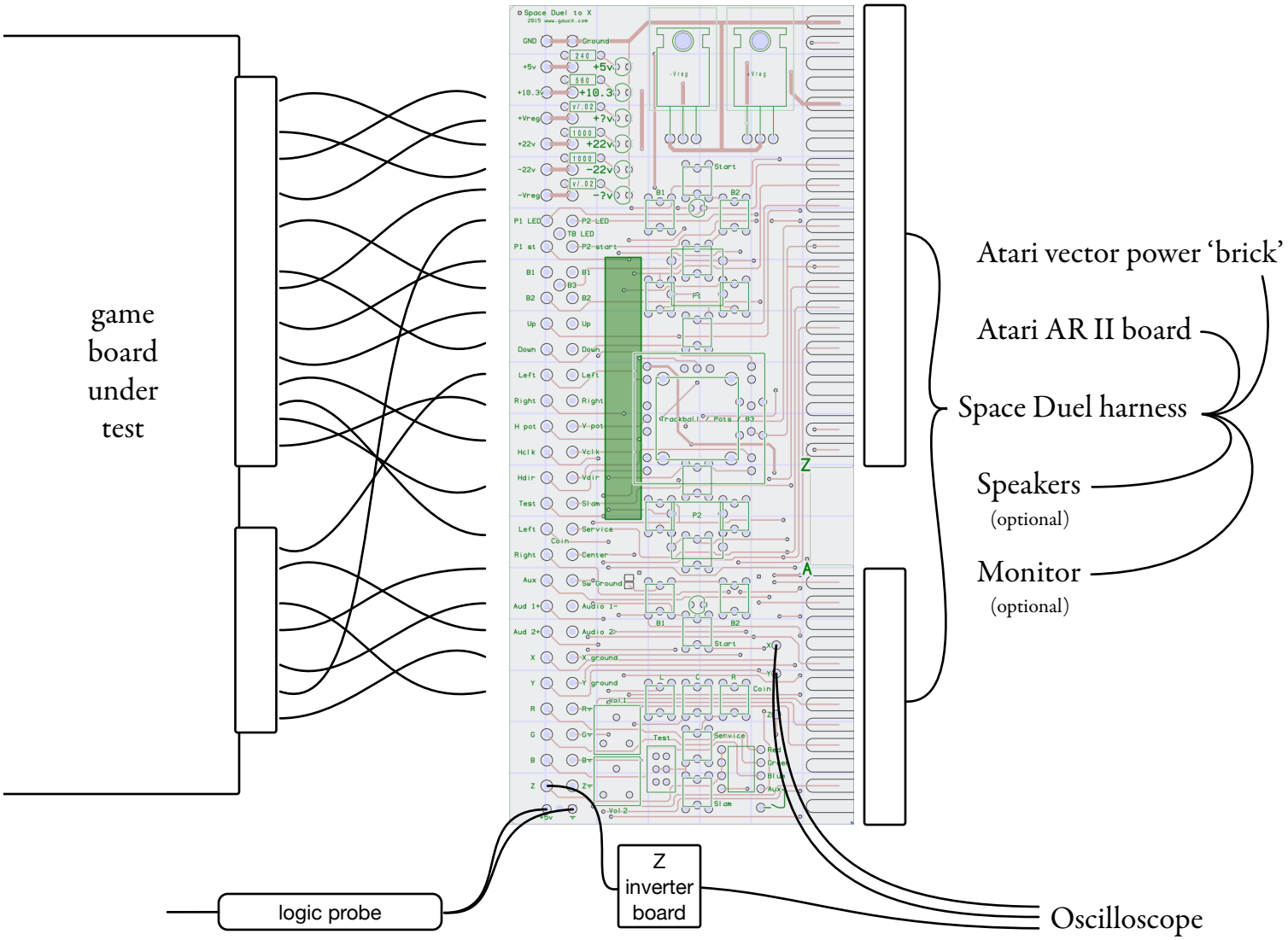
