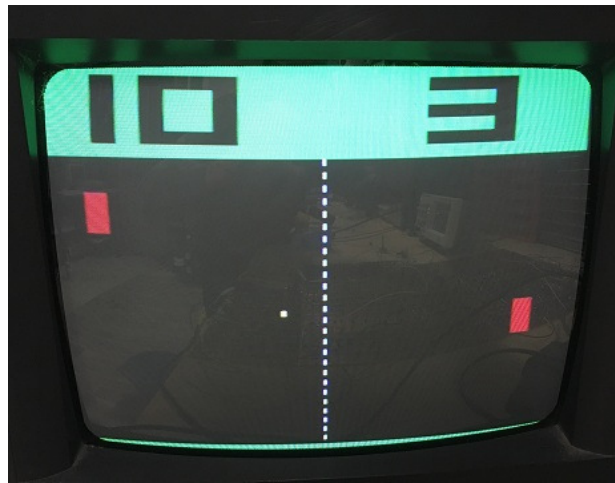
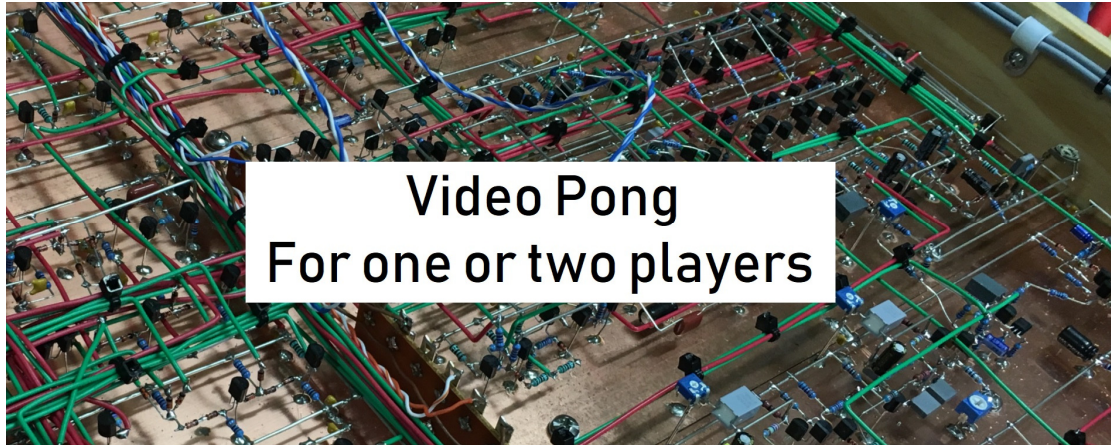




Glen Kleinschmidt
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www.glensstuff.com

In a nutshell:

A “Pong” paddle-and-ball “computer” game that produces a high quality, clean and crisp video display on a PAL composite colour video monitor. The circuitry is 100% discrete, using generic semiconductors and is built entirely "dead bug" style over a large sheet of lacquered copper laminate.

Some features:

- P.A.L. composite colour video signal generation

- One (practice) and two player modes

- 1.5 digit on-screen digital score counters (first player to 19 wins)

- Realistic synthesised percussive ball-thwacking sounds

- Simulated stereo sound with auto-panning that tracks the ball

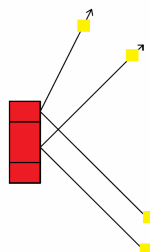
- 431 bipolar transistors, 6 junction field-effect transistors & 826 silicon diodes

Player one controls the paddle on the left and player two the paddle on the right. In Practice mode the machine takes control of the paddle on the right.

The hand controllers are just so called “zippy” or “jiffy” boxes each with a potentiometer and knob and a push-button which is pressed to serve the ball. The position of a controller’s potentiometer determines the vertical position of the respective paddle on the screen.

The moving ball automatically bounces off the vertical boundaries and the goal of each player is to keep the ball inside the court. The velocity of the ball begins at a slow and easy rate but in order to ensure that a match cannot last forever, from the start of play the ball velocity linearly speeds up until it reaches a speed that most would have difficulty keeping up with for very long.

The angle at which the ball bounces off a paddle depends on where it hits the paddle. If the ball is hit with the centre of the paddle, it will bounce off at an angle of 90 degrees, but if the ball is hit with either the upper or the lower quarter of a paddle it will bounce off with approximately twice the vertical-movement velocity.



If either player misses the ball the match ends with buzz, their opponents score counter is incremented and the ball is automatically returned to the centre of the court where it remains stationary until either player presses the "serve ball" button on their controller to commence a new match. The score counters can be reset back to zero at any time by pressing the “reset” button on the control panel.

When either player wins a game by reaching the maximum score of 19 an “end of game” chime will sound until the counters are reset back to zero.

The size of the paddles can be either large or small, selected by a switch on the control panel. Large paddles obviously make the game easier as the ball isn’t as difficult to hit.

In single player mode, the machine is an invincible opponent. Since the velocity of the ball will eventually become too fast for a human player to keep up with for too long, the skill of the player here is gauged by how long he or she can keep a match going.

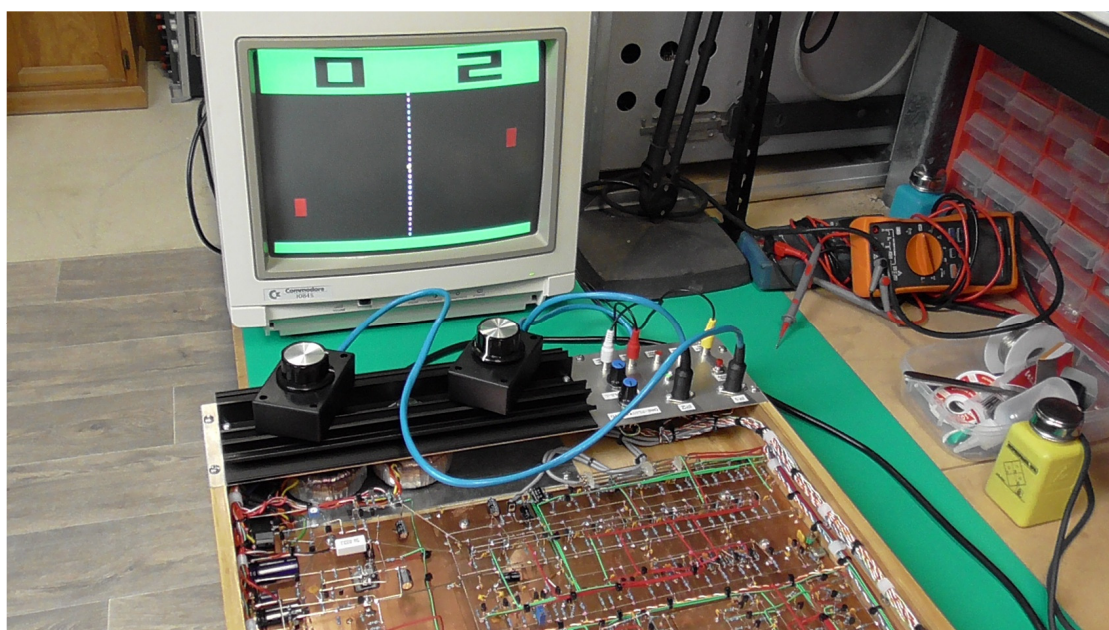
The percussive “boink” sounds that are made whenever the ball rebounds off the boundaries and paddles are continuously stereo-panned (by a pair of VCAs) between the left and right audio channels depending on the horizontal position of the ball, giving a neat simulated stereo effect.

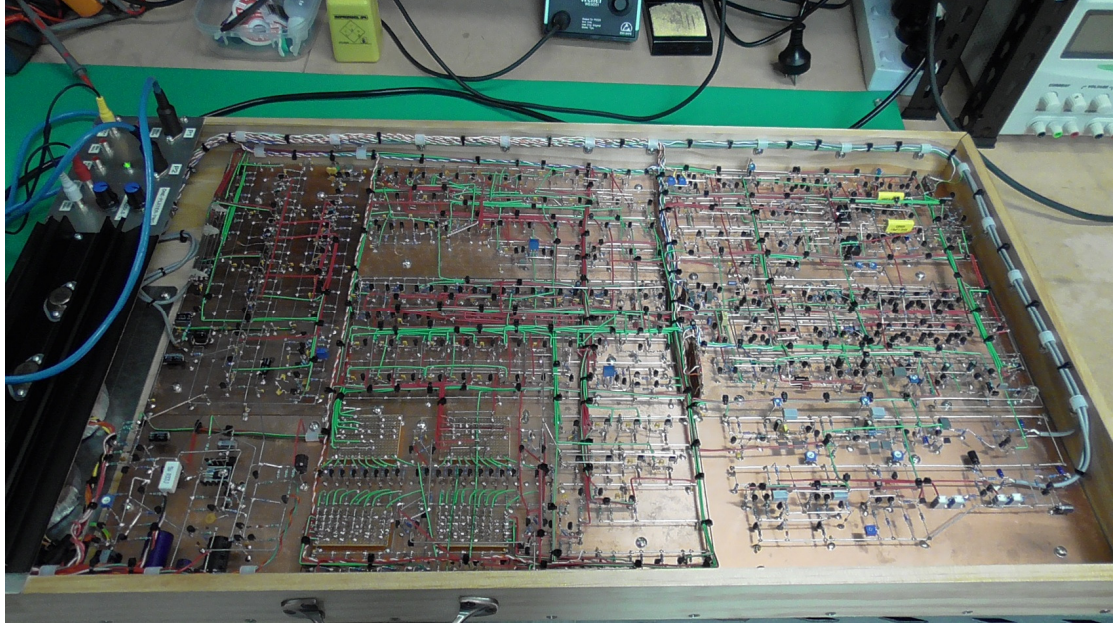
A link to a Youtube video of the machine in action:

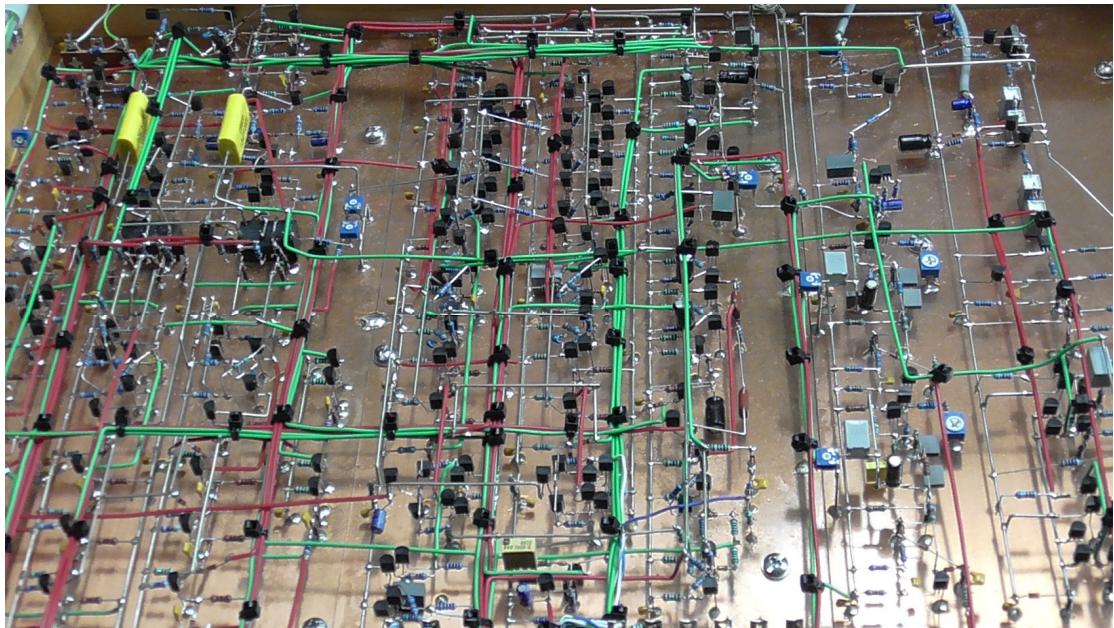
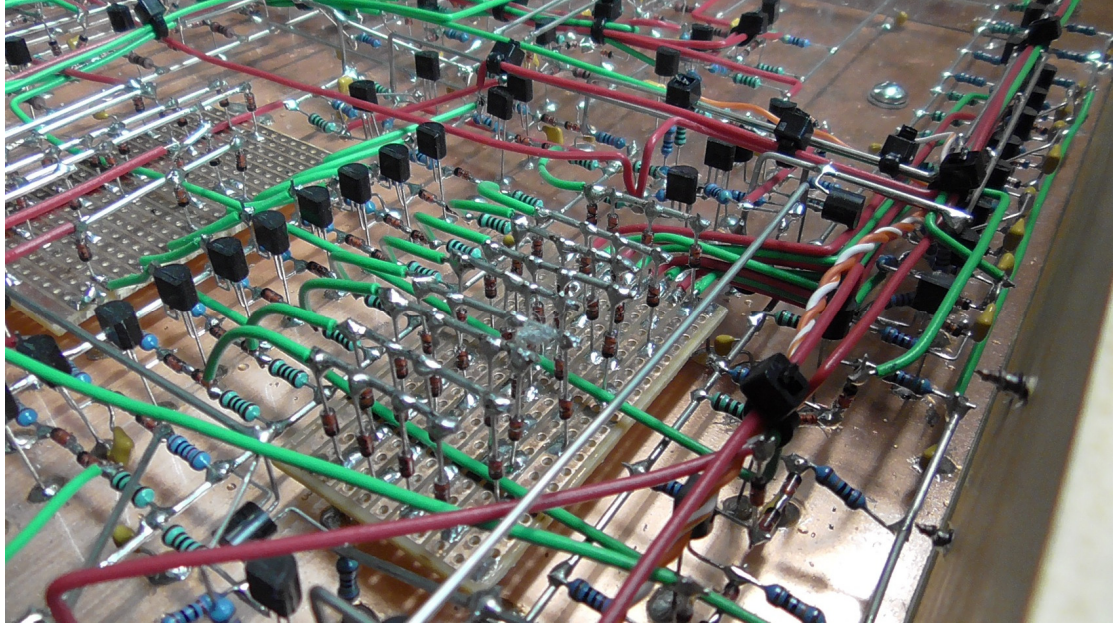
<https://www.youtube.com/watch?v=Neky4fdaLhM>

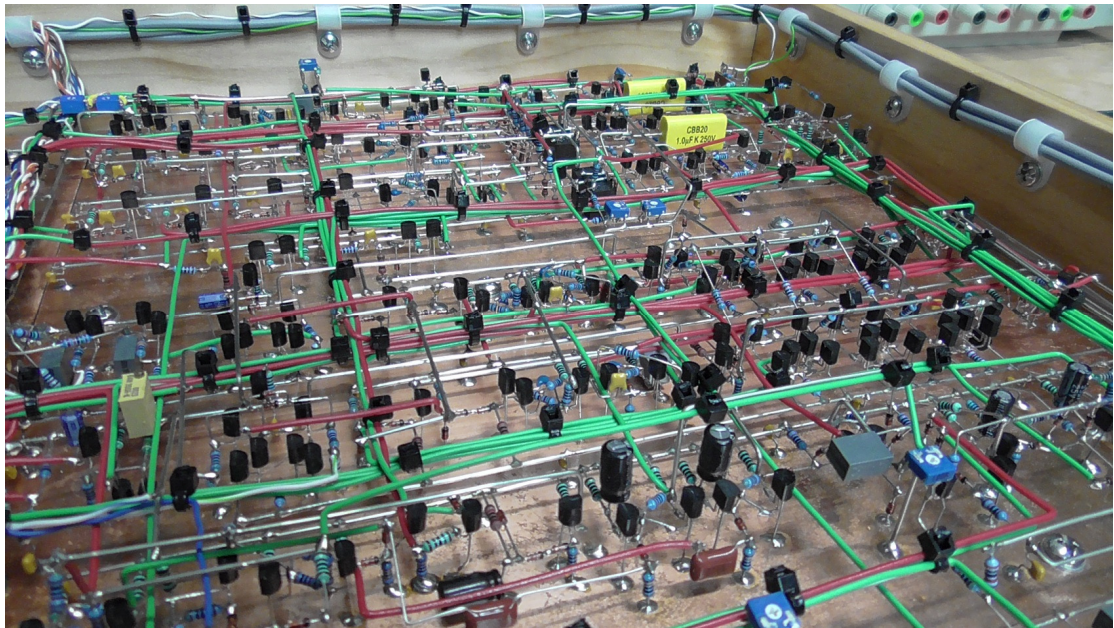
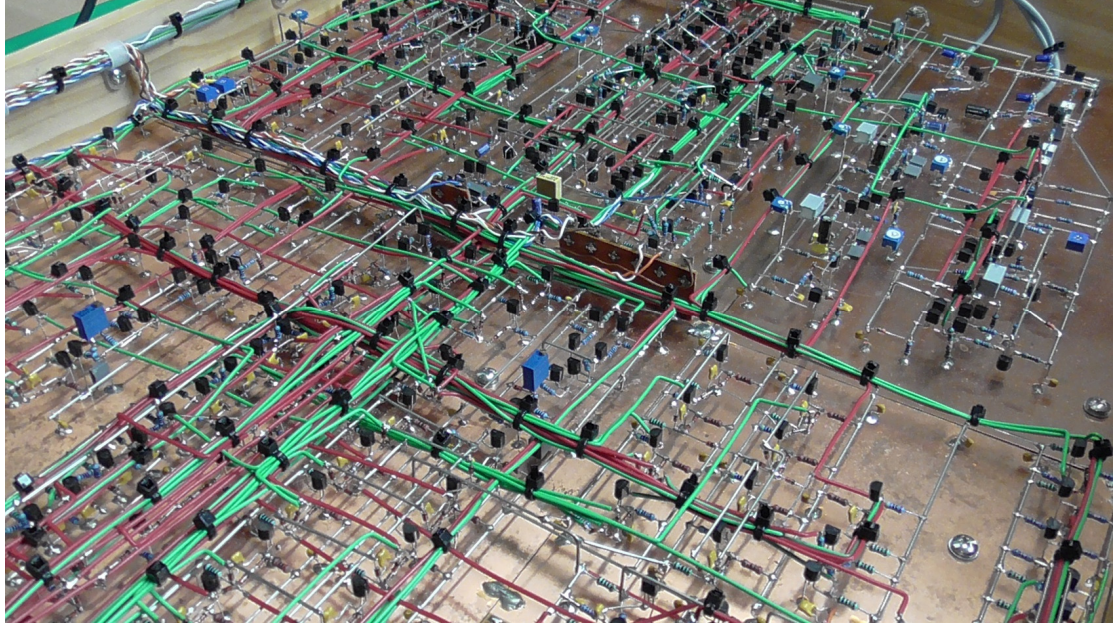
Well, that’s it, I guess. Some pictures follow along with the complete schematic diagrams for those with a couple of hours to spare who therefore might wish to build their own.

Happy soldering!

