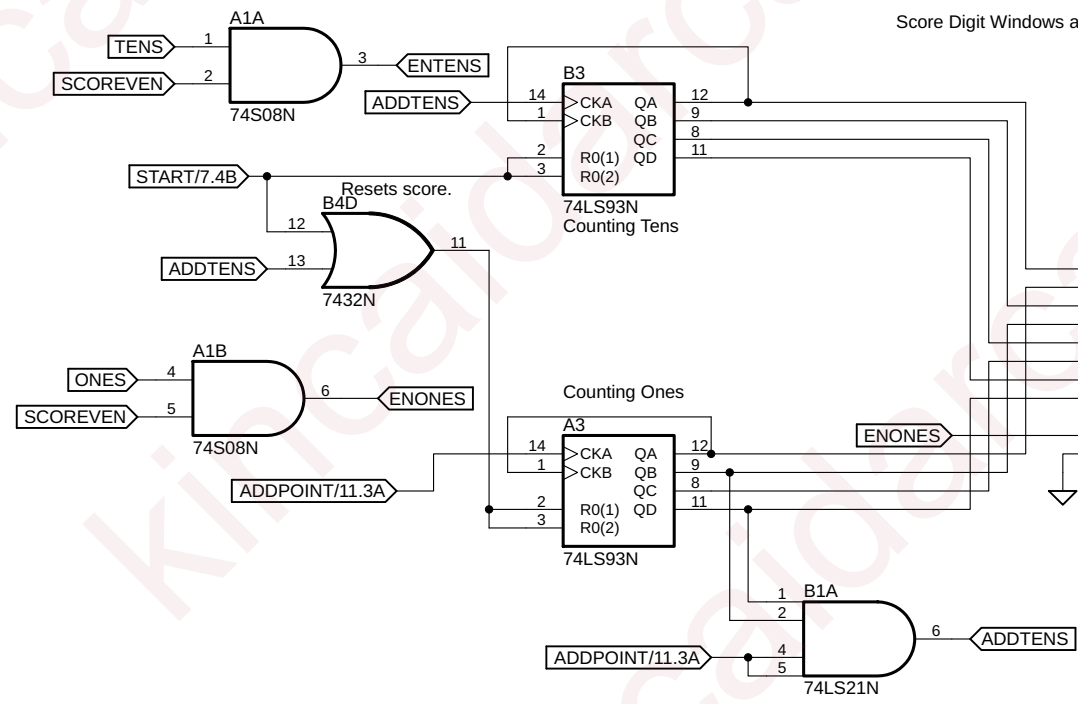
Game / Start

This circuit determines wether or not a
game is in progress, and game length.

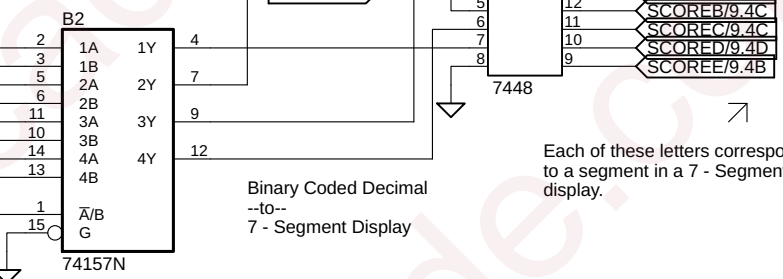
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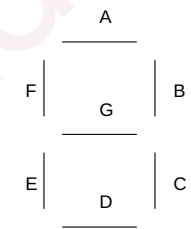
Score Digit Windows are 32V x 16H

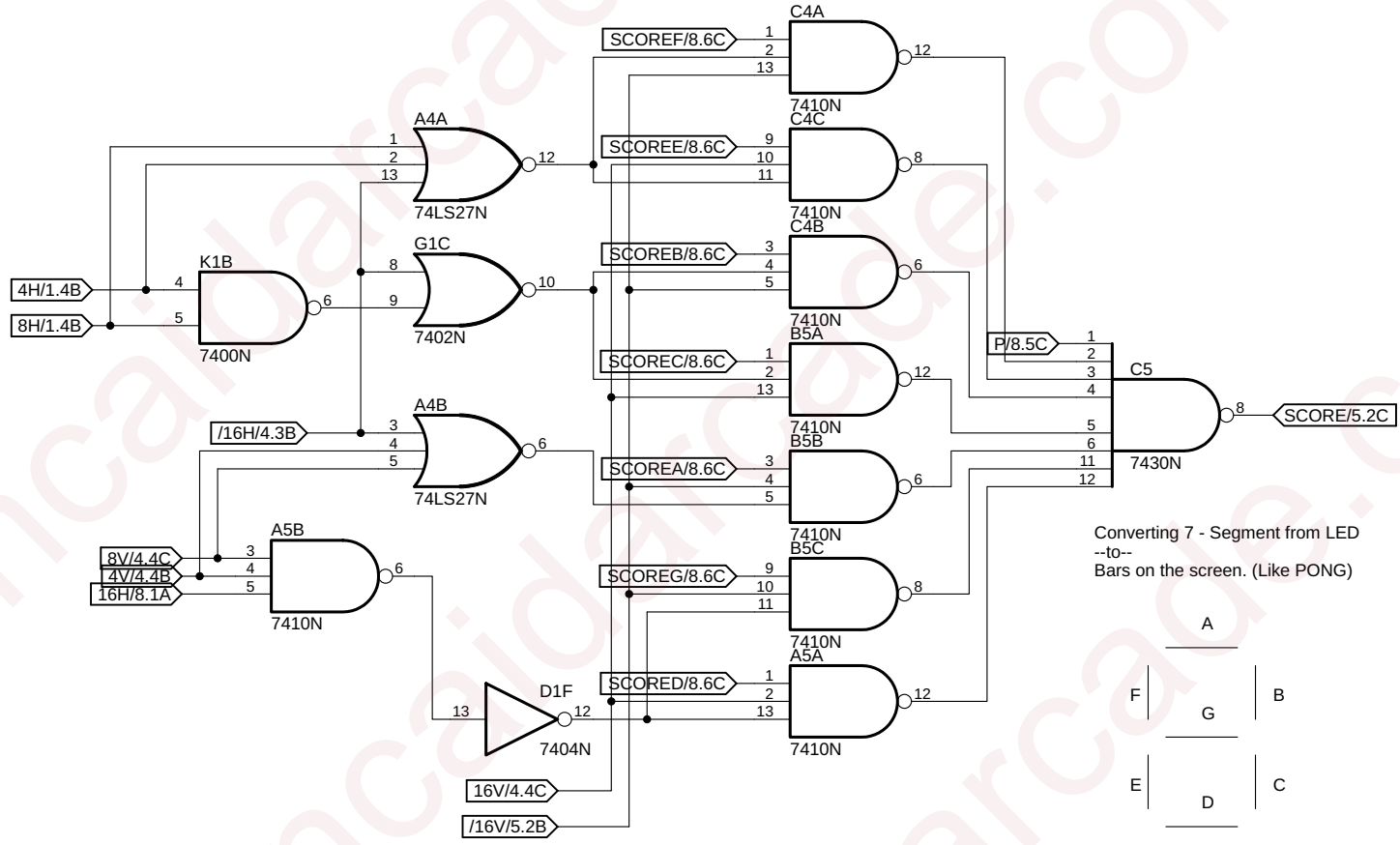


10s are "A", 1s are "B"

