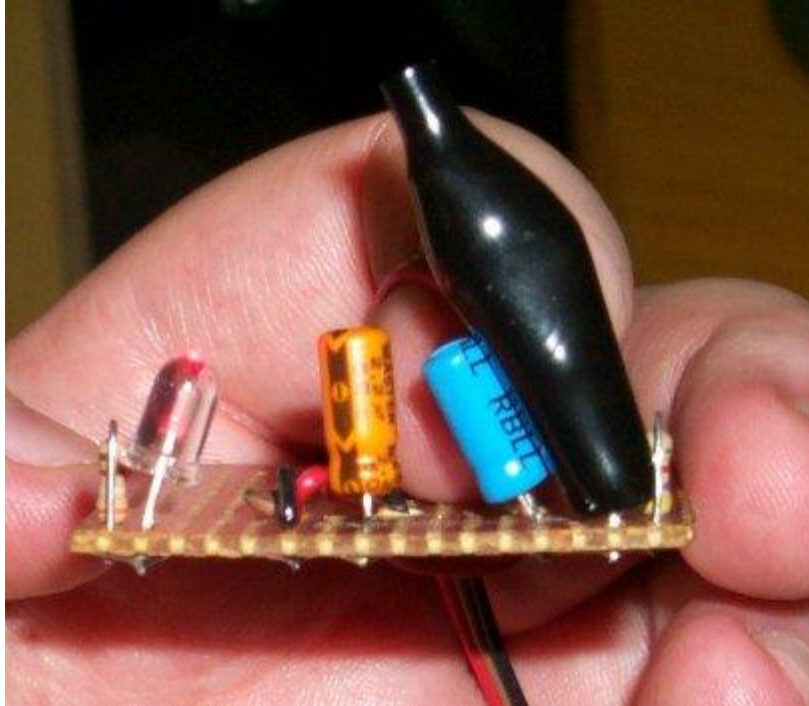


Optical Tachometer

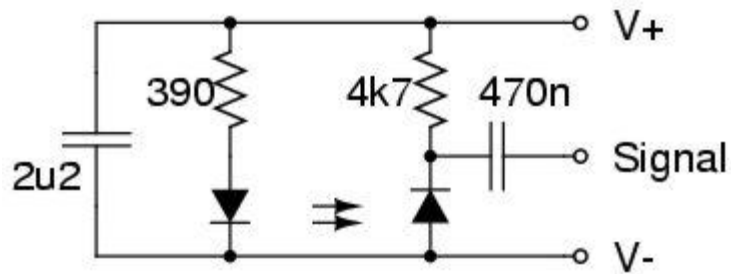


I built this simple reflection-pair optical tachometer head for my CD-ROM structural strength experiments. I needed a simple and accurate way of measuring their angular speed, while I spun them, before I could proceed to more scientific tests.

The circuit is simplicity itself. There is a red LED to illuminate the target and a photo diode in photo-conductive mode to pick up the reflected light. A simple three-wire (supply/signal/common) umbilical feeds back to the power supply and readout. Currently I use my CRO for the readout, but I have left room on the head board for a pre-amp to help integration with a counter circuit at a later stage.

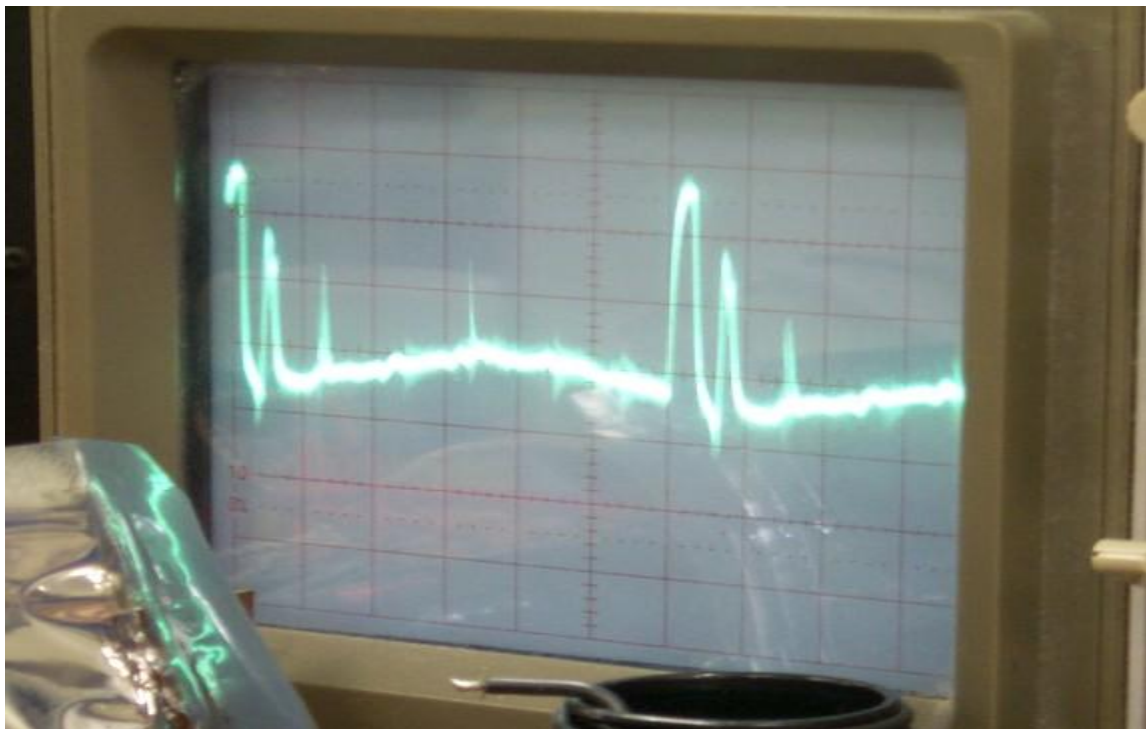
As you can see in the picture, I am using a boot from a alligator clip as the light shield. The resulting signal is about 50mV pk-pk for the difference between the shiny CD surface and a black region painted on with a whiteboard marker.

Optical Tachometer Head



The supply voltage is 6V, but anything that correctly biases the red LED and photo diode with the given resistor values will work fine. I used 4 AA penlight cells in a holder than offers a 9V battery snap style connector.

Below is an image of the signal observed while monitoring a CD being spun via a small electric motor. The two peaks are from the non-reflective black lines on the CD the smaller blurry peaks are the RF noise from the electric motor (Their constant phase relationship with the optical signal indicates the drive connection is solid with no slip, their number also confirms the motor has 3 poles). The vertical gain is 20mV/div and the horizontal rate 2ms/div, giving an RPM of about 4800.



SOURCE: <http://www.vk2zay.net/article/29>