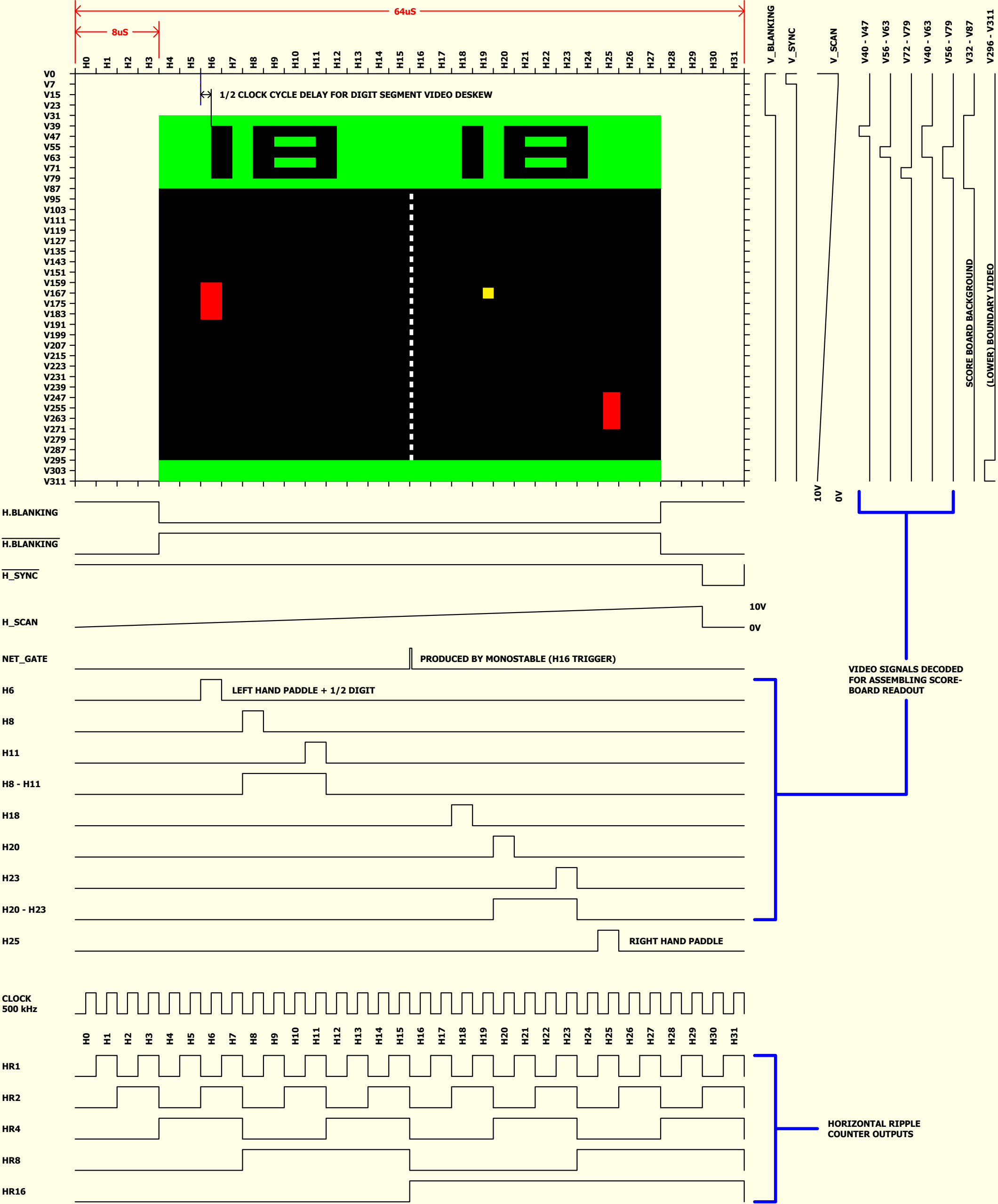








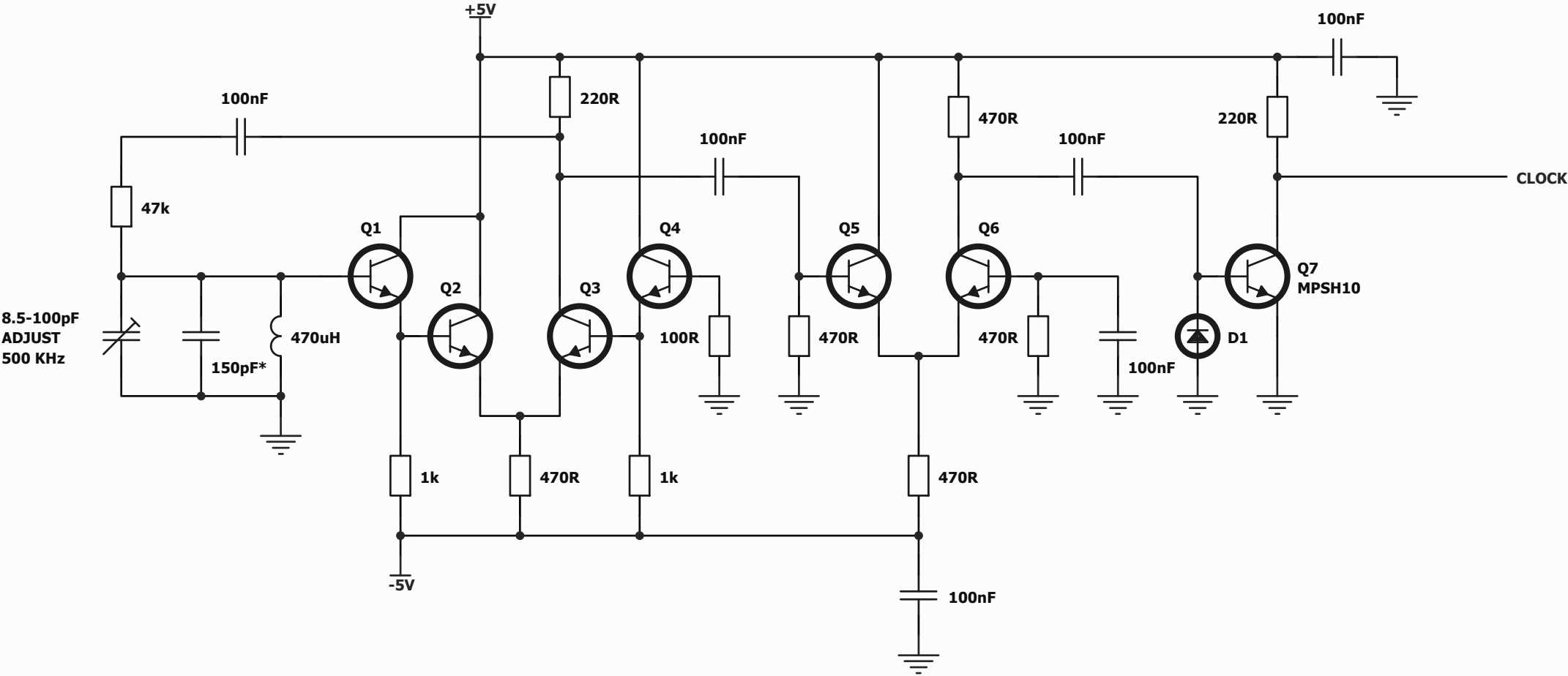
VIDEO SIGNALS TIMING DIAGRAM



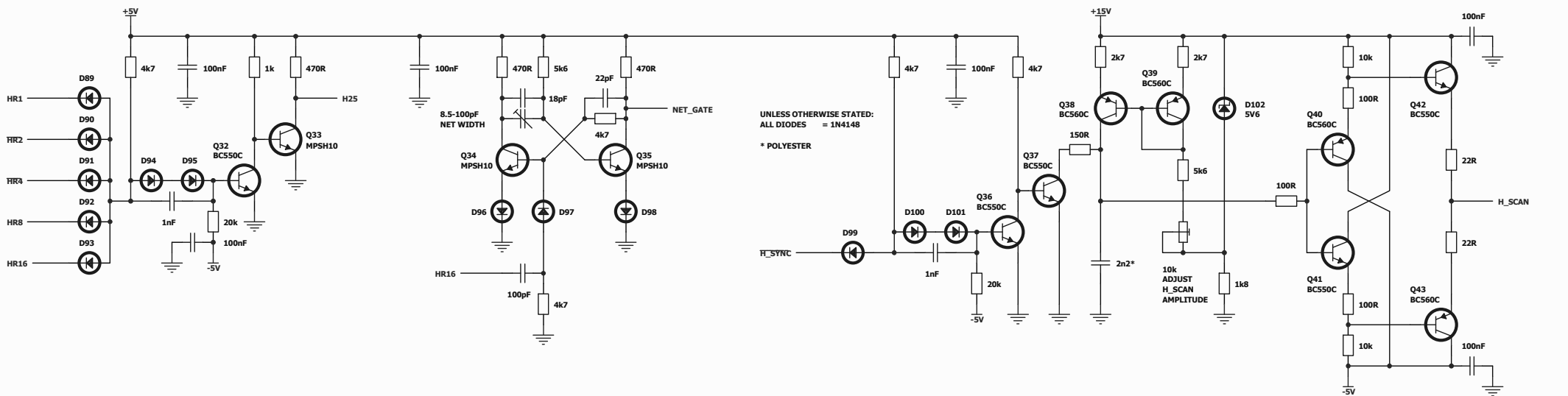
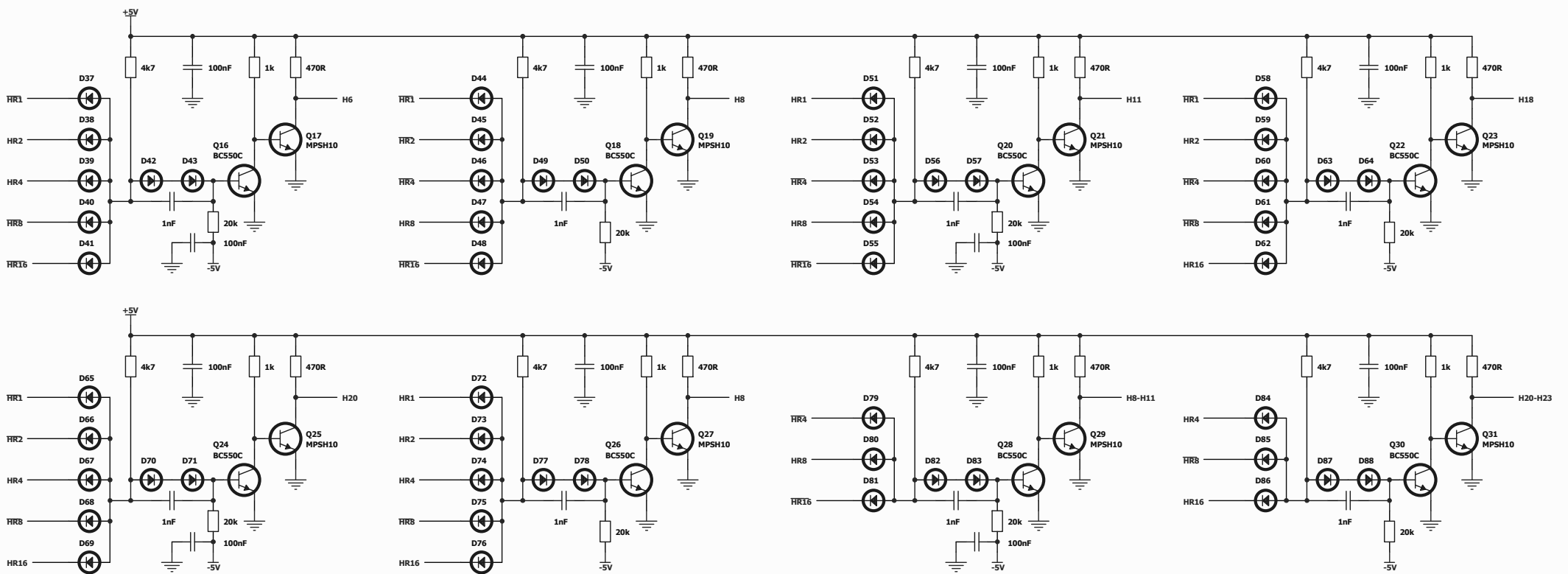
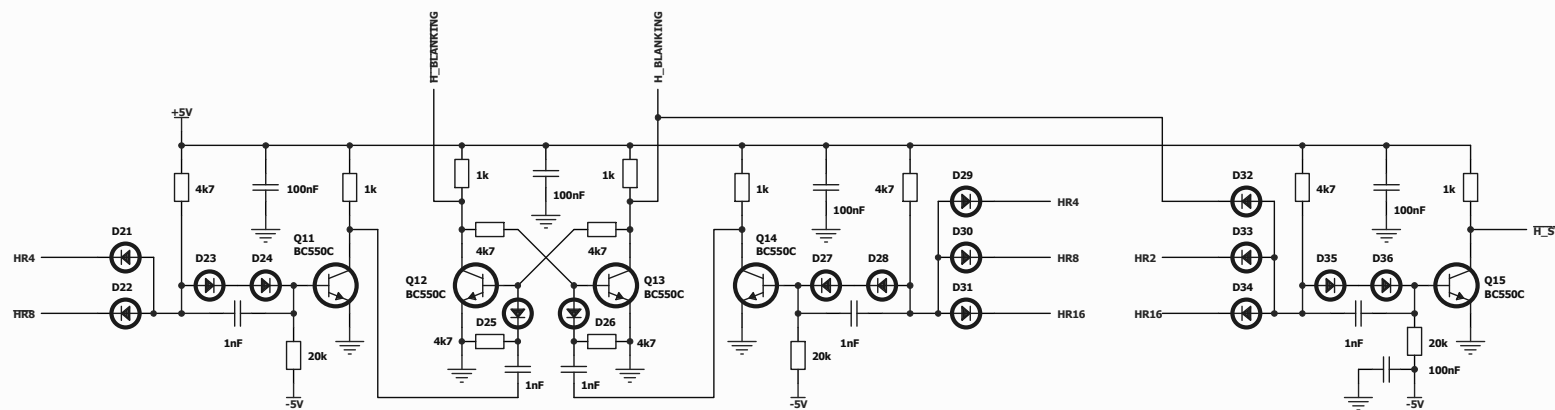
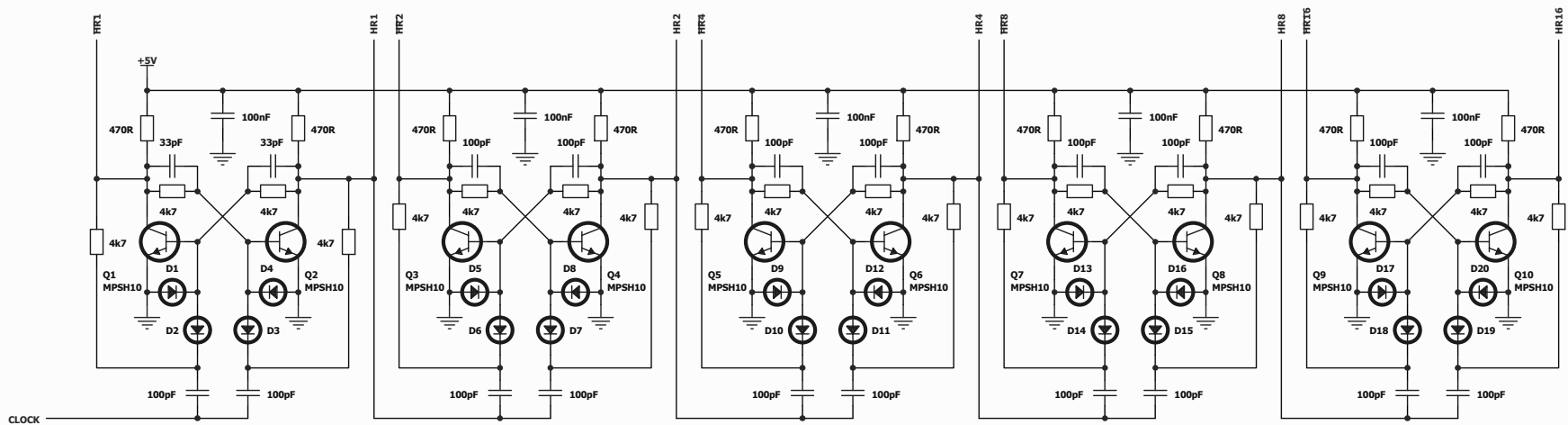
MASTER TIMING OSCILLATOR