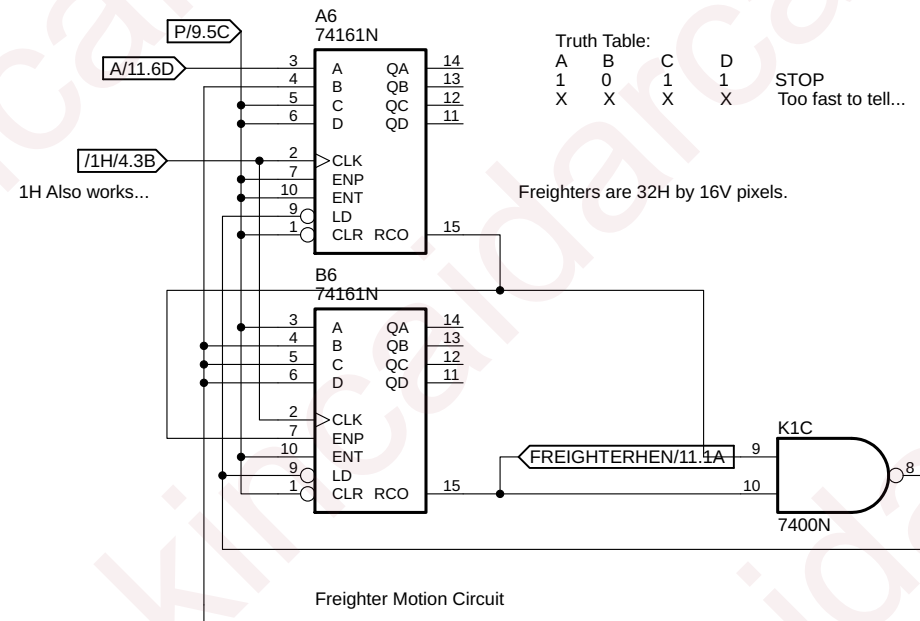


Each of these letters corresponds to a segment in a 7 - Segment display.



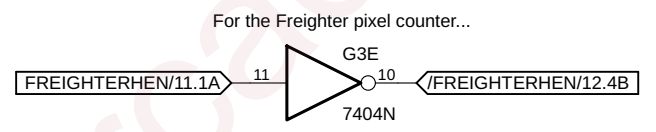
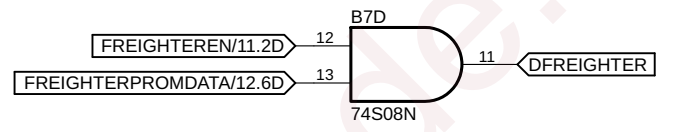
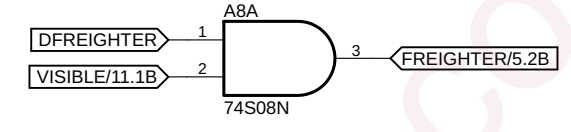
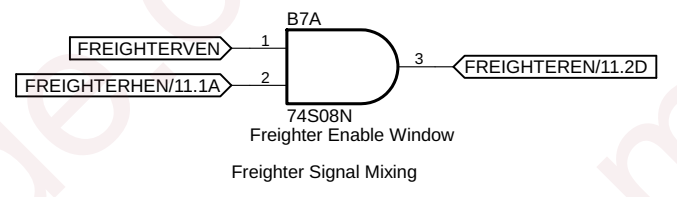
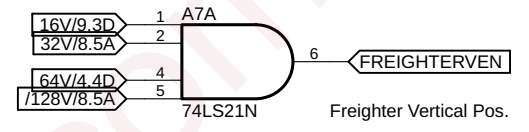


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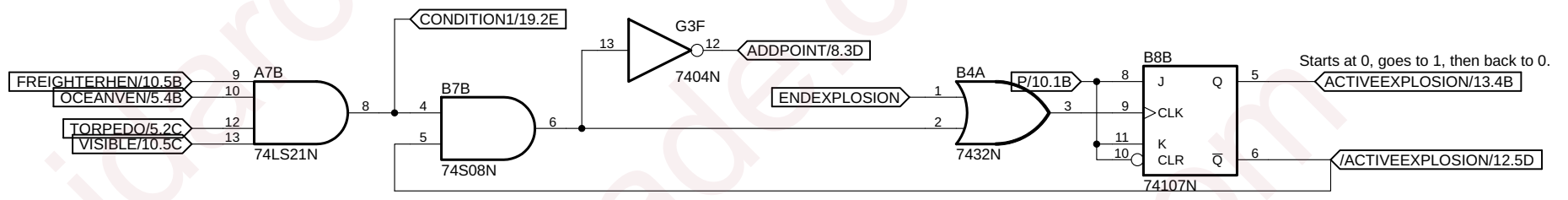


Truth Table:

A	B	C	D	
1	0	1	1	STOP
X	X	X	X	Too fast to tell...

