

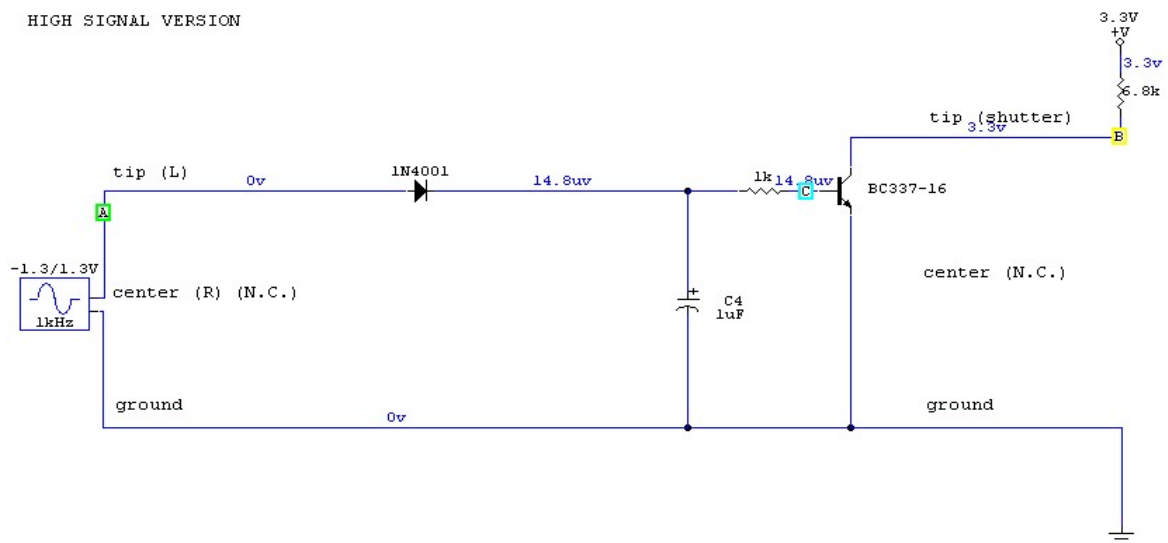
BIULA AUDIO TRIGGER for Canon®Digic II DSLR

During several years of astroimaging, I've used every sort of imaging device (from film to SC modified TouCams to modern modified DSLR), but the increasing level of technology did not solve the real challenge of the amateur astroimager: SKY LIGHT POLLUTION!!!

So, especially in this last couple of years, I moved my setup on mountain sites, trying to make it smaller as possible: one modded DSLR with tele lens, one autoguiding webcam with its 200mm optic, one motorized EQ2 mount and one mini laptop with only 2 USB ports, hence another problem:

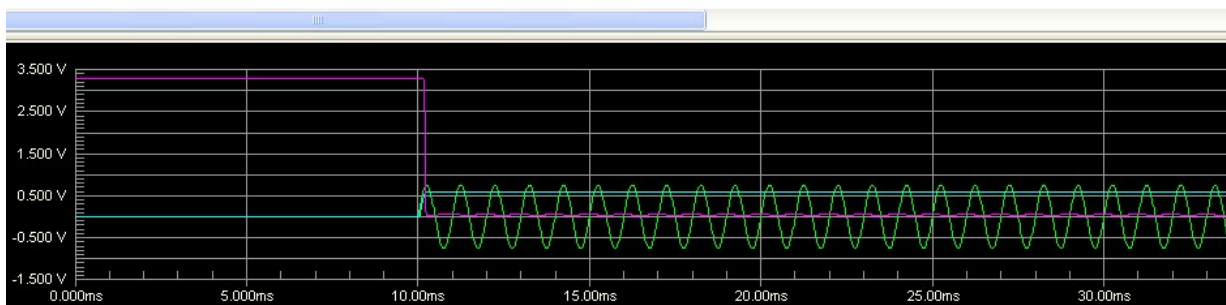
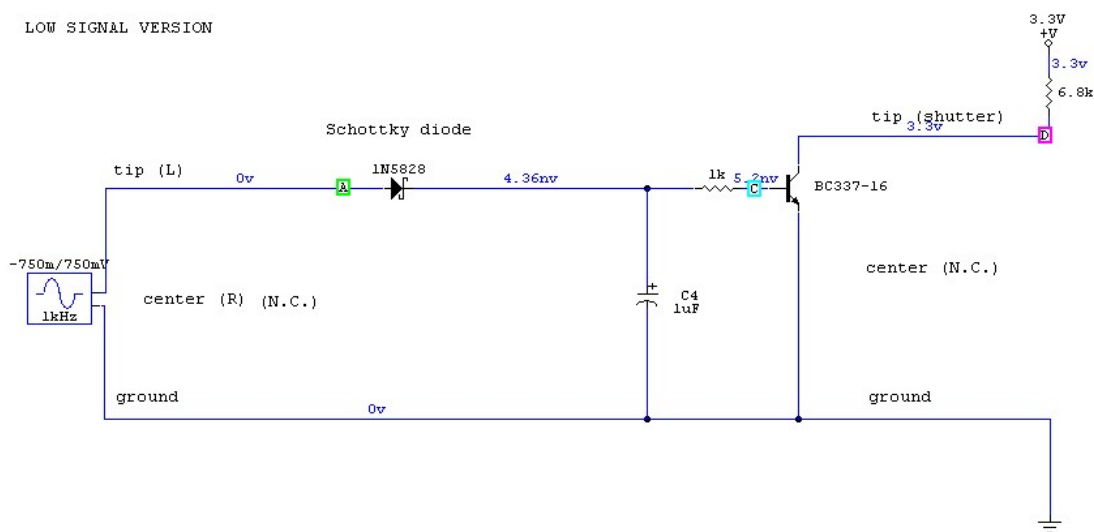
MODERN LAPTOPS AND NETBOOKS LACK OF PARALLEL AND SERIAL PORTS!!!

So I've implemented a system to fire the camera shutter with the AUDIO OUT of the laptop, using one USB for DSLR connection and the second USB for webcam autoguiding. The trick is in a converter cable with a minimal electronic circuit easy to DIY even with basic electronic skill (I use this system from a couple of years and I'm very happy with it):



As you can see the circuit is pretty simple, and now some explanations:

- Laptop triggers the shutter playing at full volume a 1kHz wave for the duration of the exposure, when sound stops exposure ends. The 1kHz frequency was chosen from a “standard” point of view, because is the classic audio test signal and because is easy to check out also in a noisy environment (best human ear sensibility point).
- the goal of the circuit, as you can see, is to convert audio sine waves in a 0.6V continuous voltage on the base of a common NPN transistor, reaching the so called “saturation”, so the transistor act as a switch and drives the (internal to the camera) shutter circuit from typical 3.3V to near 0V. This for the camera (in my case an EOS 350d) means: “fire the shutter and let it open until the control point rises again to 3.3V”, that is when wave from the laptop stops.
- in my setup audio is pulled out playing a wav file long as the exposure is, or looping a 1 second wav file for the required time (a simple DSLR control software can do this easily).
- circuit is somewhat derivated from an RF demodulator: one diode and one calculated capacitor extract from a carrier wave the useful signal (in our case a continuous voltage), so, as the most skilled of you probably know, the diode choice is fundamental due the low voltages in the circuit (diodes drop out a part of the applied voltage in their junction depending on the technology used to build them), and that is the reason of this second schematics :