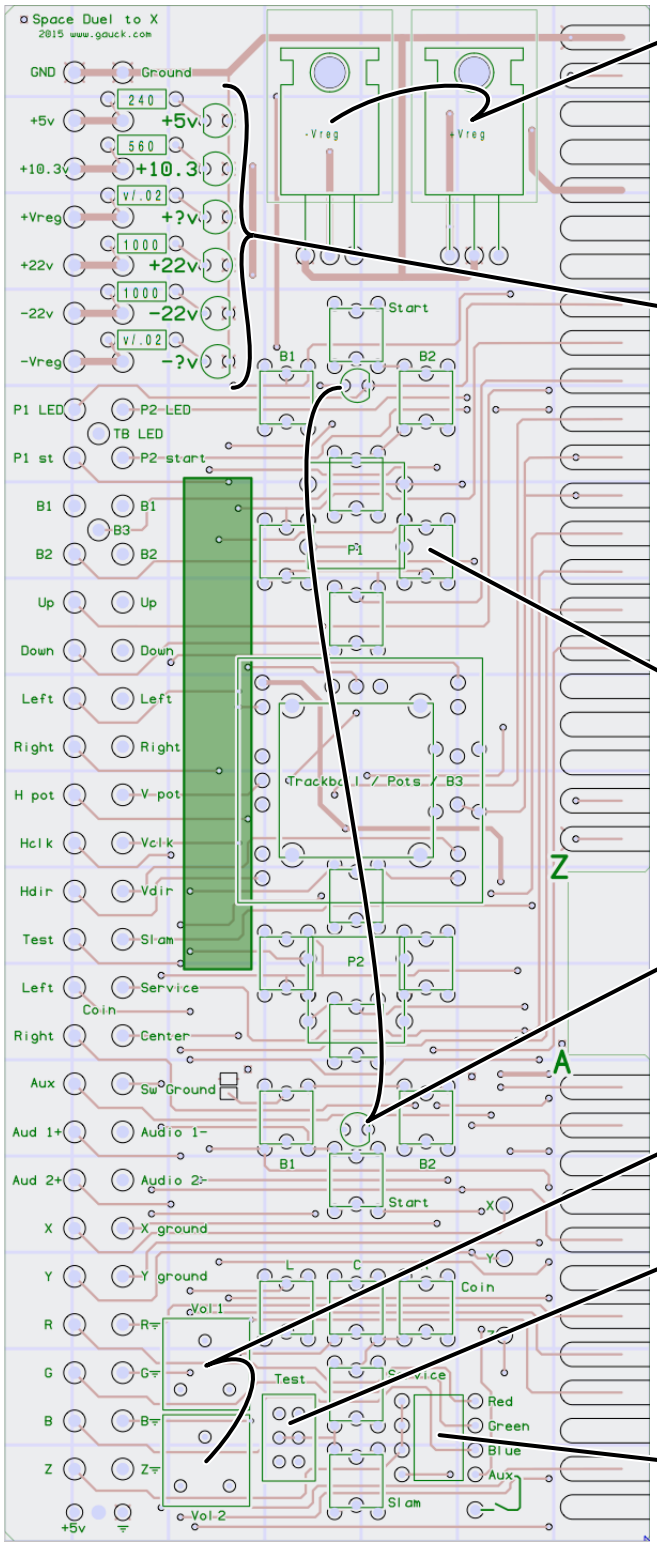
Vector Test Bench Adapter