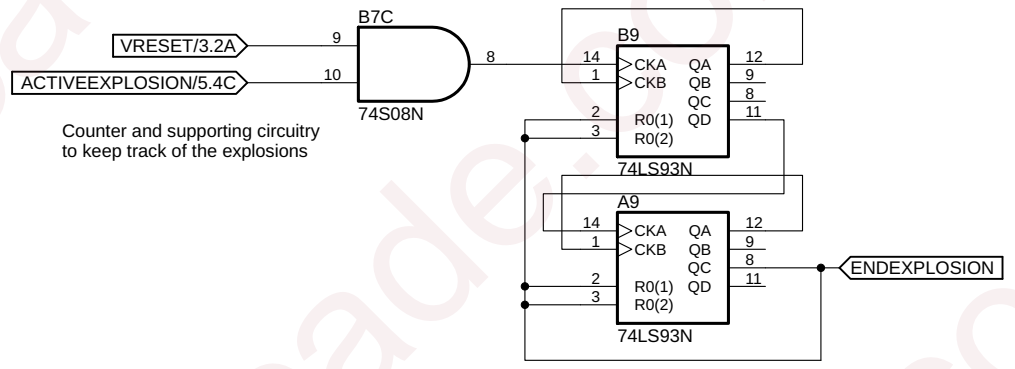


A

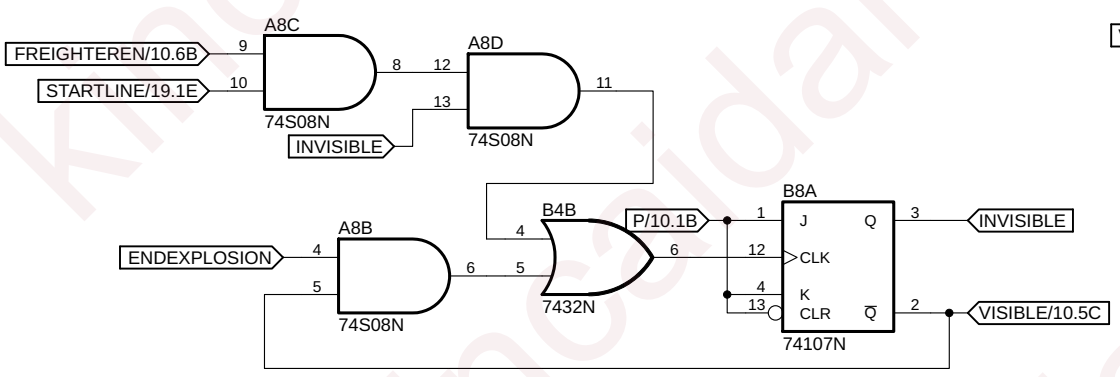


Explosions are ~ 2 seconds long. Vreset happens ~ 60 times a second. The counters reset when it has happened 128 times. (About 2 seconds.)

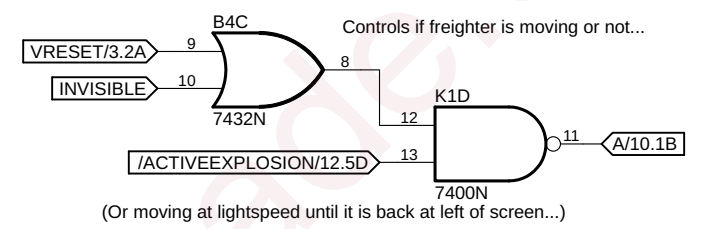
B



C



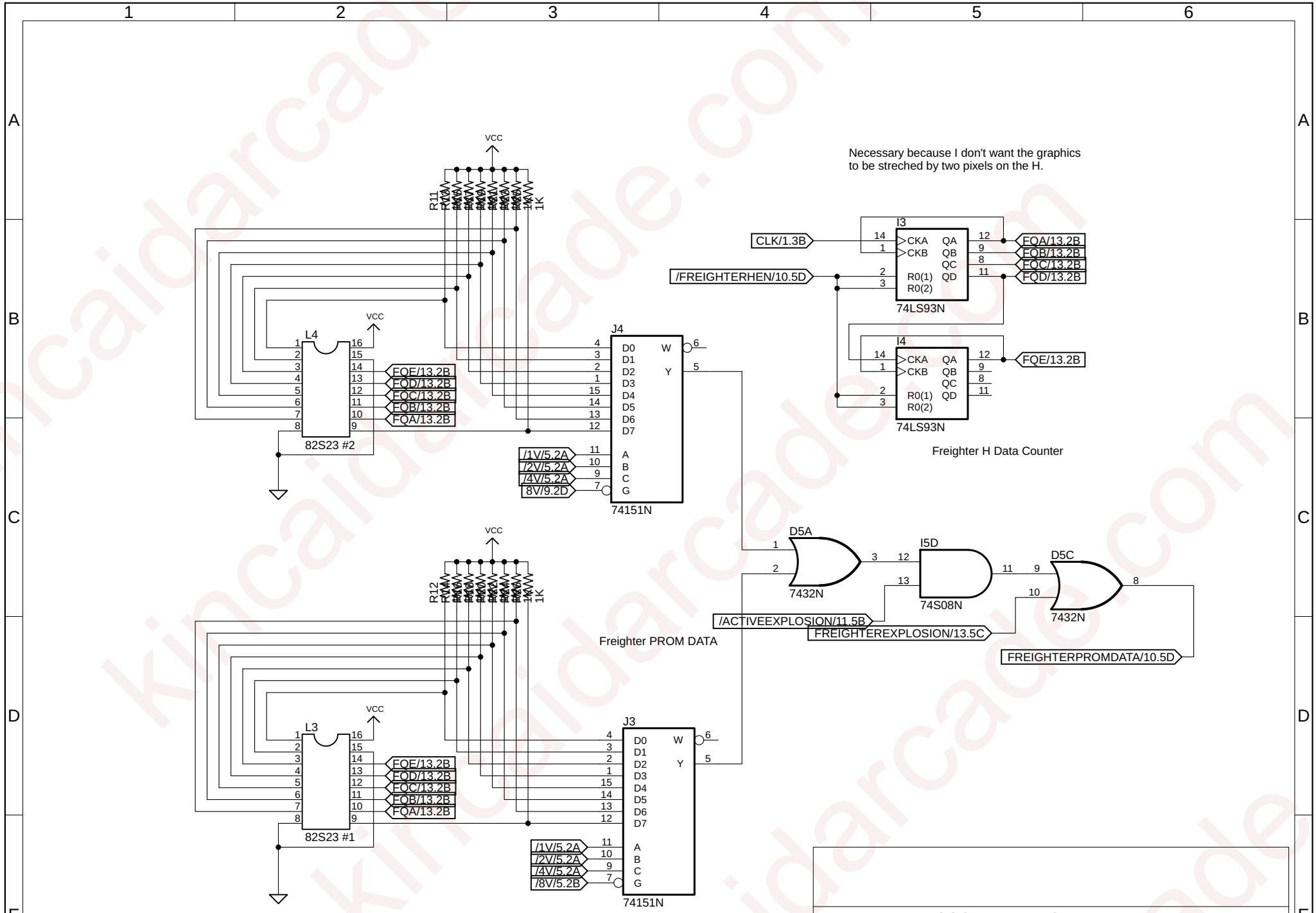
Makes the freighter invisible and unhittable until it gets back to the left of the screen.



