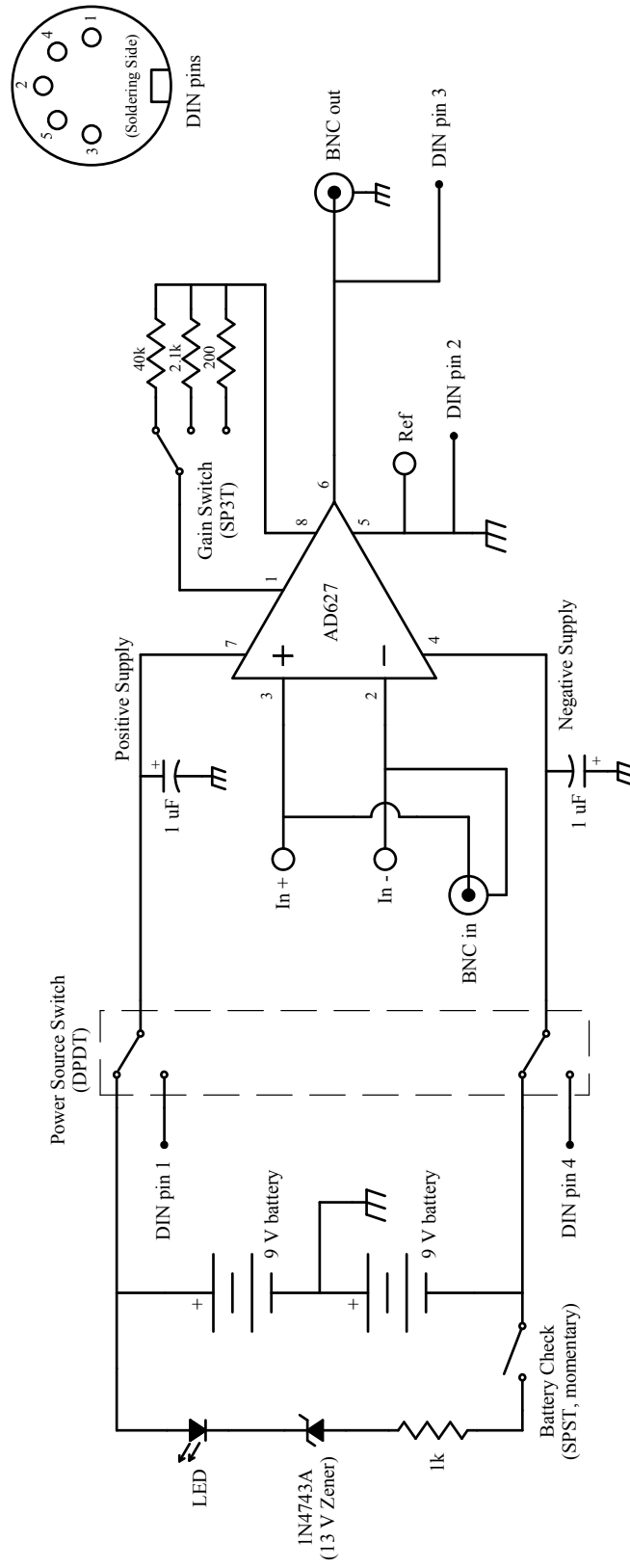


# Instrumentation Amplifier Circuit



## Notes

The circuit design that we will use for the class project is based on the AD627 amplifier chip from Analog Devices.

**Power Supplies:** The circuit is designed to run off of either a pair of 9 V batteries, or an external power supply. The “Power Source” switch selects which power source to use. If no external supply is connected, that setting can be used as an ‘off’ switch for the batteries.

**Battery Check:** A battery check LED is also provided. When the “Battery Check” switch is closed, the battery voltage is applied to the zener diode/LED circuit, and the LED will illuminate if the total voltage is larger than about 15 V. The switch is momentary, meaning it stays open except when you manually hold it closed. That prevents the check circuit from draining the batteries while not in use.

**Gain Selection:** The amplifier gain is selected via a three-position switch. The resistor values must be chosen accurately to get the desired gain. Your final circuit should exhibit a dc gain within 1% of the specification.

**Connectors:** The circuit features multiple input and output connectors for maximum flexibility. The input signals can be either taken from a pair of banana plug jacks (In+ and In- in the diagram), or a single BNC jack. The output signal is provided through a BNC jack and also through a multipin DIN connector. The DIN connector also provides the external power supply connections. An illustration of the DIN pin assignments is shown at the top right.

**Reference Connection:** The reference output (pin 5 of the chip) is used to sense ground. In battery operation, it need not be tied to actual earth ground, since the entire circuit can float to any voltage. The reference terminal must, however, be attached to a point in the test circuit such that both  $V_+$  and  $V_-$  are within the supply voltage range. For example, if you want to measure the difference between two points at  $V_+ = 100.0$  V and  $V_- = 99.9$  V, the reference terminal must be held at a point between about 91 V and 109 V, assuming  $\pm 9$  V supplies. Typically, you would hook the reference up to either  $V_+$  or  $V_-$  in this situation. A banana jack output (Reference) is provided to make such a connection.

Note, however, that if the circuit is grounded through another point, such as when the output is connected to an oscilloscope, then the reference voltage will be grounded through that other connection.