UNLESS OTHERWISE STATED:
ALL NPN = BC550C
ALL DIODES = 1N4148

* NPO/COG OR MICA

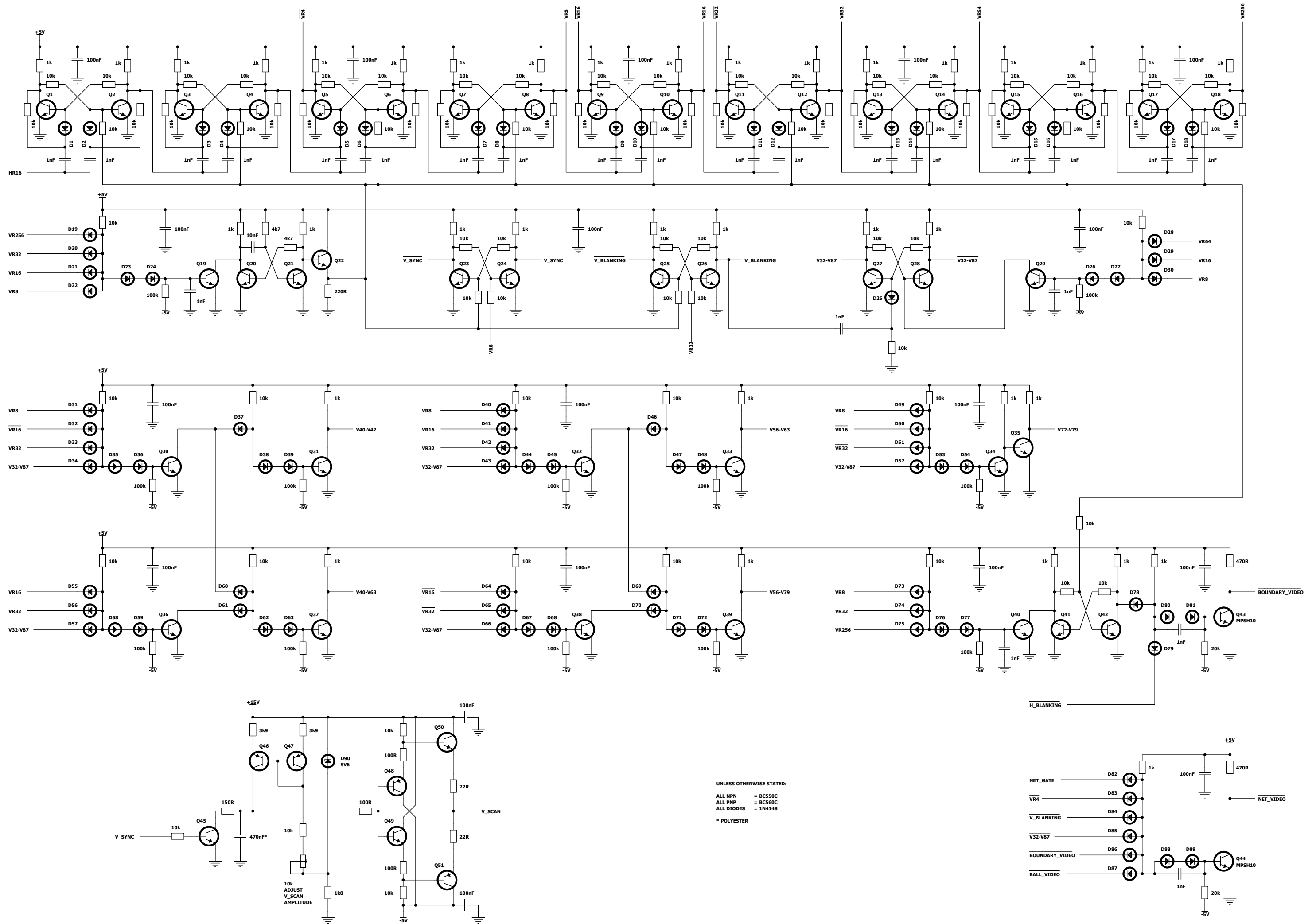


HORIZONTAL TIMING

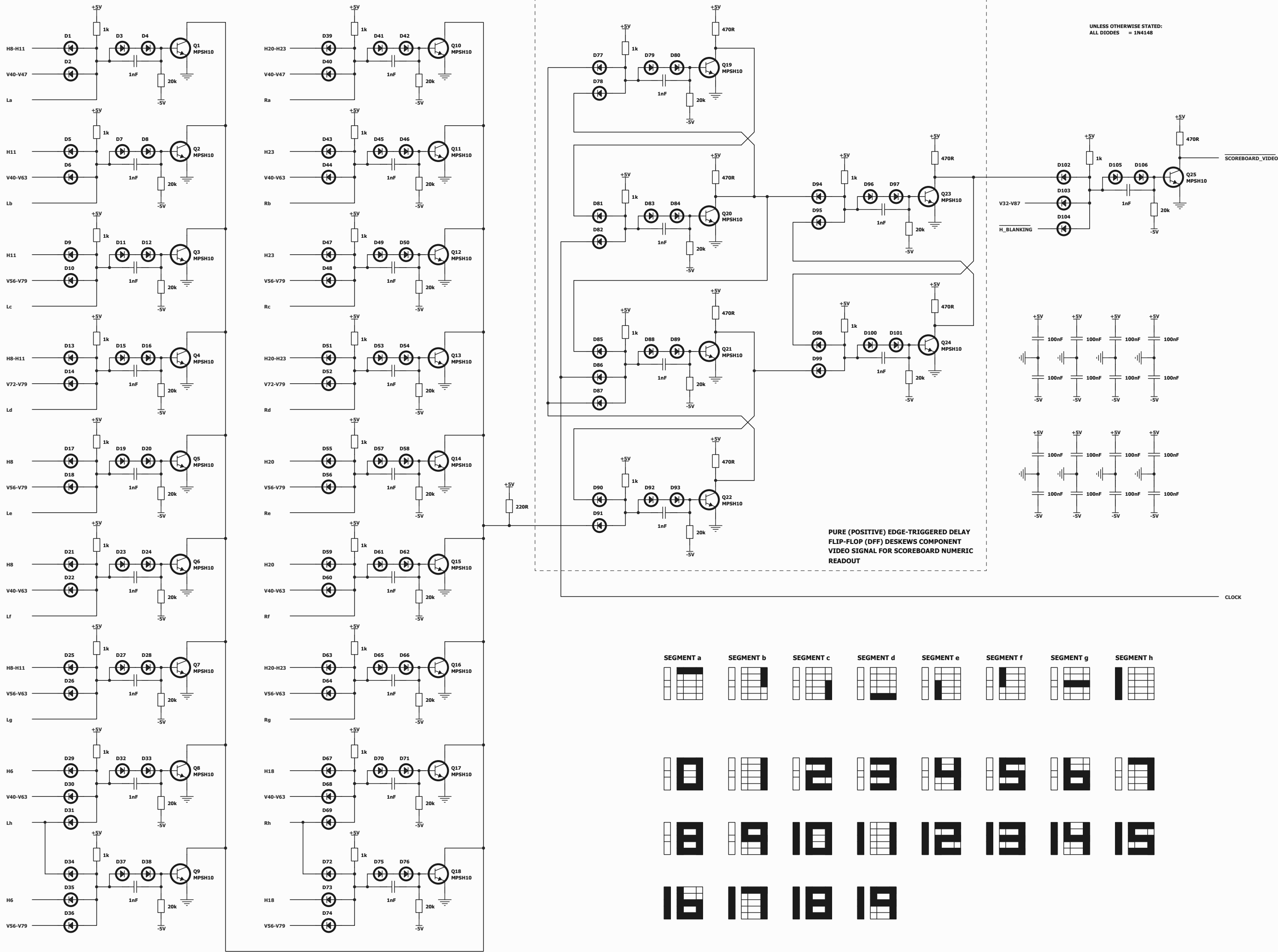


UNLESS OTHERWISE STATED:
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* POLYESTER