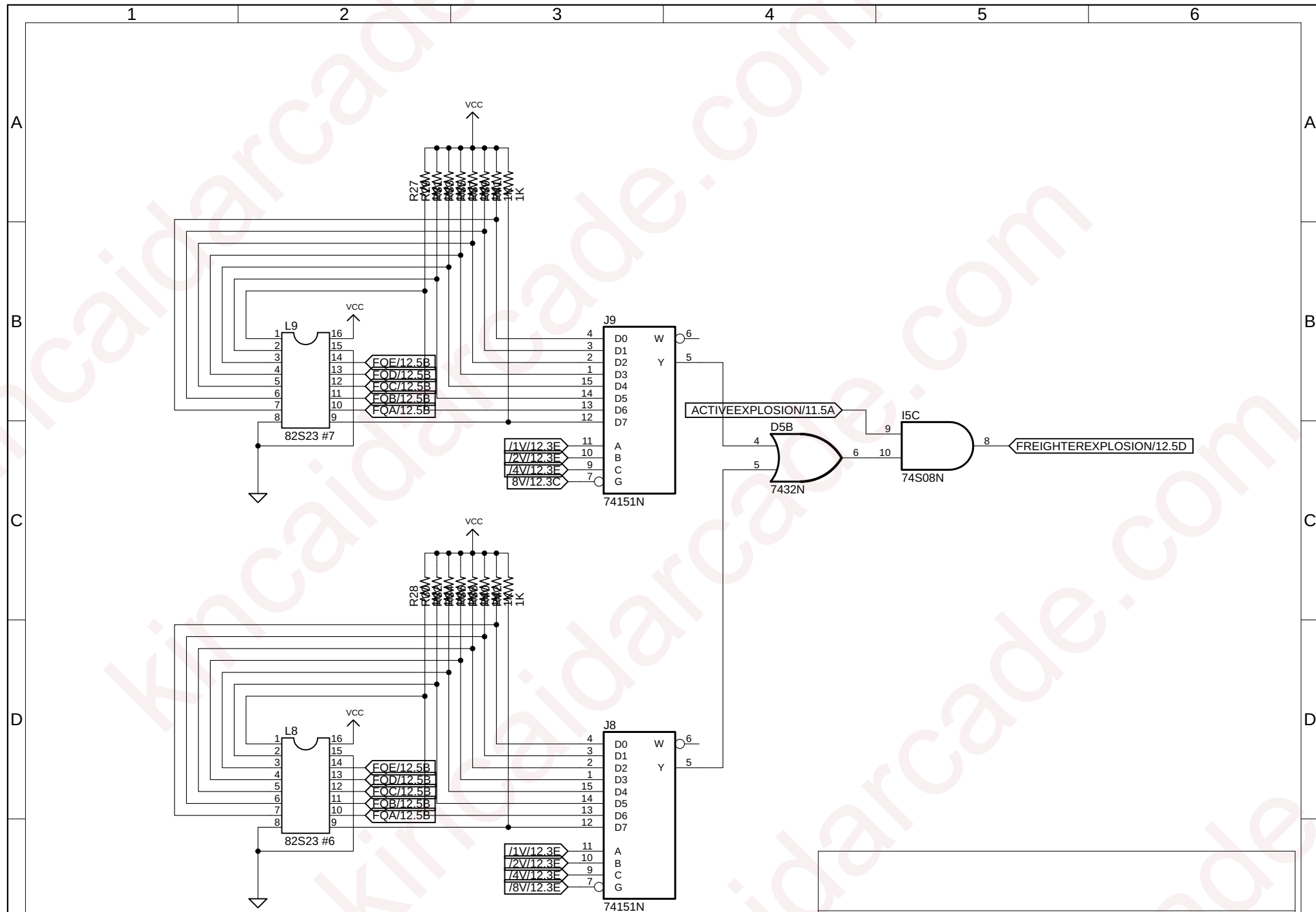
D

E

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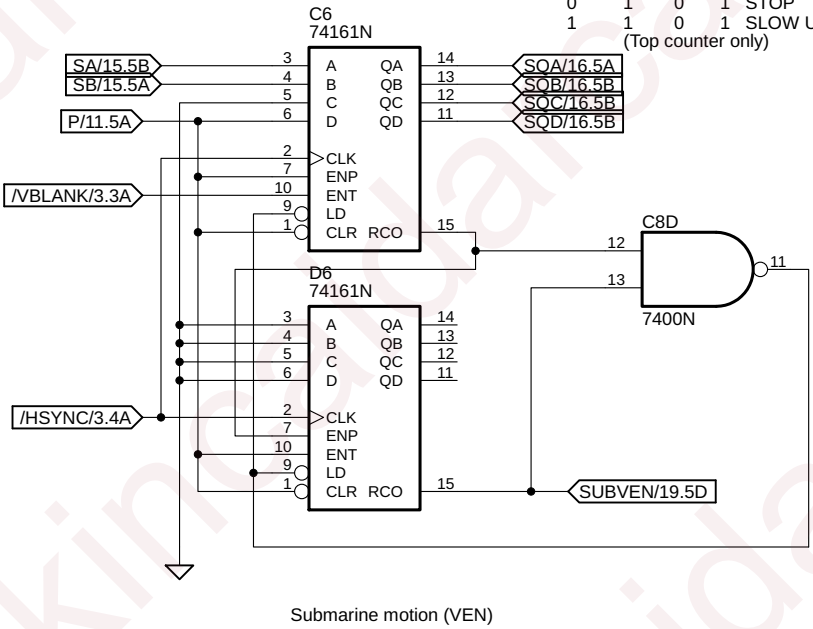


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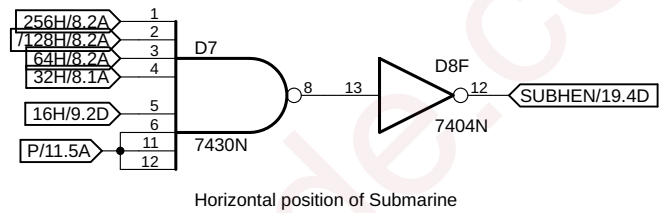
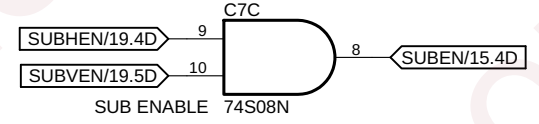
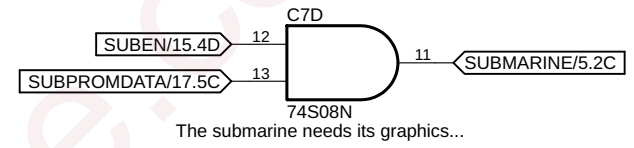


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From My experience in testing the Motion Circuits, this produces:
 A B C D OUTPUT
 0 0 0 1 FAST DOWN
 1 0 0 1 SLOW DOWN
 0 1 0 1 STOP
 1 1 0 1 SLOW UP
 (Top counter only)



