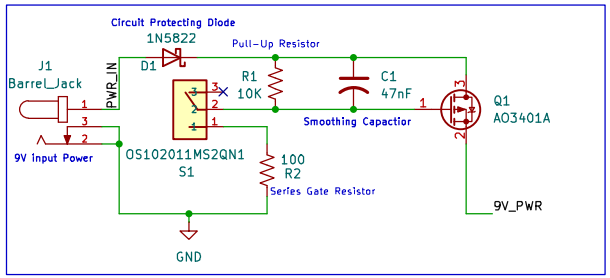
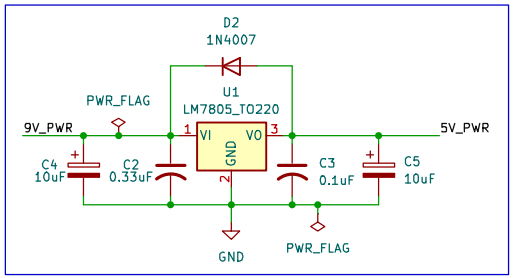
Input power with High-Side Switch.

The P-Channel MOSFET (Q1) functions as a high-side power switch, controlling the flow of 9 V to the rest of the circuit.
When the gate voltage (Vg) equals the source voltage (Vs), the MOSFET is off; when Switch S1 pulls the gate low, Vgs becomes negative, turning the MOSFET on and allowing current to pass to the output.
The pull-up resistor (R1) keeps the MOSFET off when the switch is open, while the series gate resistor (R2) limits surge current when charging or discharging the gate.
The smoothing capacitor (C1) slows gate voltage changes, creating a soft start and reducing inrush or electrical noise during switching.
The Schottky diode (D1) provides reverse-polarity protection, ensuring current only flows when the power supply is correctly connected.
Together, these components form a safe, reliable, and noise-resistant high-side power control stage for the breadboard supply.



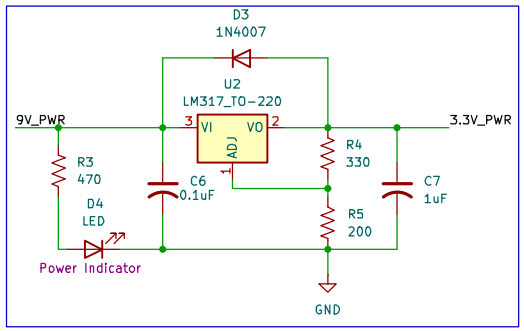
9V input to 5V out circuit

The LM7805 (U1) linear voltage regulator converts the 9 V input to a stable 5 V output for downstream circuits.
Input capacitors C4 (10 µF) and C2 (0.33 µF) smooth and filter the supply, reducing input ripple and noise before regulation.
Output capacitors C5 (10 µF) and C3 (0.1 µF) stabilize the regulator and reduce voltage fluctuations under varying load conditions.
The protection diode D2 (1N4007) prevents reverse current from the output to the input when power is removed or reversed.



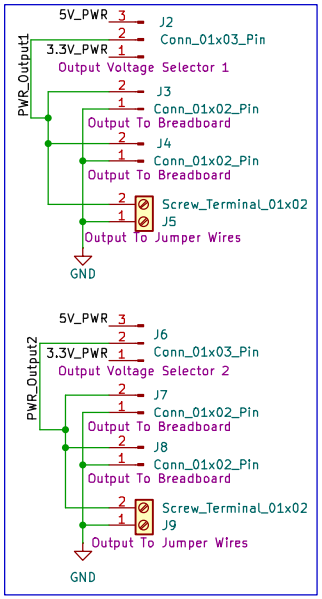
9V input (after switch) to 3.3v out circuit

The LM317 (U2) adjustable regulator converts the 9 V input to a stable 3.3 V output using the resistor pair R4 (330 Ω) and R5 (200 Ω) to set the output voltage.
The 0.1 µF capacitor (C6) filters input noise, while C3 (1 µF) stabilizes the output and improves transient response.
The 1N4001 diode (D3) provides reverse-current protection when powering inductive or capacitive loads.
An indicator LED (D1) and current-limiting resistor (R3) show when the circuit is active.



Jumper pin selection for 5V or 3.3V output to headers & Screw terminal

Each output rail can be independently configured to supply either 5 V or 3.3 V using the jumper headers (J2/J6) as voltage selectors.
The selected output voltage is distributed to two pairs of breadboard header pins (J3-J4, J7-J8), providing reliable power delivery to both sides of the breadboard.
Additional screw terminals (J5/J9) offer a convenient way to connect external jumper wires or power auxiliary circuits.



Output Power Specifications

This circuit provides regulated 5 V and 3.3 V outputs derived from a 9 V input using linear regulators (LM7805 and LM317).
Because linear regulation dissipates heat as voltage drop × current, thermal limits constrain sustained output current.
At 9 V input, the 5 V regulator dissipates about 4 W at 1 A and the 3.3 V regulator about 5.7 W at 1 A.
With modest heatsinking, each rail can reliably supply ≈300-500 mA continuous, and short bursts up to 1 A.
1.5 A represents the theoretical upper limit of the regulators and input path, but thermal protection may trigger under prolonged load.
Upgrading to switching regulators or improved cooling can raise efficiency and current capability in later revisions.

Evan Stewart

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Title: Breadboard Power Supply		
Size: A4	Date: 2025-10-15	**Rev: 0.2**
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