

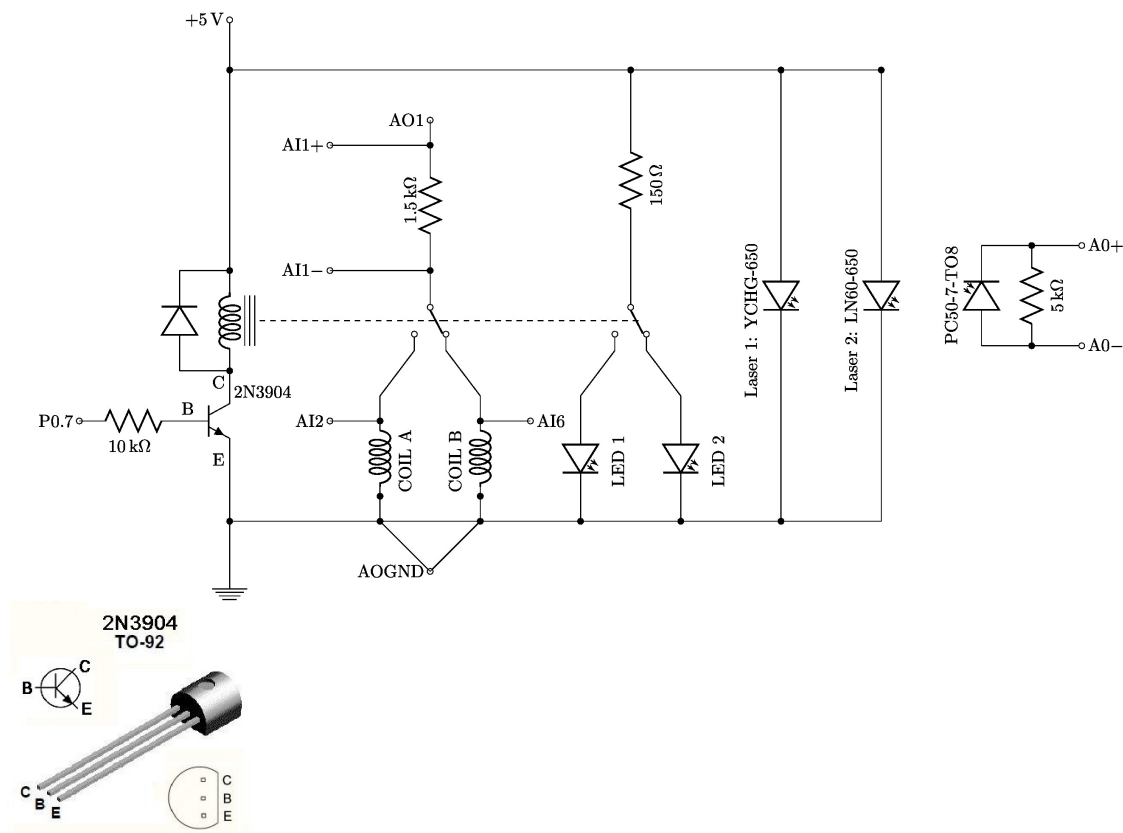
# An alternative circuit for the NIST LEGO Watt Balance

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We built our first LEGO Watt Balance in the summer of 2012. Since then we have built four more devices, iteratively streamlining various components. In the end, we found a cheaper and easier way to build the instrument by using two simplifications:

1) National Instruments<sup>1</sup> released a new USB data acquisition device, the USB-6001. This device has bipolar analog output, which is necessary for the LEGO Watt Balance. This single device replaces both the Labjack and Phidget described in the text.

2) We also discovered the laser modules can be powered with 5 V. Hence, there is no need to use a voltage regulator.



The new circuit diagram is shown above. We will provide software for both versions of the electronics.

<sup>1</sup>Certain commercial equipment, instruments, or materials are identified in this paper in order to specify the experimental procedure adequately. Such identification is not intended to imply recommendation or endorsement by the National Institute of Standards and Technology, nor is it intended to imply that the materials or equipment identified are necessarily the best available for the purpose.