Submarine motion (VEN)



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A

B

C

D

E

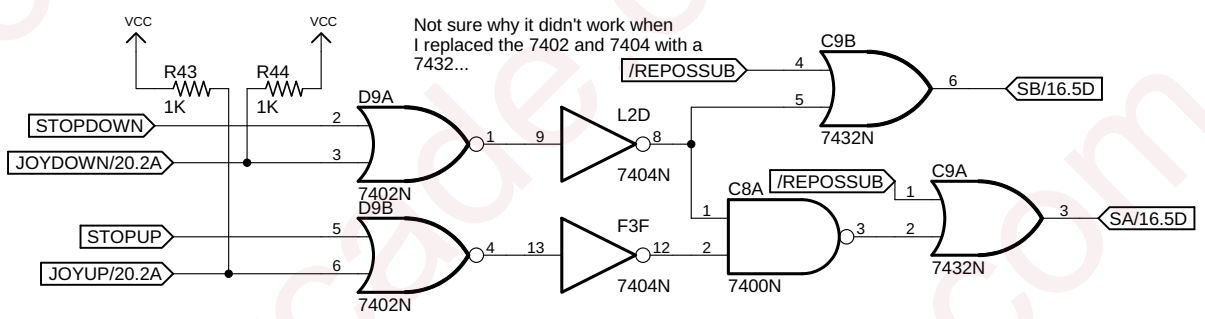
A

B

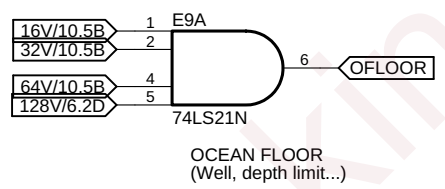
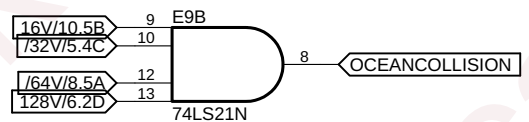
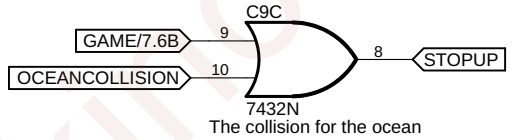
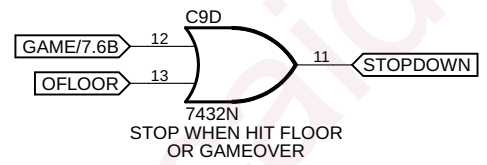
C

D

E



Not sure why it didn't work when I replaced the 7402 and 7404 with a 7432...

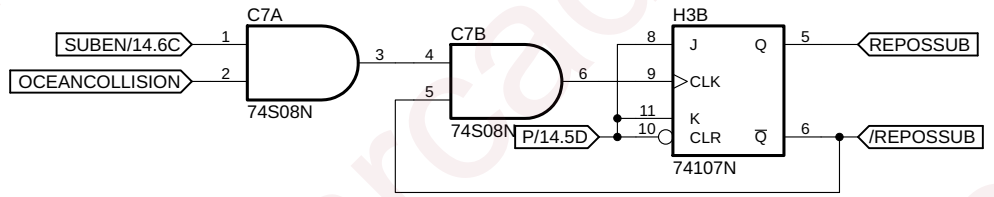


Move the submarine from the air to the water before screen shows game. (Because of video converter)

Basically a 1-bit memory cell that says Is the sub under water? If 0, THEN MOVE IT UNDER WATER!! If 1, then maybe physics actually is realistic here...

Only necessary because on power on, it starts at the top. I need to get it to the bottom before a game starts...

-OR- If 0, I DIDN'T KNOW SUBS COULD FLY! If 1, then nothing to see here...