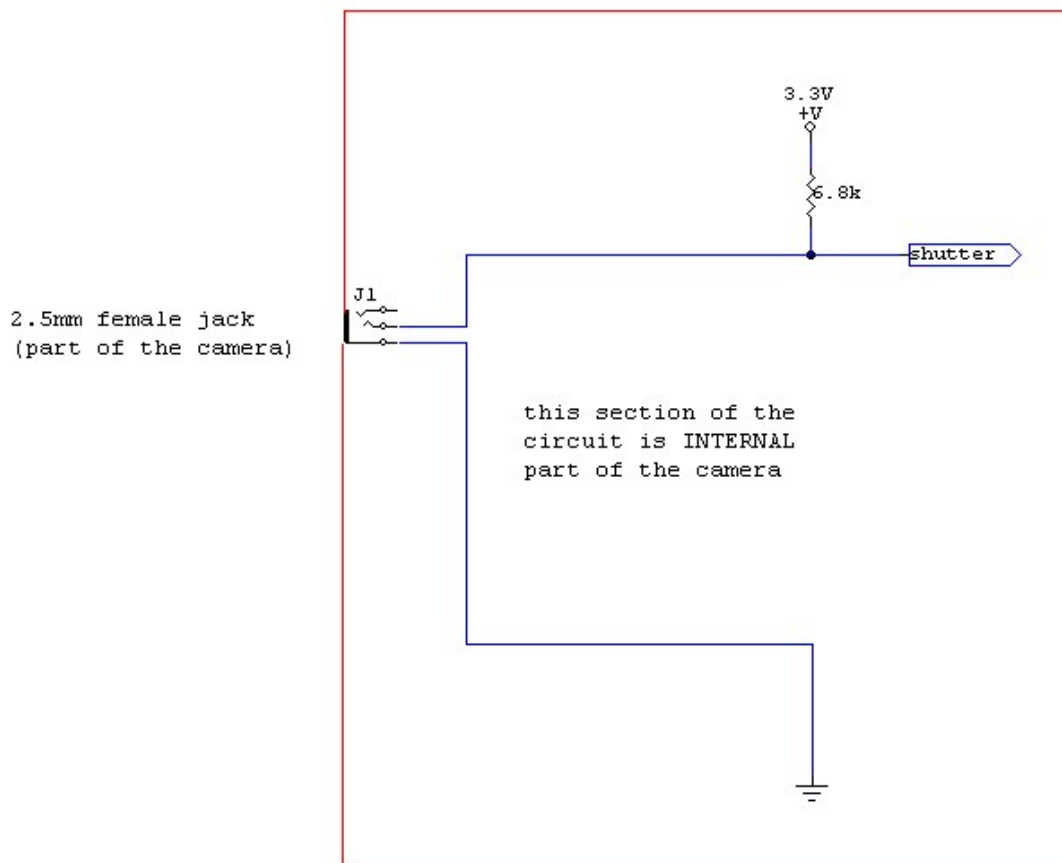


as you can easily see, this is called LOW SIGNAL VERSION (the other is HIGH, or normal, SIGNAL VERSION) referred to the peak to peak signal your laptop can pull out: someone is quite strong (1.5-2 Vpp), other are weak (0.7 - 1Vpp).

So the different diode (may be a Schottky or a germanium diode) can drop only 0.2 – 0.4V instead of the classical 0.6 – 0.7v of a silicon diode (1N4001 or similar) and do the job of putting a 0.6V on the base of the switching transistor (by the way, whatever general purpose NPN is OK!).

This is the point you must investigate relating to your real setup, tweaking around different diodes if you encounter problems with the standard version.

Now some other picture to talk about:

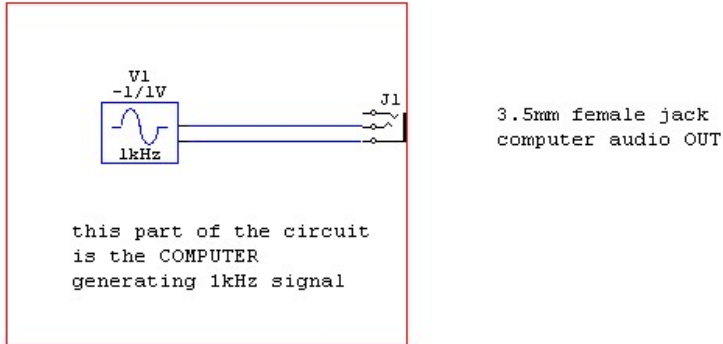


This is the equivalent circuit of the shutter sensing system INTERNAL at the camera:

Is important to see the 6.8k Ohm resistor pulling to 3.3V the tip contact of the female jack, because this is a wise method to drive to ground the “shutter” labeled point (camera logic checks this to decide the shutter status), preventing 3.3V camera supply to short (that is the reason why you could even use a mechanical switch or whatever similar to fire the camera safely).