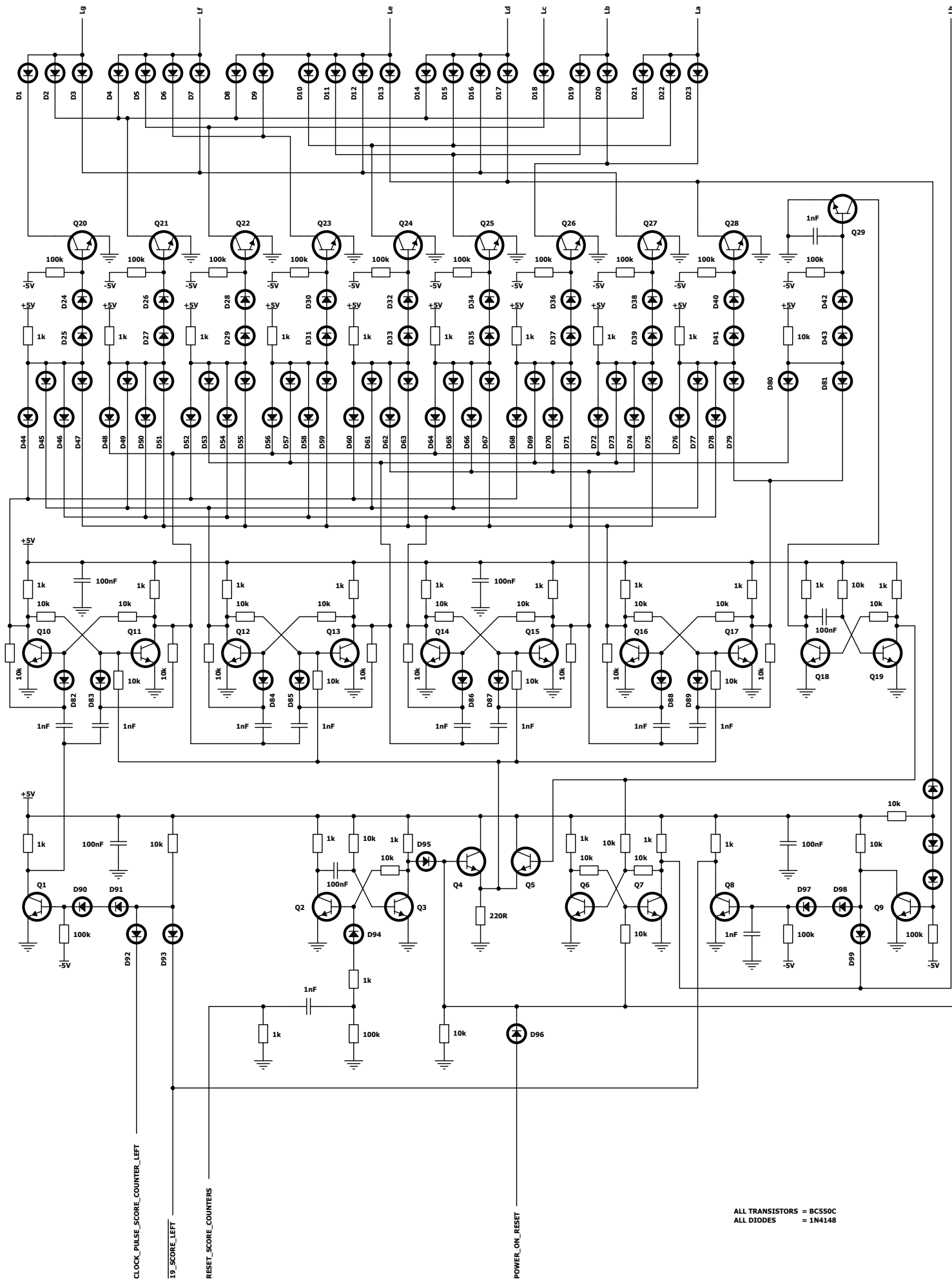
VERTICAL TIMING



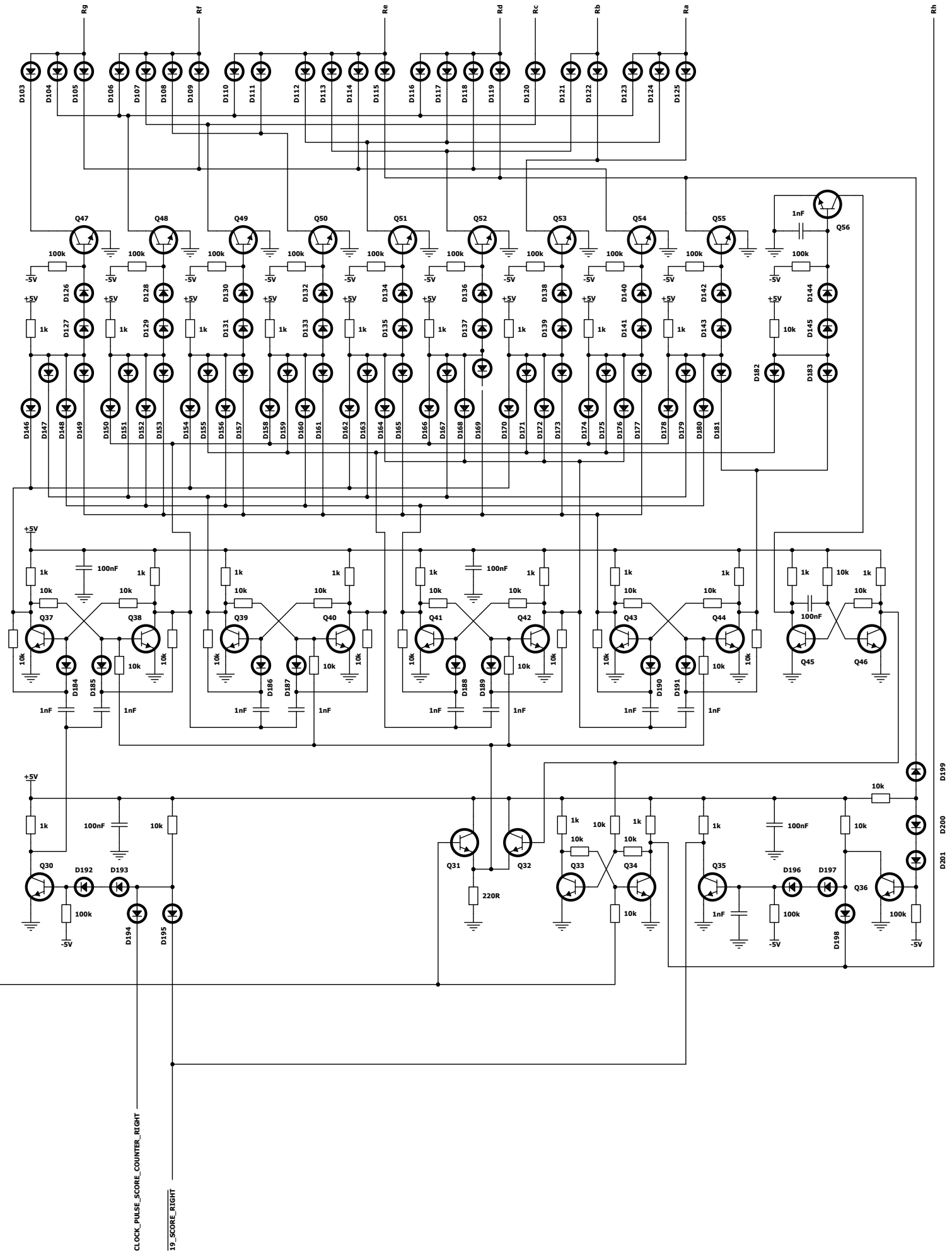
SCORE BOARD VIDEO SIGNAL



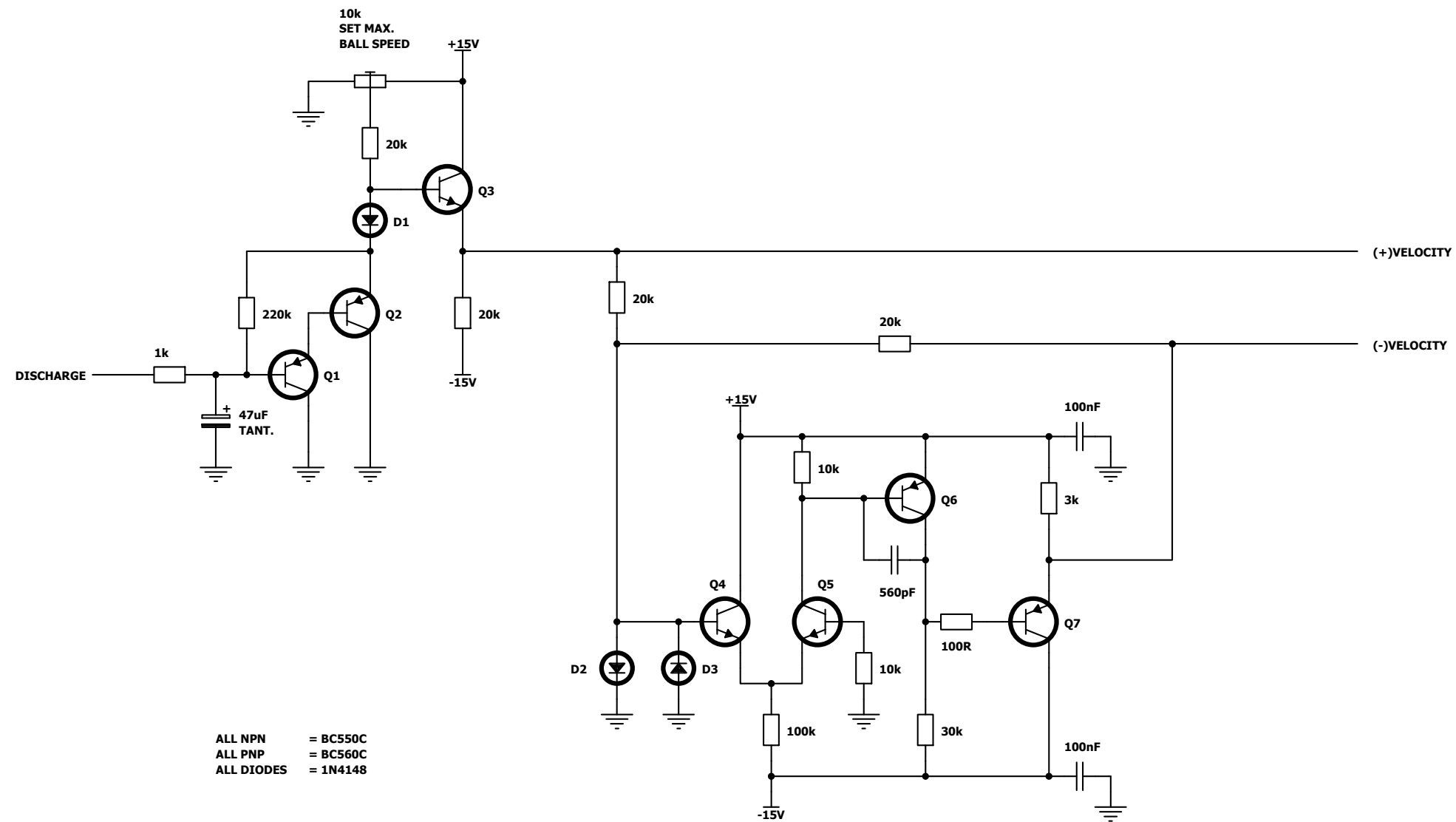
LEFT HAND (PLAYER 1) SCORE COUNTER



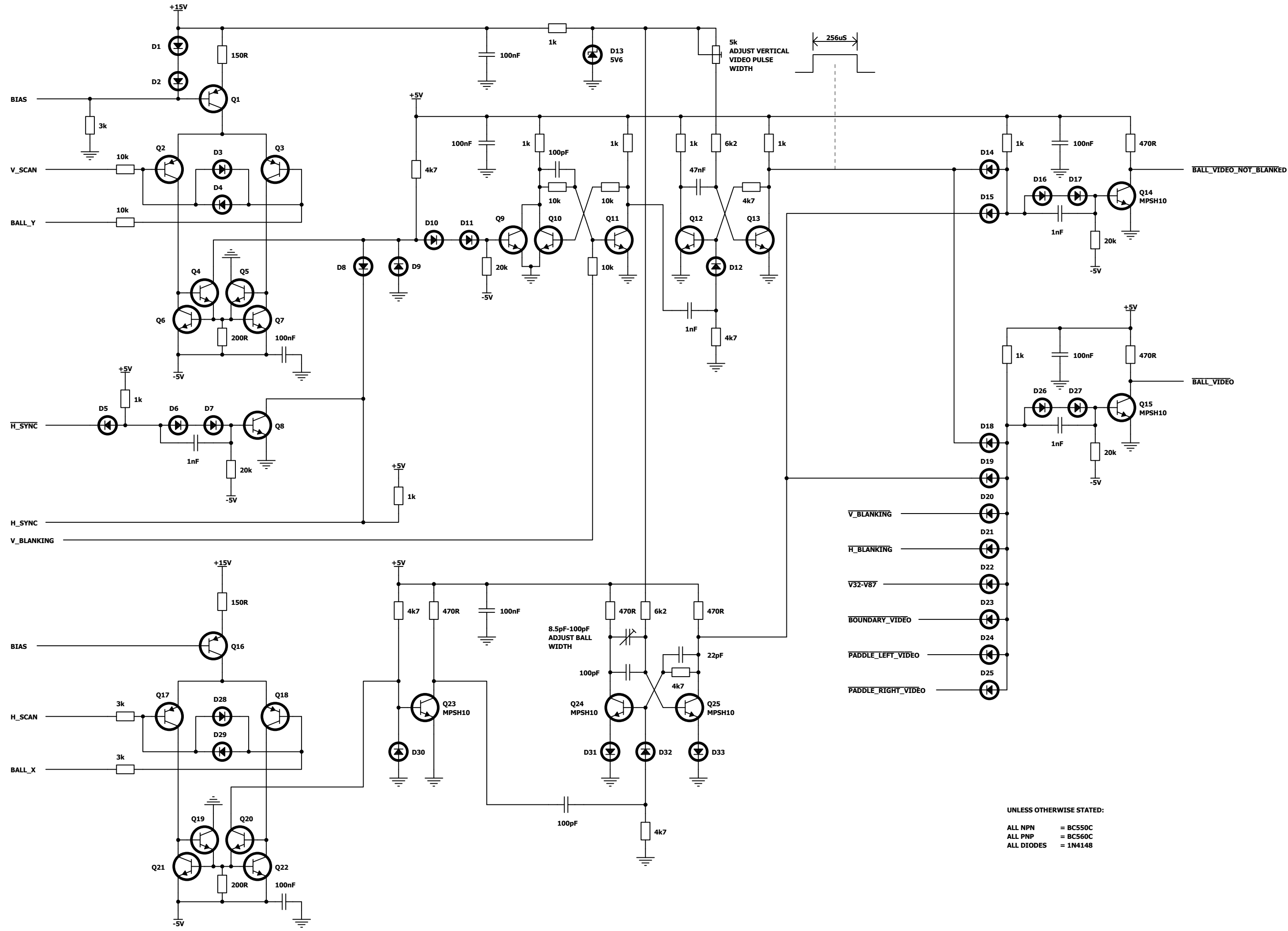