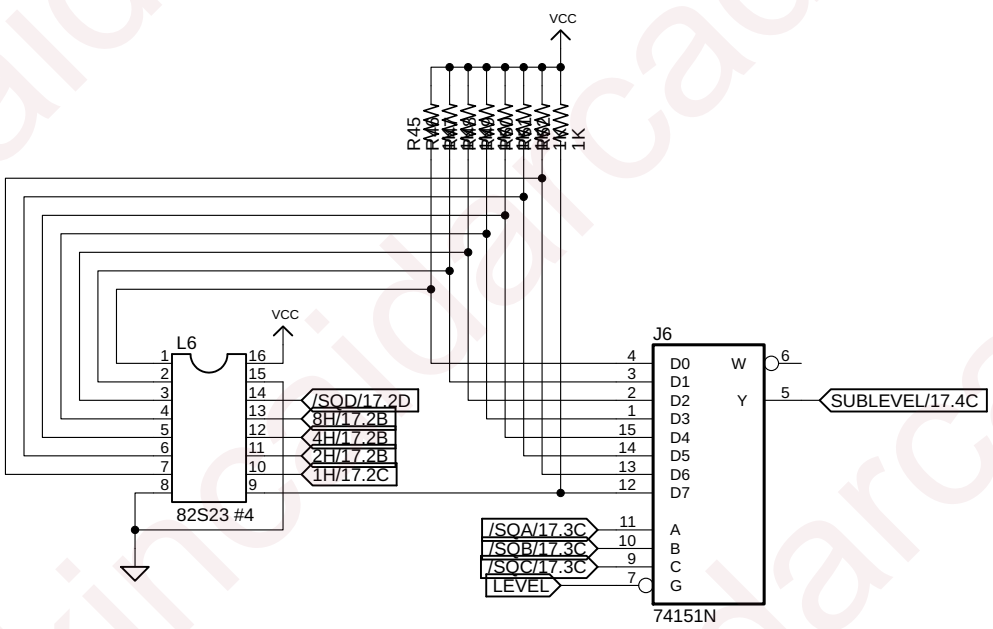
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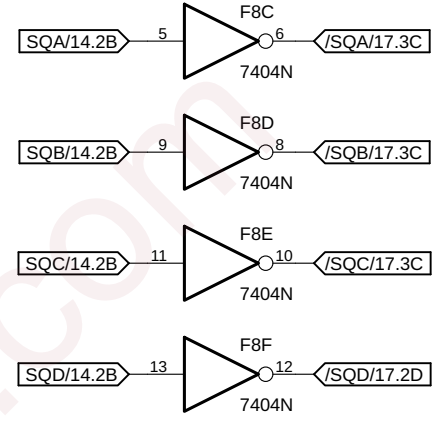
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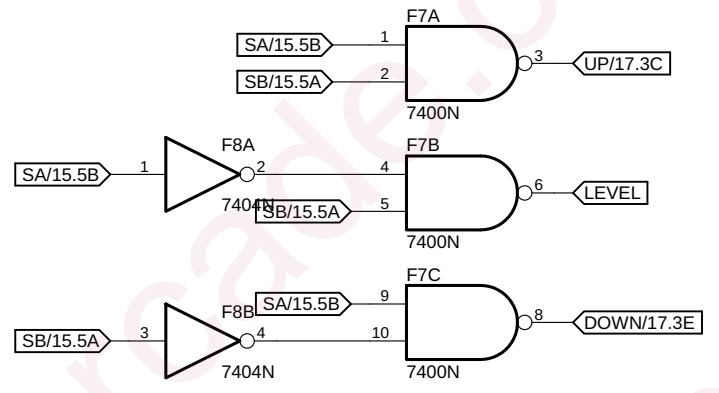
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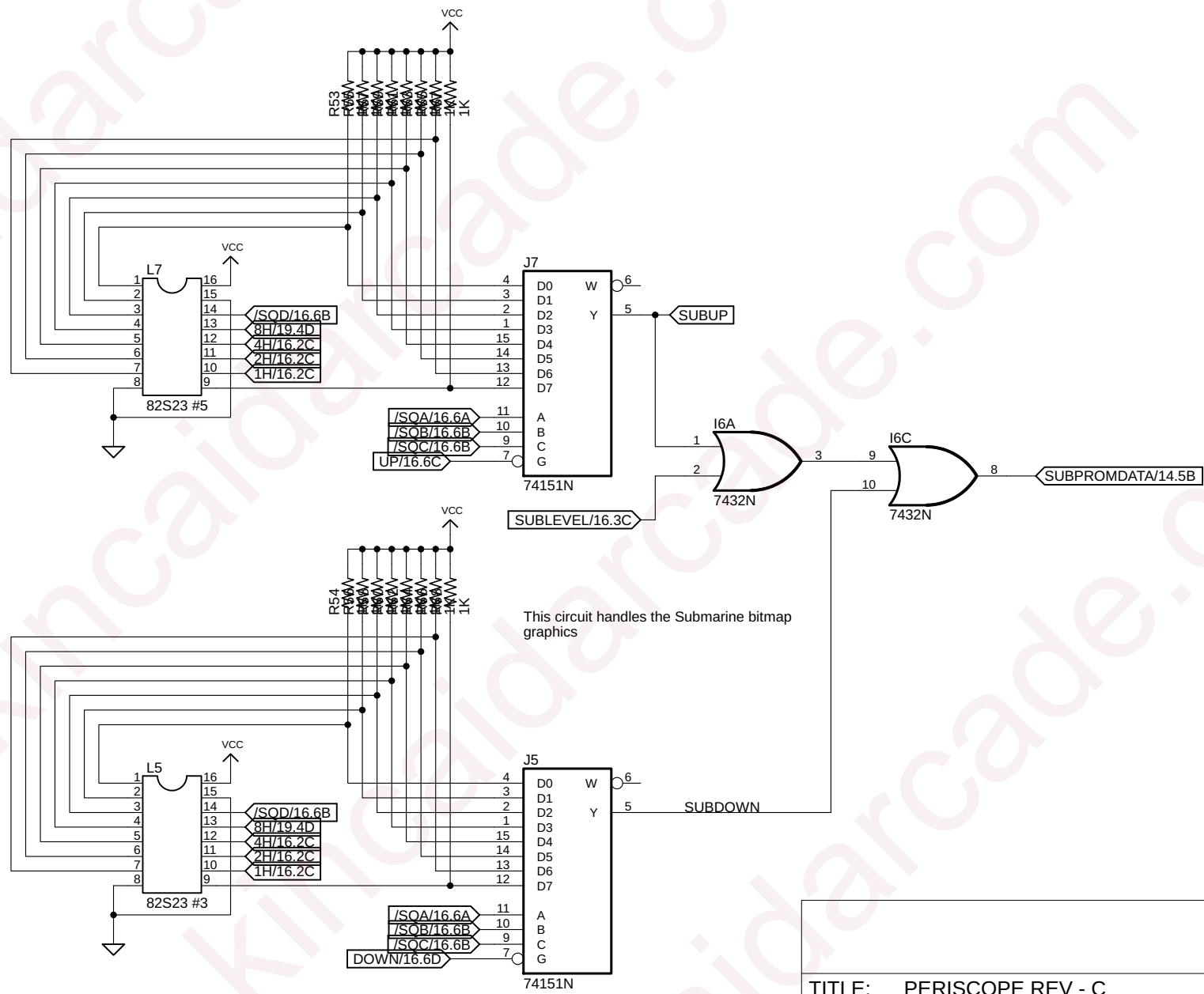
This is only necessary because of how the PROMS are coded...