The vector test bench adapter (VTBA) is a circuit board designed to simplify the hookup and testing of vector game boards by providing a breakout of the signals in a Space Duel harness, on-board player controls, LED power indicators, service, slam, coin, and self-test switches, volume controls, and places for a positive and negative voltage regulator for user-selectable custom power. It also has convenience hook ups for a logic probe and oscilloscope. The VTBA can be used for any vector game, anywhere from a bare board (to convert pinouts), partially populated (self-test switch and coin/service/slam buttons recommended), or fully populated for a specific game (including LEDs for P1 and P2 start). Here is an overview of where the VTBA is placed:



The VTBA plugs into a Space Duel harness, which in turn requires an Atari power brick and AR II board (rev 2, 3 or 4). Speakers are optional but recommended (for self-test beeps, etc) and can be plugged in to the harness or directly into the J8 connector of the AR II. The color vector monitor is nice to have (!) but optional if you have an oscilloscope. To help when testing multiple boards, there are extra +5v and GND points for a logic probe, as well as X, Y, and Z test points on the VTBA so the probes can be left connected when the game board is switched. The optional Z inverter board piggybacks onto the VTBA and eliminates retrace lines on a scope (with Z input).



Voltage regulators (optional): supply user-selectable voltages at the holes on the left edge of the VTBA. The -Vreg is connected to -22v and GND, and will accept a 79xx series TO-220 package. Fitting a 7905, for example, will supply -5v to the -Vreg holes. The +Vreg supplies positive voltages to the +Vreg holes by fitting a 78xx series part.

Power LEDs & associated resistors (optional): these are 3mm LEDs for each of the voltages coming from the harness (+5v, +10.3v, +22v and -22v) as well as the optional Vregs. Values are shown in ohms, and for the user-selectable voltages the calculation is shown assuming 220ma LEDs. For example, a 7905 Vreg supplies -5v so the resistor needed would be -5v/0.02a which is 250 ohms. Note the LED orientation for negative voltages is flipped.

Buttons: small tactile buttons of either two or four legs can be fitted. The two holes are 5mm apart, and the four holes are in a 6.5x4.5mm pattern. Holes are 1mm in diameter so you can pick the button style, feel and color you prefer.

P1 & P2 LEDs: size is 3mm, the required resistors are assumed to be on the game board under test (true for Atari). If not, wire one in series with the lead leaving the VTBA.

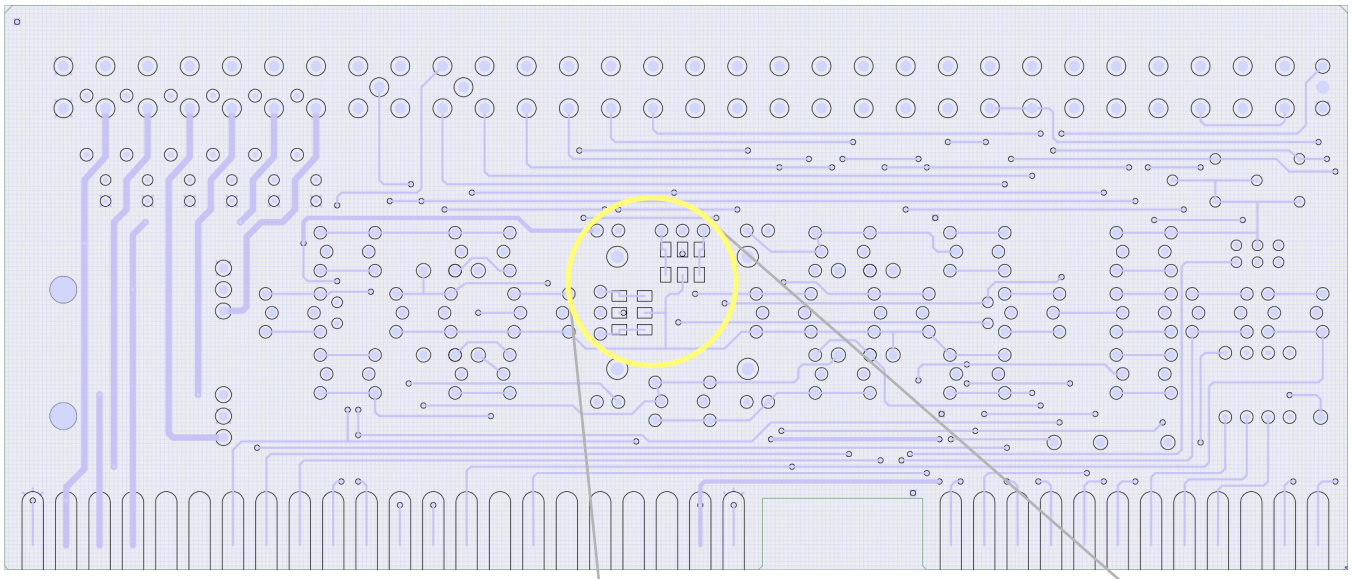
Volume pots: Atari used 5K pots. The pin spacing is 0.2 inches.