RIGHT HAND (PLAYER 2) SCORE COUNTER



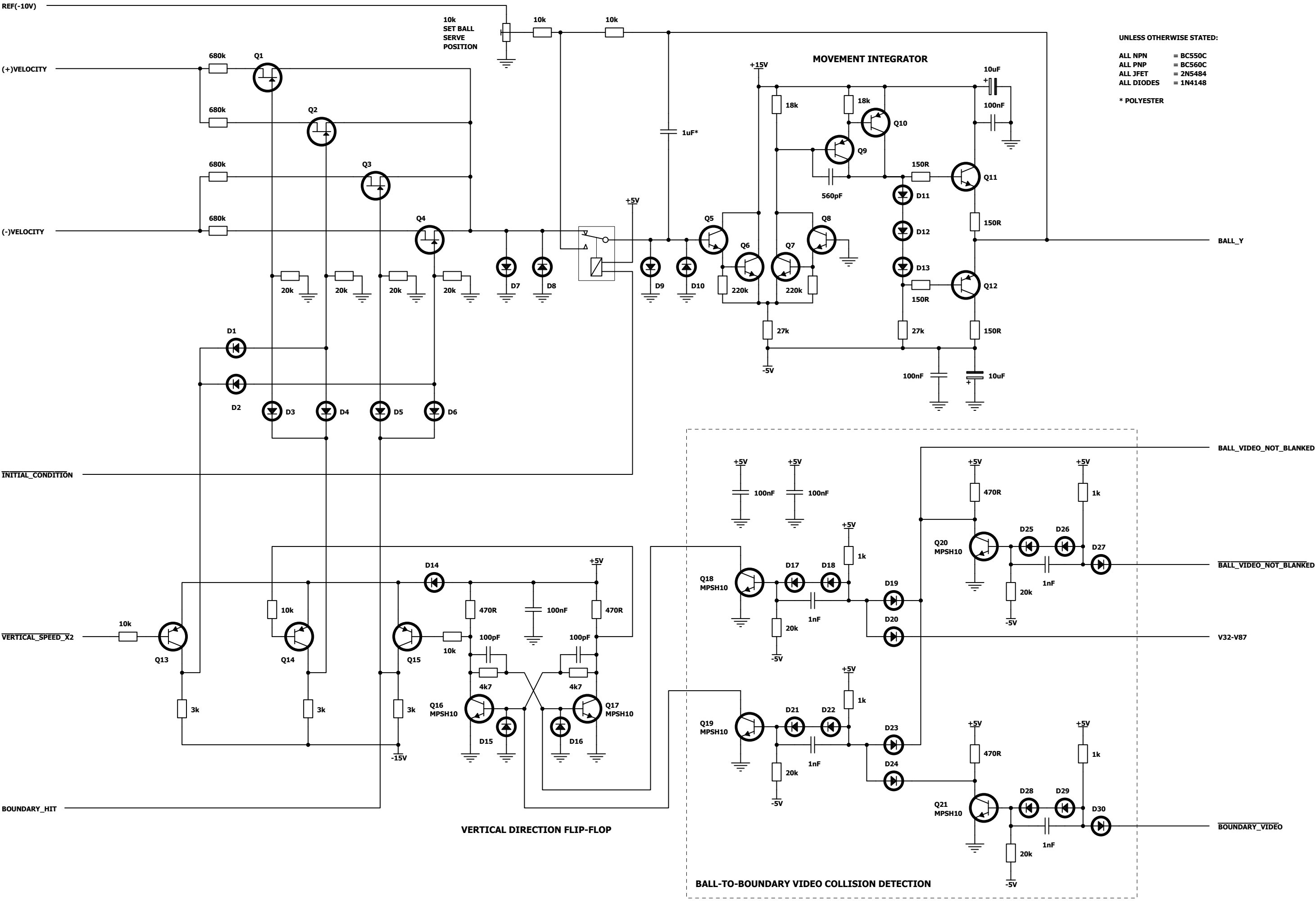
VELOCITY INTEGRATOR



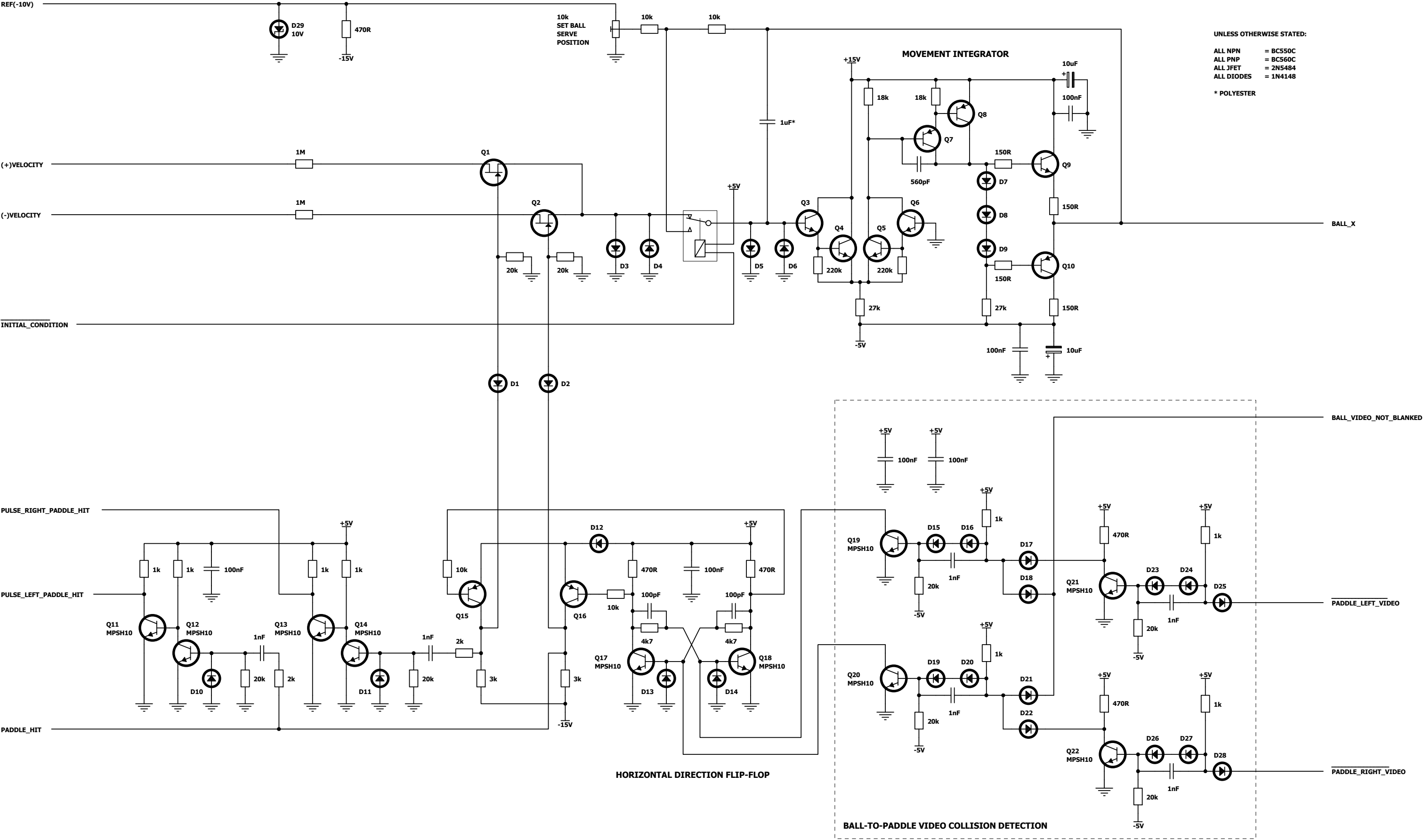
BALL VIDEO GENERATOR



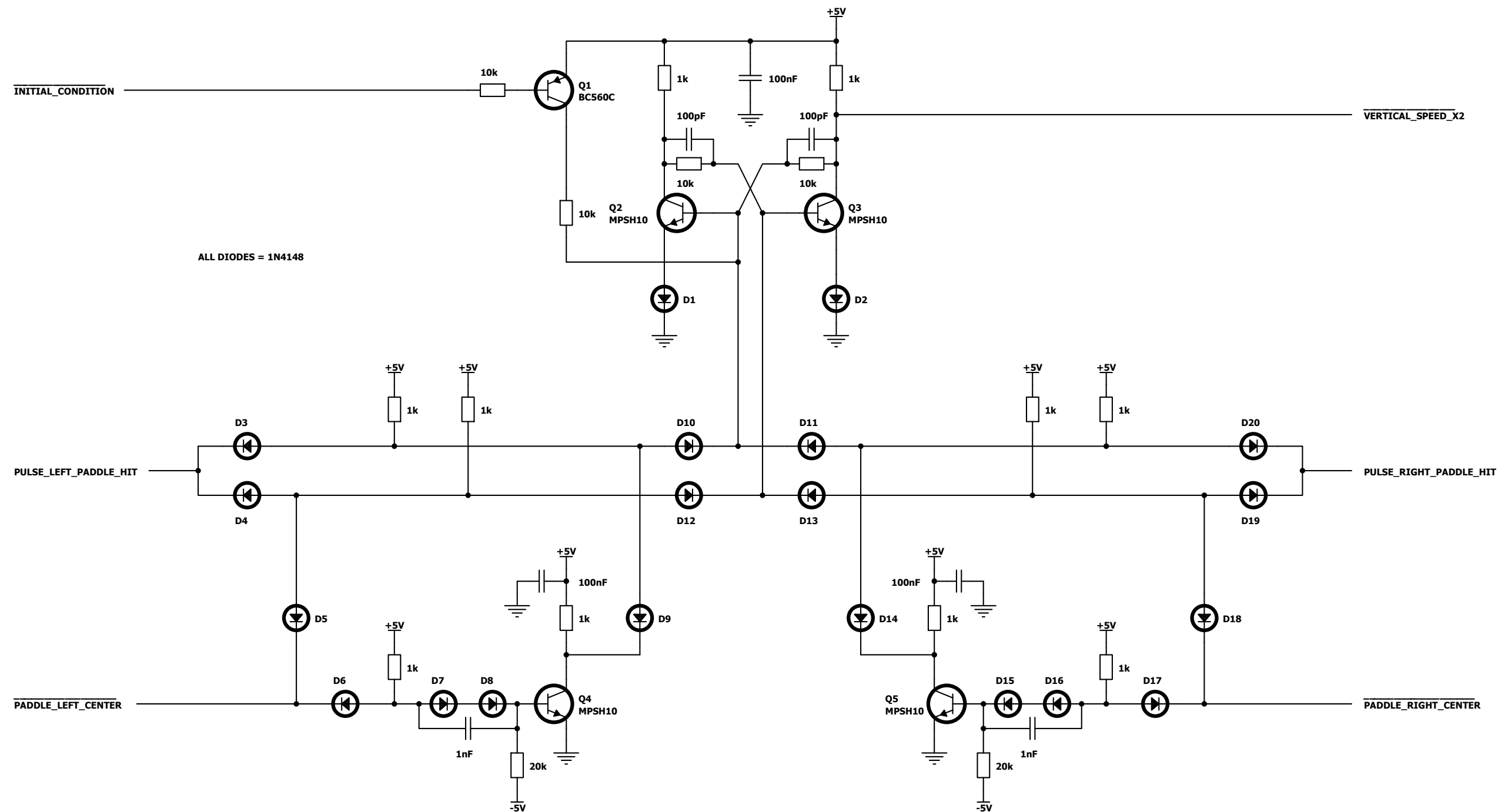
BALL VERTICAL MOVEMENT