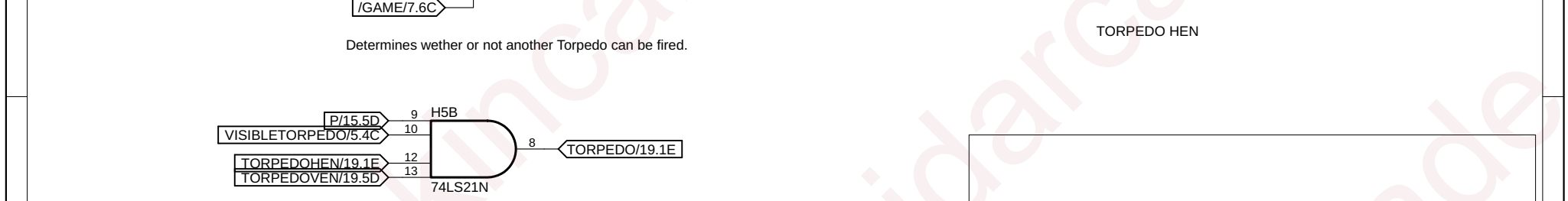
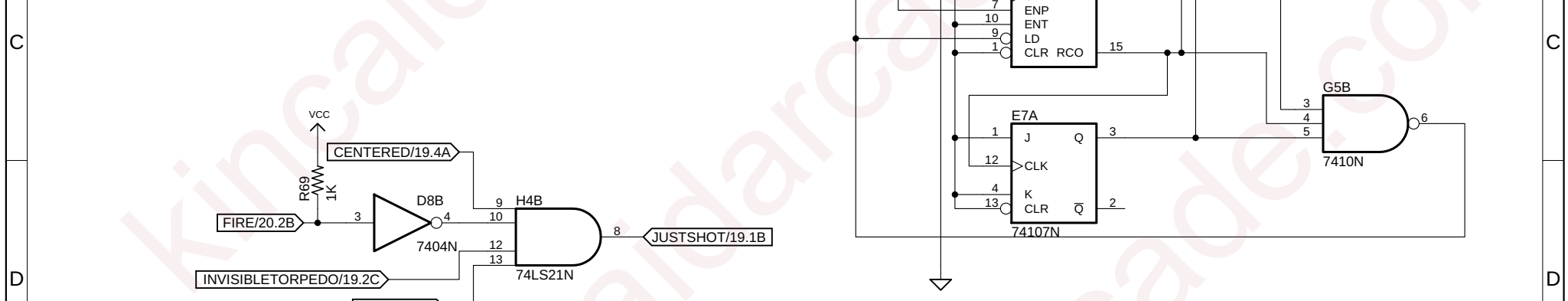
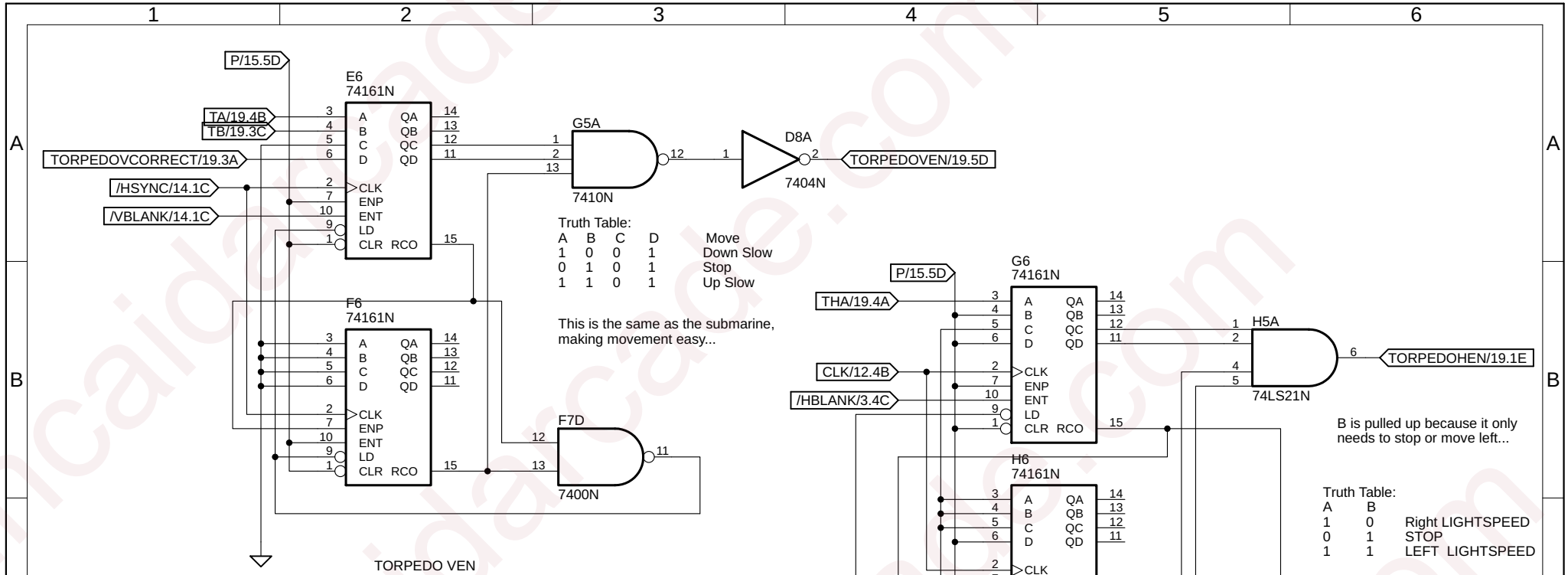
Which graphic will be shown at any given time...



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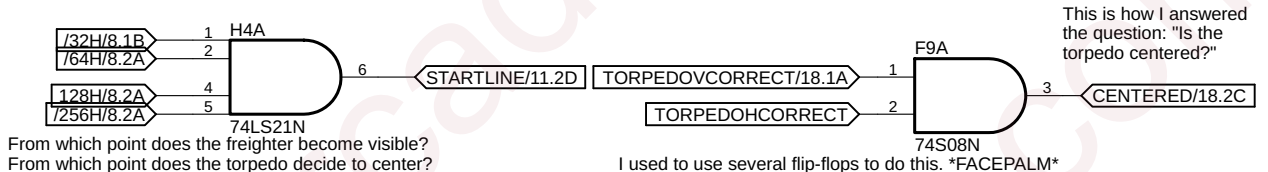


Determines whether or not another Torpedo can be fired.

Torpedo Signal Mixing

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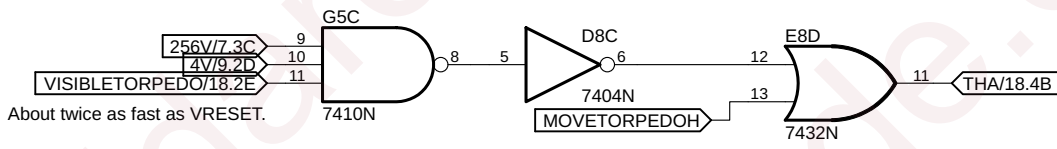
A



From which point does the freighter become visible?
From which point does the torpedo decide to center?

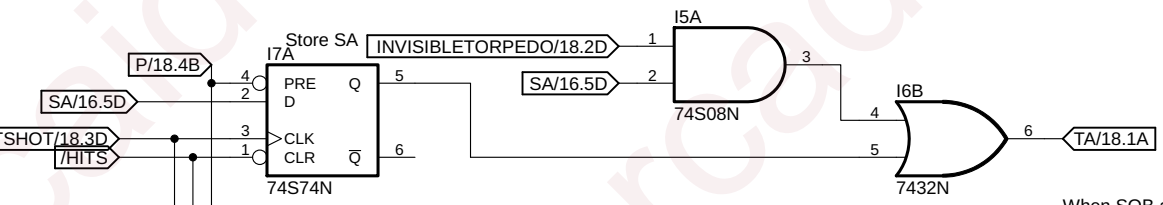
I used to use several flip-flops to do this. *FACEPALM*

B



About twice as fast as VRESET.