The third contact is the focus one, driven by a similar circuit, but we don't use it by now.

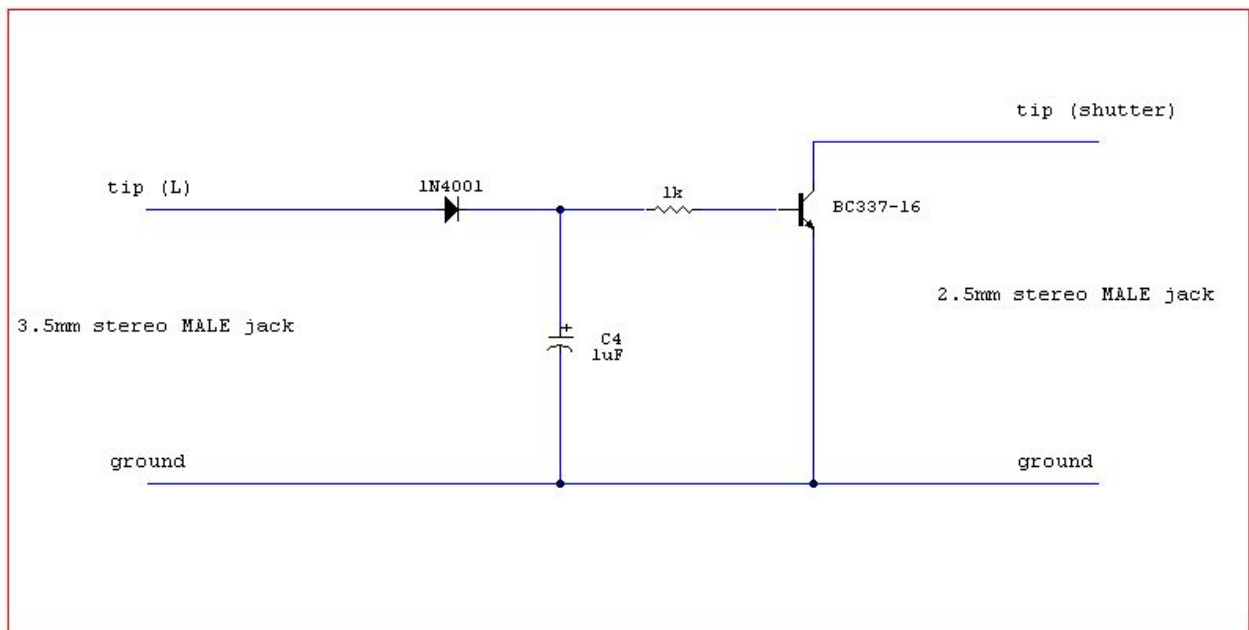
And now another picture:



Simply said, this is the computer playing out the 1kHz 1-2Vpp sound (from the LINE OUT or HEADPHONE OUT depending on the model you have).

Is important to remember that some astronomer dedicated software may have this kind of feature integrated in a near future (I have found positive feedback from Ivaylo Stoynov, compiler of the mighty “Astro Photography Tool” software), so the use of the DSLR can be very effective even with a light setup like mine.

And now the core of the circuit:



This is basically a 2 wire cable terminated at each side by a MALE stereo jack of two different sizes, 3.5mm on the computer side, 2.5mm on the camera side, with 4 electronic components in between: if you are able to work with SMD components like I do, you can even implement the whole circuit in the jacks shells, ending up in a neat, simple looking cable...

It's up to you, you can choose every kind of enclosure, just remember this is a sort of PASSIVE device, because an external power supply is not needed, so why make it bigger than a 9V battery ?

Finally I hope you could find it useful, and please remember my name when you spread this idea to other people: refer at the project as BIULA AUDIO TRIGGER.

Kind regards and dark sky,

Giancarlo "Biula" Biolatti.

biula@libero.it feel free of asking further informations.

P.s: please don't ask me to make the cable for you, I don't sell or ship anything related to this project! Thank you!