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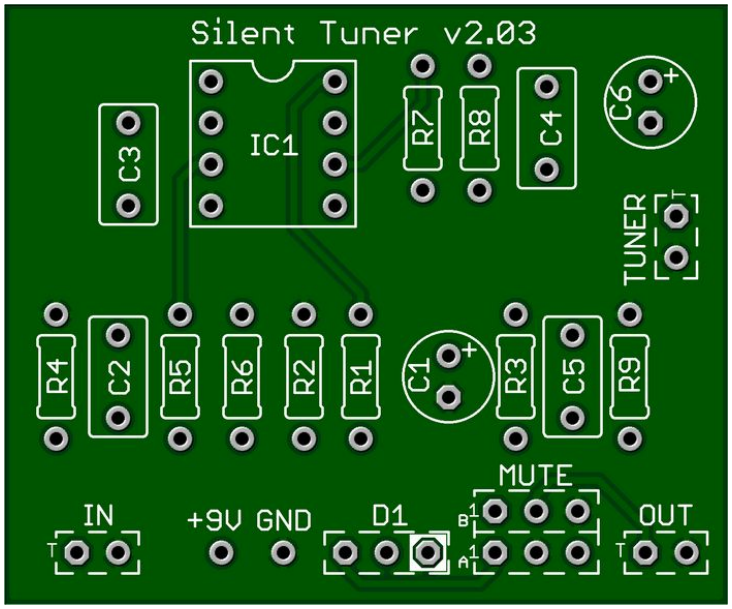
Silent Tuner Build Instructions

This design will fit into a 1290NS/1590B size enclosure or larger. Thanks to Tonmann for the initial design and build notes from Version 1 converted to fabricated boards with new design by Bruce R.

Although this circuit was primarily designed for onstage use Silent Tuning - it allows you to cut the signal to the amplifier whilst tuning your guitar. It removes the tuner completely from the signal path so there is no worry about whether your tuner is true bypass or not or whether your tuner sucks the tone out of your sound.

It puts the tuner at the front of the signal chain **where it belongs**; the tuner sees a low (guitar) level signal free from the influences of any effects pedal when the tuner is connected further along the effects pedal chain.

The circuit buffers (high input impedance, low output impedance) your guitar making it suitable to drive vintage (low impedance input) effects plus it increases performance when using long cables with your effects in bypass mode. The circuit provides an output of +6dB (gain of 2) although it can be configured as a unity gain (no boost) buffer or the gain can be increased by changing a single resistor. With a few *modifications the circuit can be configured as a foot switchable booster and / or variable gain circuit.



Board Dimensions (W x H) 1.80 x 1.47 inches.

PARTS LIST

The component values in this circuit are not critical. They were chosen with the following in mind:

- Easier and usually cheaper to buy components of the same value
- Prolonged battery life should the circuit be powered with battery supply only

Part	Value	Part	Value	Part	Value
R1	100k	R7	100k	C4	220n
R2	100k	R8	100k	C5	220n
R3	1k8	R9	100k	C6	2u2
R4	1M	C1	100u	D1	BiColor CA LED
R5	1M	C2	220n	IC1	TL072
R6	100k	C3	220n	MUTE	DPDT ON-ON

Build Notes and Mods

R4 – the main idea behind the Silent Tuner is that it should always be connected as the first circuit in an effects chain and should not be bypassed. In this case R1 is not needed and can be omitted; should you wish to make this circuit true bypass, R4 should be included to reduce the chance of popping when switching.

C6 – most modern digital guitar tuners have a buffered, DC de-coupled input (an input capacitor functioning like C1 in this circuit). In these cases C3 is not needed and can be replaced with a jumper. If you wish to invest five minutes in checking your guitar tuner, plug a guitar cable into the input of the tuner, set your DMM (Digital Multimeter) to DC volts and measure the voltage across the tip and sleeve of your guitar cable. If there is no voltage present, you can replace C3 with a jumper.

C2, C3, C4, & C5 – these are good values to keep the frequency response of the circuit flat for guitar, larger values are also acceptable. Bass players might want to increase C3, C4 and C5 to 470nF for a flat response at bass guitar frequencies.