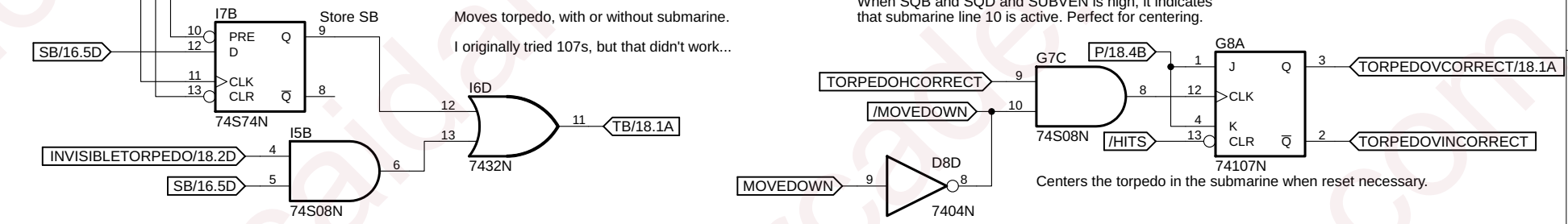
C



Moves torpedo, with or without submarine.
I originally tried 107s, but that didn't work...

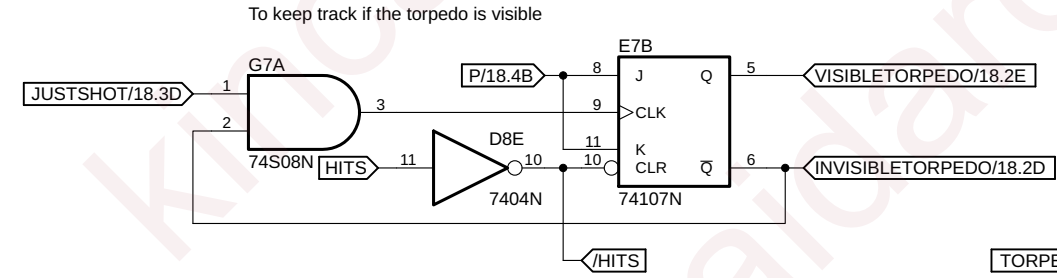
When SQB and SQD and SUBVEN is high, it indicates that submarine line 10 is active. Perfect for centering.

D

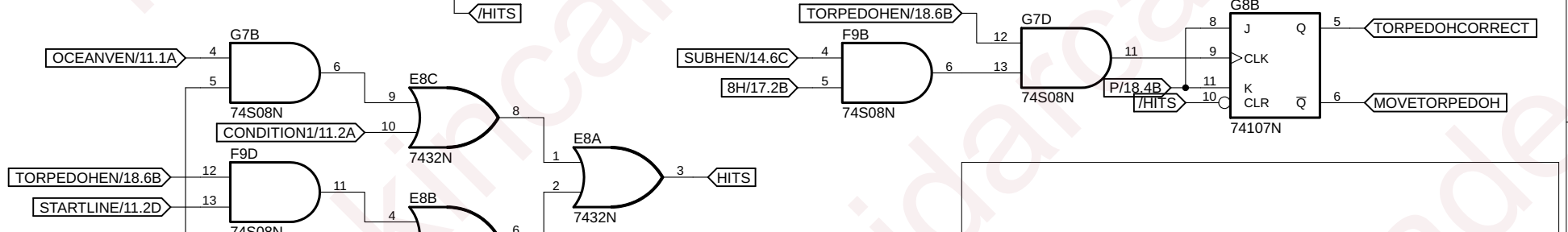


Centers the torpedo in the submarine when reset necessary.

E



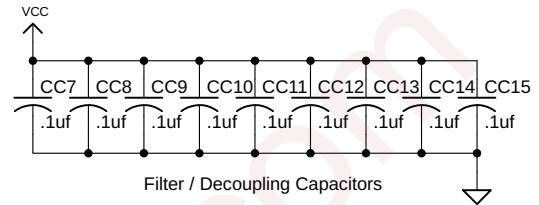
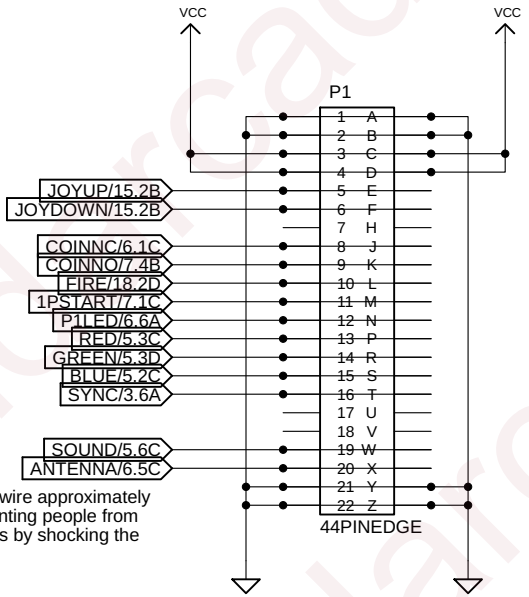
To keep track if the torpedo is visible



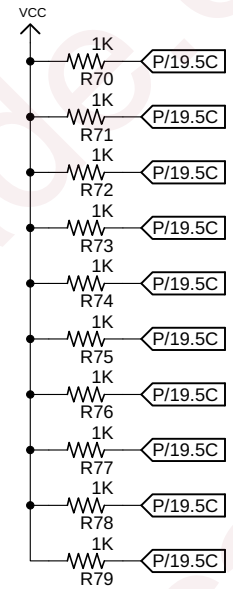
Has better chance of resetting torpedo than VBLANK

For moving torpedo back to start pos.

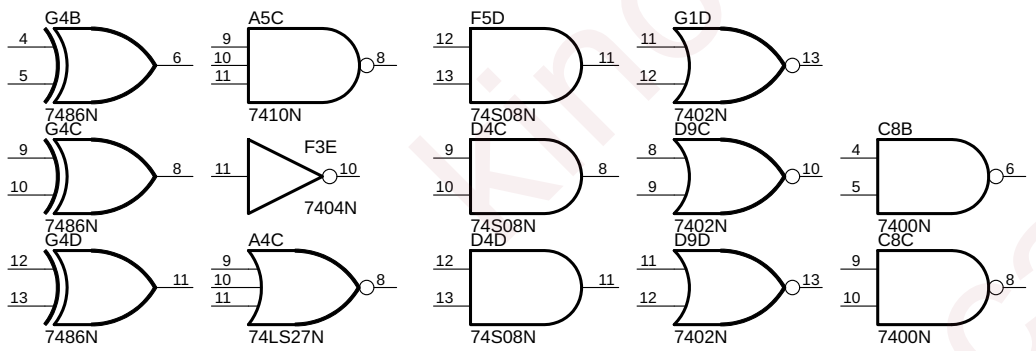
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The Antenna is a wire approximately 1 foot long, preventing people from getting free games by shocking the cabinet.



Extra Gates:



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