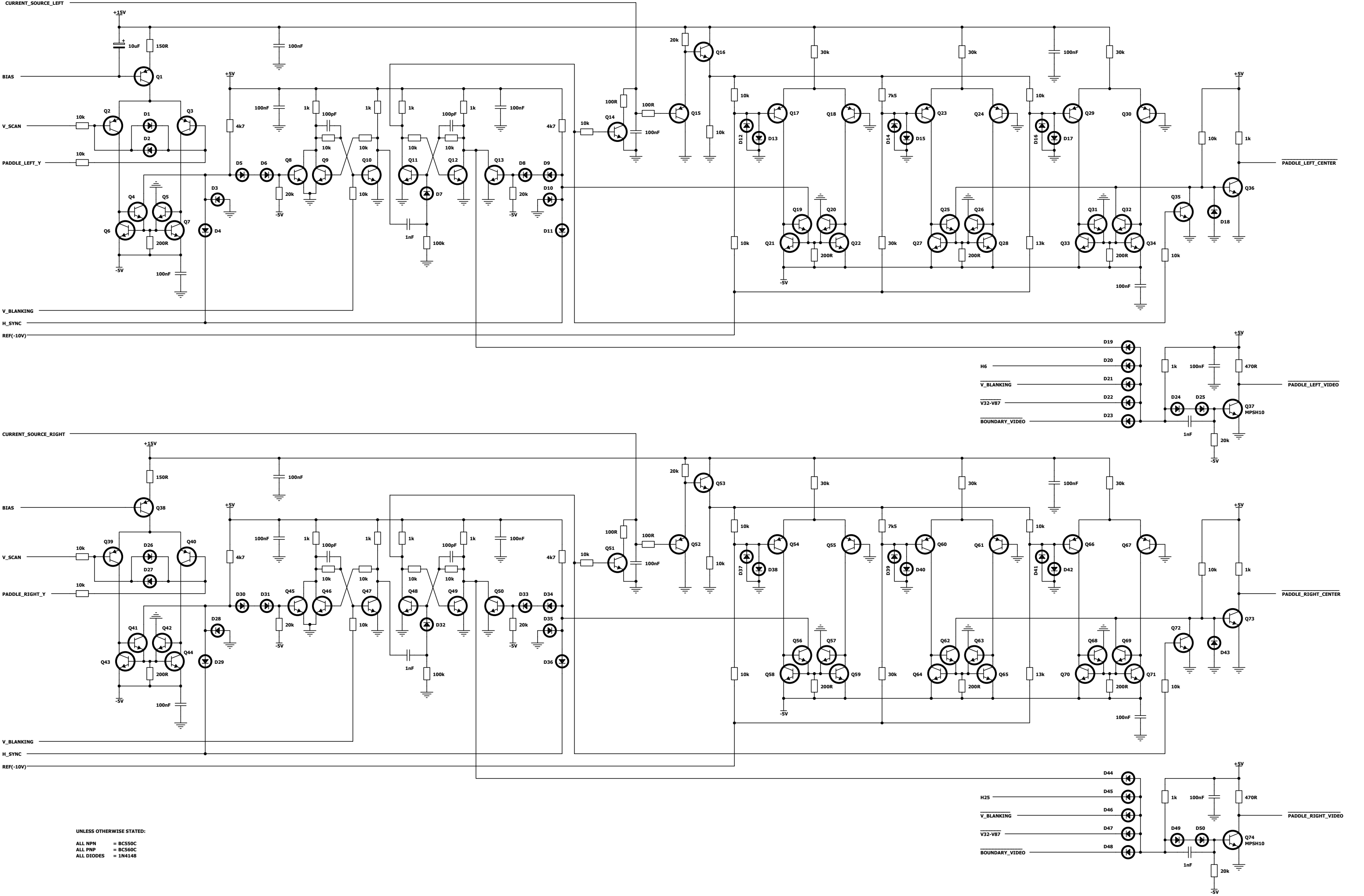
BALL HORIZONTAL MOVEMENT



BALL DEFLECTION ANGLE CONTROL

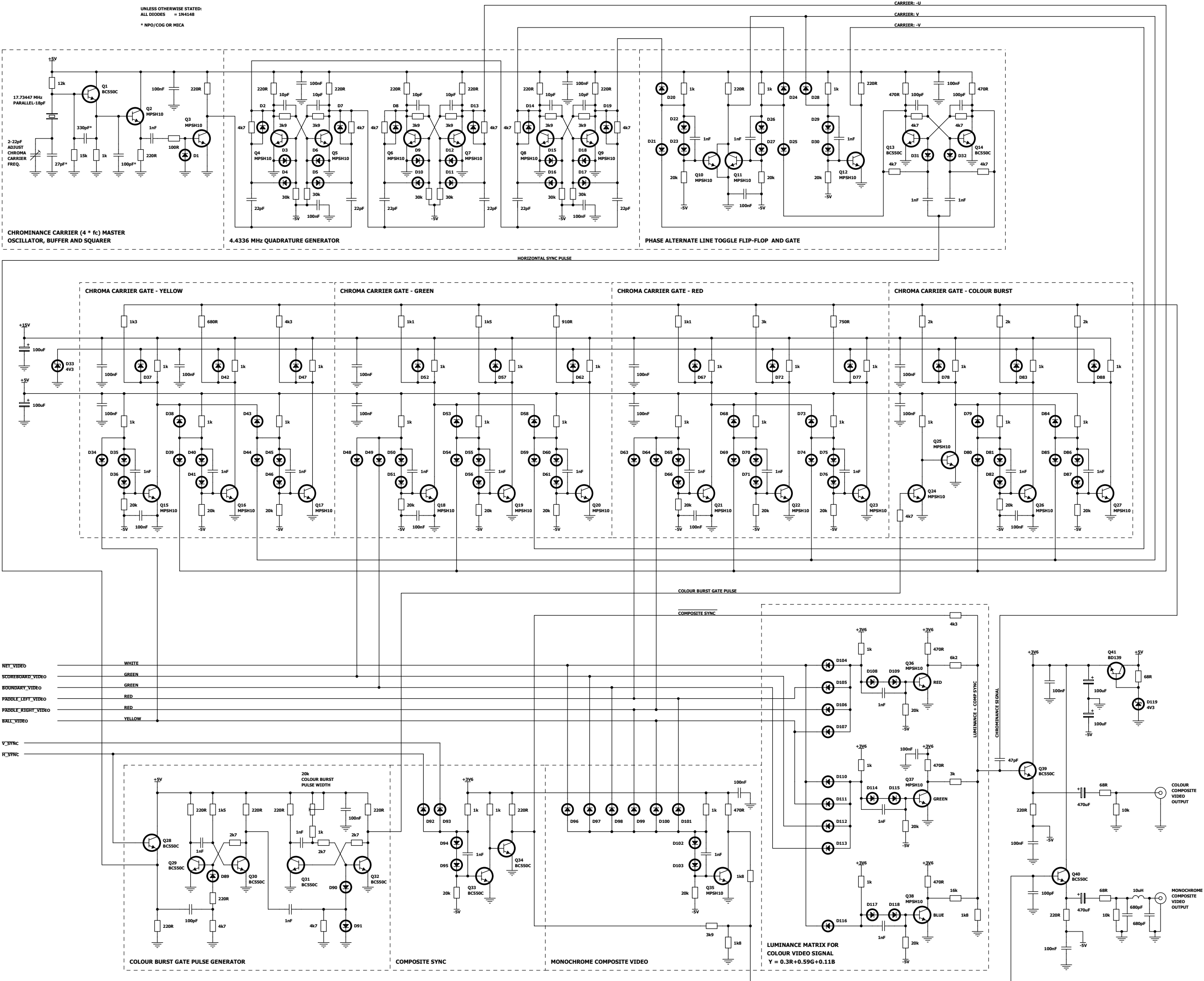


PADDLE VIDEO GENERATORS

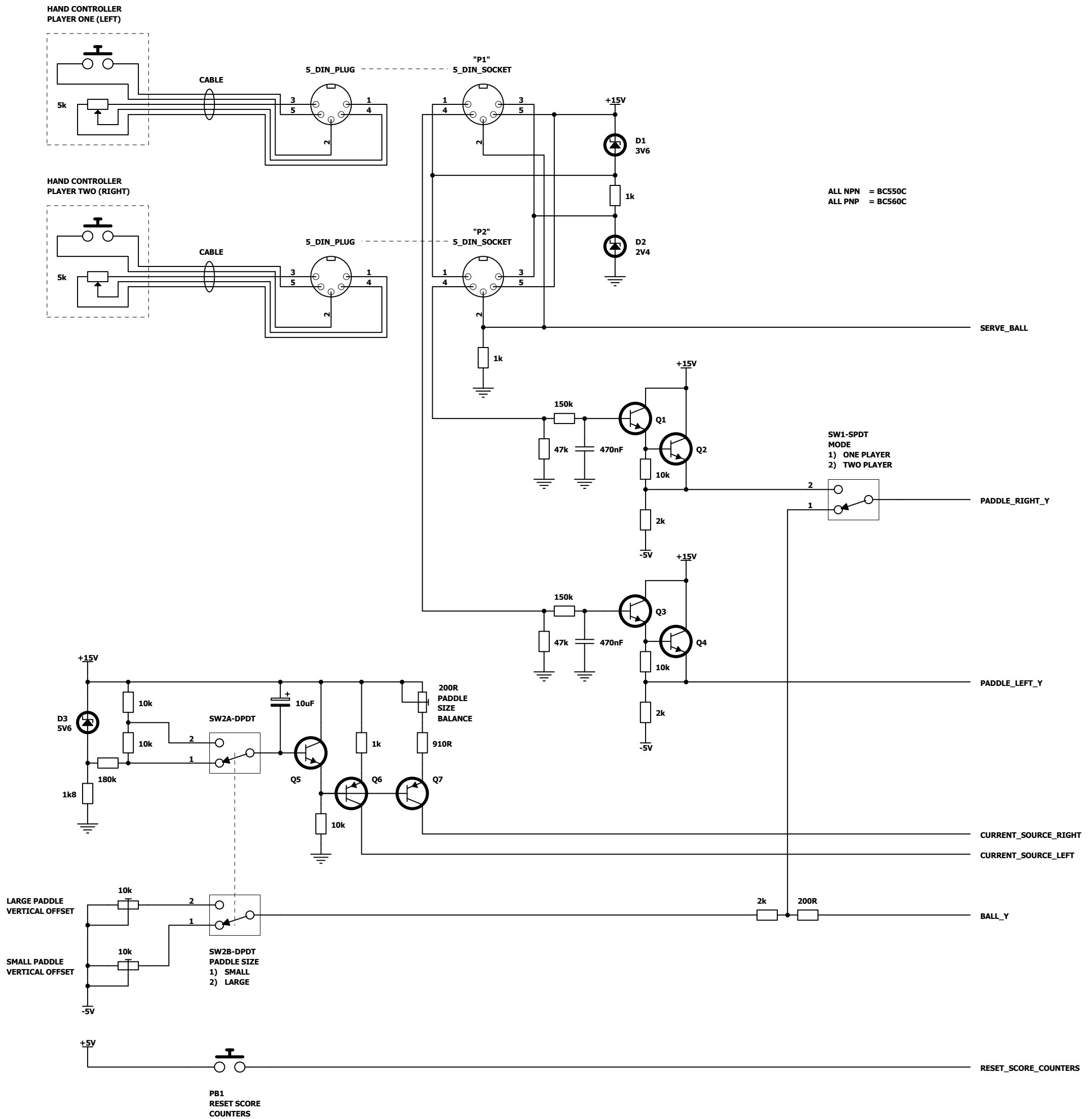


COMPOSITE VIDEO GENERATION