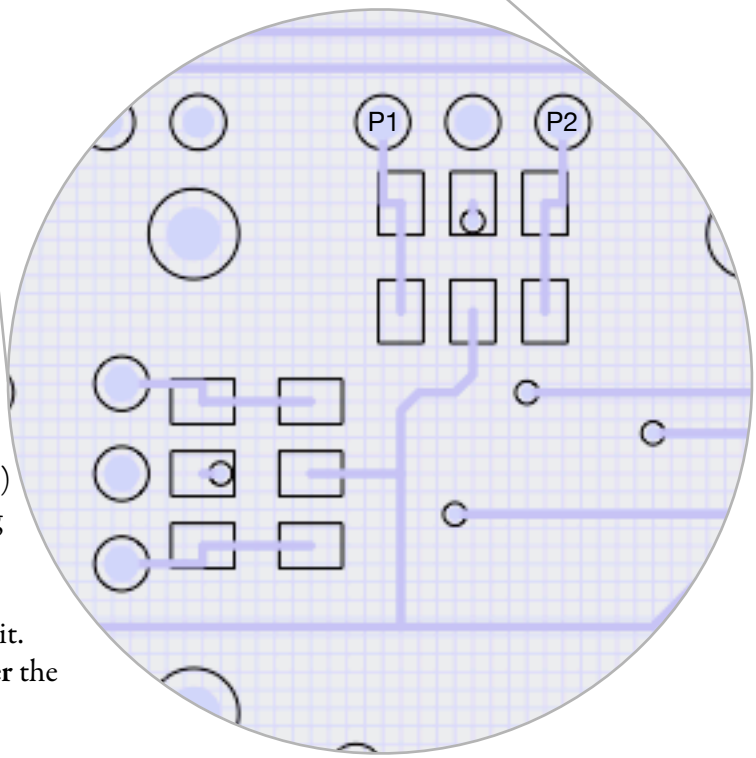
Test switch: pins are 2.5mm apart and a single pole switch could be fitted using the right side column. A double pole switch will fit (the second column of pins are 2mm away) and used for another purpose or the top terminal bridged for redundancy.

DIP switch (4 pos): For B&W games, the incoming Z channel can be connected to the red, green, and/or blue for display on the test monitor hooked up to the harness. Or, the outputs from a color game can be connected to the Z channel for individual or combined display on a scope. The fourth switch connects the 'Aux' input (and pin R) to whatever is wired to the nearby terminal - so that switch can ground 'Aux' or send it +5v or whatever. Note that pin R is already wired to switch ground in a Space Duel cocktail harness.

Note about switch ground: it is separate from signal ground in the harness and on the VTBA, and usually combined on the game board. There are solder pads near the Sw. Ground terminal for you to bridge if you'd like to be sure.

When using an analog joystick, each axis must be configured using the two groups of six split pads on the bottom side of the board:



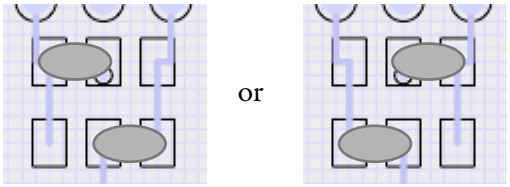


These six pads are arranged to allow one end of the joystick's potentiometer to be connected to ground, and then other end connected to +5v.

Looking at the top grouping, one end of the pot comes through the board by way of hole P1, and is connected to the two pads below it. The other end of the pot comes through P2 and connects to the two pads below it. The unlabeled hole between P1 and P2 is the wiper going to 'V pot.'

One of the center pads is +5v (top pad with the circle) and the other is ground (bottom pad with trace going downwards). Using a blob of solder, bridge the upper of the P1 pads to the +5v pad next to it, **OR** bridge the lower P1 pad to the ground pad next to to it. The P1 end of the pot should now connected to **either** the center pad for +5v or the center pad for ground.

To connect the other (P2) end of the pot, form another solder bridge from one of the P2 pads to whichever center pad was **not** used in the first step. The two valid configurations are shown below.



or

Test the first axis. If your player moves opposite from the desired direction then redo both solder blobs to change from one configuration to the other. If your player moves along the wrong axis (up/down instead of left/right) then swap the wires between 'V pot' and 'H pot.' Once it's sorted, rotate the board 90° clockwise and repeat for the other pot.