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R7 & R8 – although these are covered later in the modification section, these two resistors can be lowered in value to produce the same output level at all frequencies provided that C4 is increased in value accordingly. Halving the value of both resistors and doubling the value of C4 (47k, 47k, 470nF) will produce the same results as 100k, 100k, 220nF.

R1 & R2 - these can be reduced in value if you are using an external power supply. This will increase the amount of current drawn from the power supply (therefore less attractive when using batteries) and reduce resistor noise, although there was no noticeable noise on the prototype. Any value down to about 10k seems to be standard.

R3 is the CLR – Current Limiting Resistor for the LED. Your choice based on brightness.

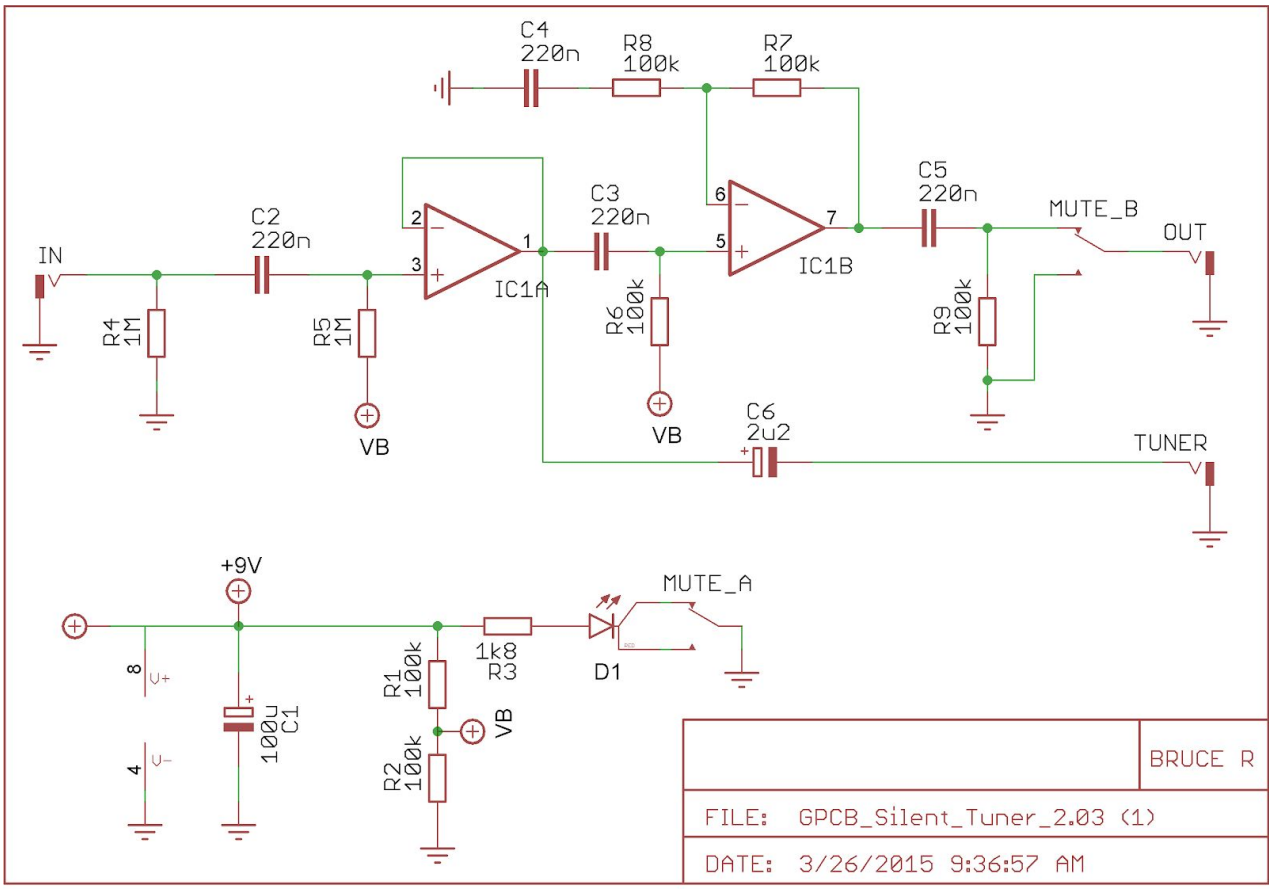
Gain

With R7 and R8 at equal values the gain of the circuit is 2 (calculated as R7 / R8 + 1) i.e. the output signal is twice as large as the input signal. If you wish to change the circuit to unity gain (no signal boost), replace R7 with a jumper and do not install R8 and C4. If you wish to increase the gain of the circuit, increase the value of R4 – an example: Changing R7 to 220k will produce a gain of: 220k / 100k +1 = 2.2 +1 = 3.2 It is also possible to reduce the value of R5 to increase the gain but then C4 should be increased (half the resistance, double the capacitance) to keep the frequency response flat.
Other possible modifications include boosting via a foot switch / toggle switch or variable gain.

Switching

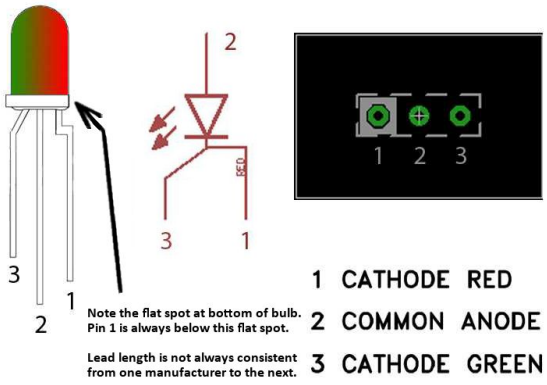