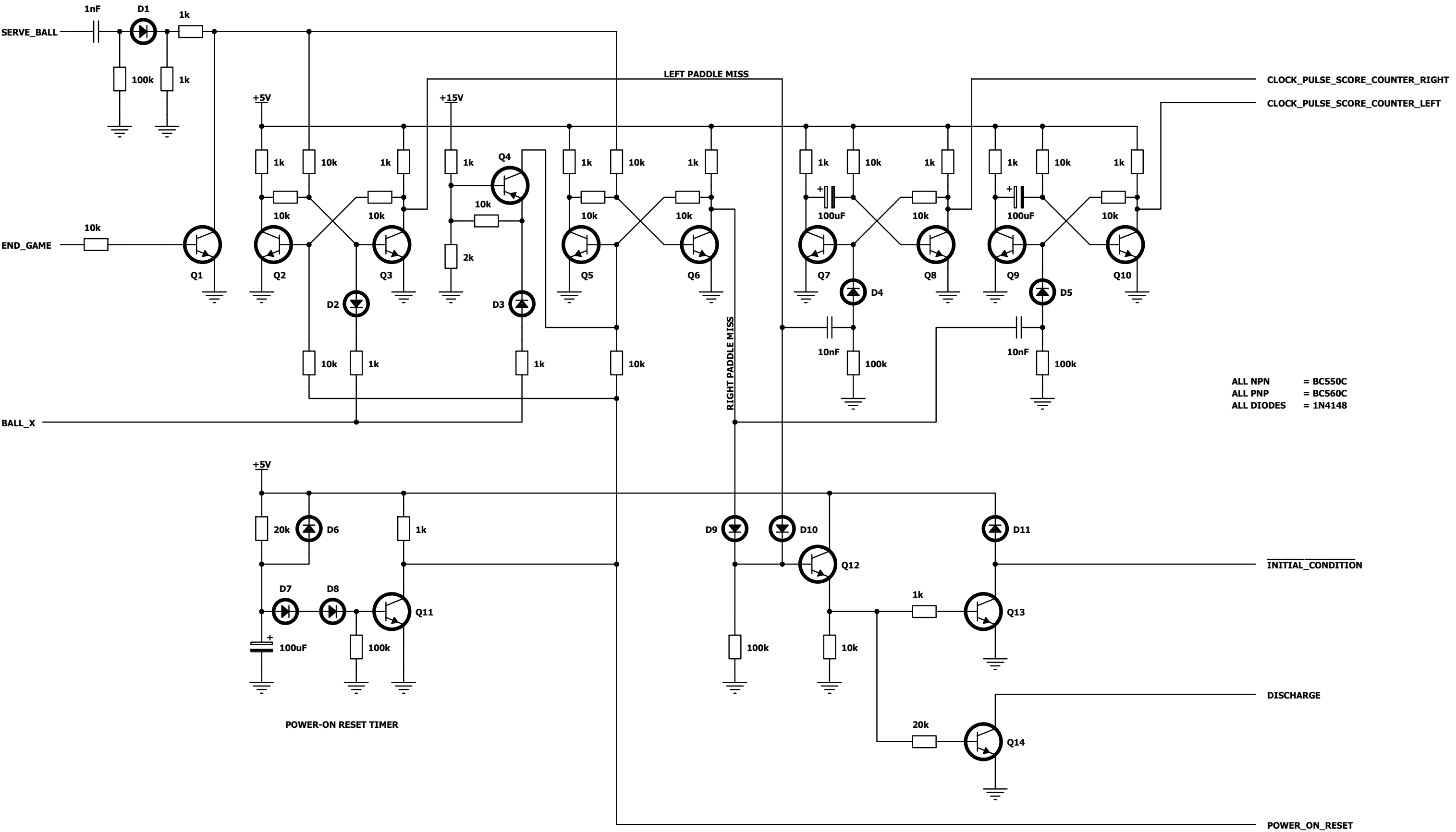
UNLESS OTHERWISE STATED:
ALL DIODES = 1N4148
* NPO/COG OR MICA



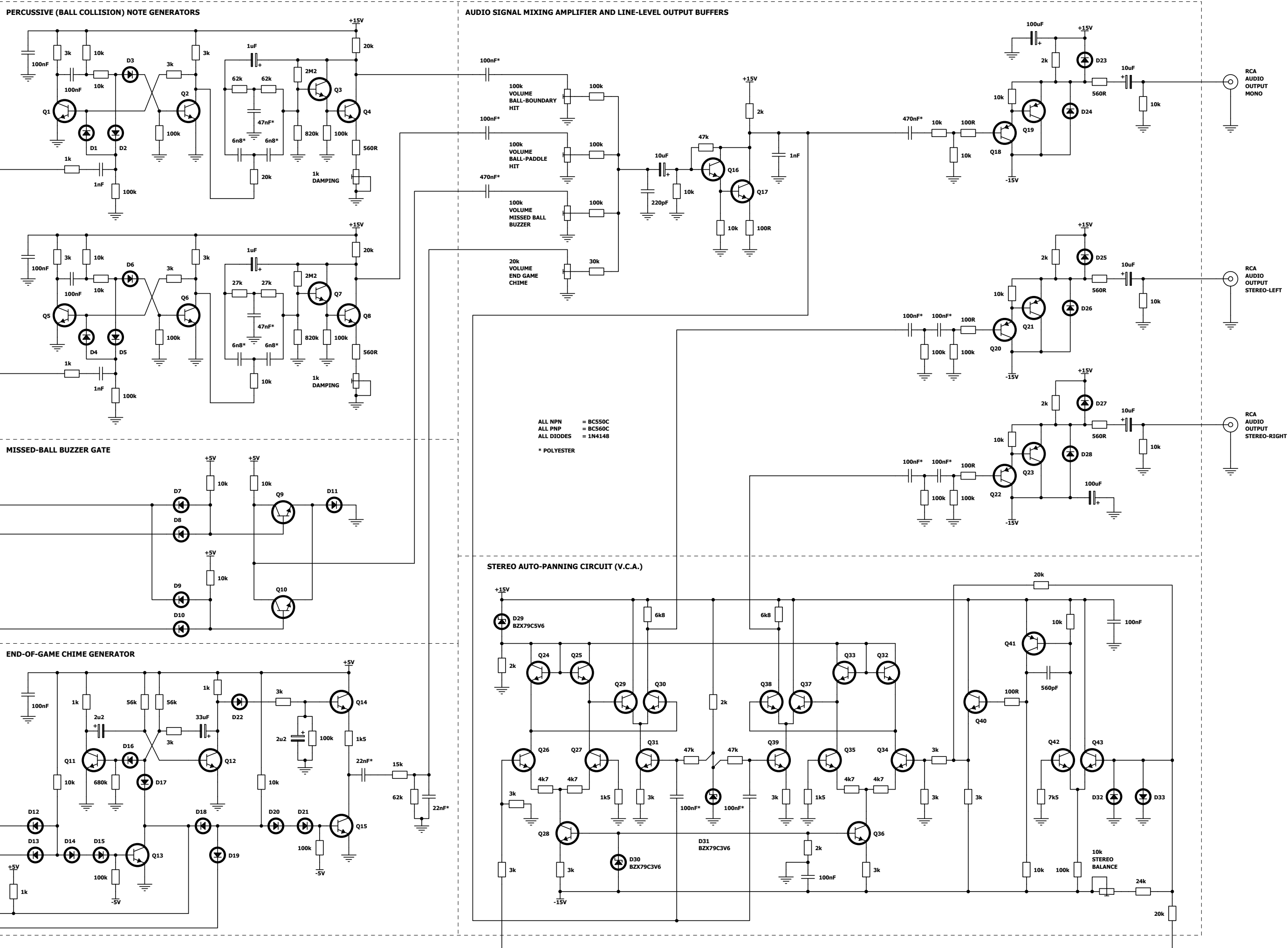
CONTROL PANEL CIRCUITS



CONTROL LOGIC



AUDIO CIRCUITS



POWER SUPPLY