The idea behind the footswitch is to allow a guitarist to tune the guitar on stage without the signal reaching the amplifier (hence Silent Tuner). Pressing the footswitch disconnects the board output signal from the output jack (and grounds the input of the first effect pedal in the chain) and extinguishes the LED. The type of footswitch used in the schematic is a DPDT latching footswitch. Click the switch to disconnect the signal, click again to reconnect the signal. Another method is to use a momentary footswitch where you stand on the footswitch to disconnect the signal and take your foot off to reconnect the signal; the advantages of this method isthat you can't forget to switch the signal back on again (if your foot isn't on the switch, the signal is connected to the output) plus you won't need LED status to tell you when the switch is operated. For this type of switch you would only need a SPDT momentary.

SCHEMATIC



STATUS LED

D3 is a common anode bi-color LED. The diagram at right shows the pin-out, schematic symbol and pad connection for a common anode LED. The pin-out for the bi-color LED is typically (but not always) as follows:

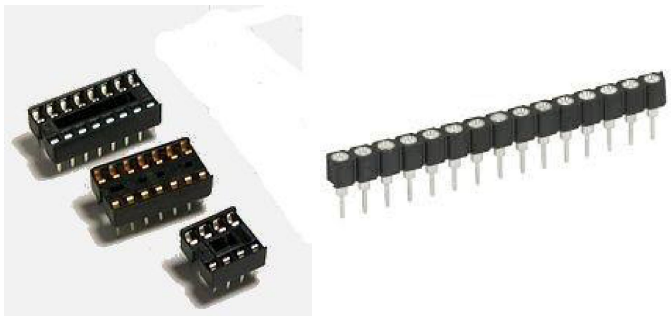


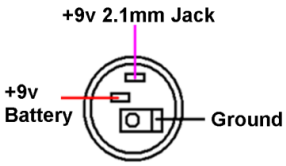
The lead 1 pad on the circuit board is marked with a white box.

When connected correctly, the LED will light red when power is applied and the circuit is in bypass mode. The LED will light green when in effects mode. If you wish to use a standard LED, connect the anode to the middle pad and the cathode to the right pad to show the circuit in effects mode. If you use a 3PDT wiring board that includes an LED, you can omit this LED and R23. *R23 is the LED's Current Limiting Resistor (CLR). If you use a different LED, you may want to change this value to adjust LED brightness.

IC's and transistors are easily damaged by heat from soldering and should never be directly soldered to the PCB.

For transistors, diodes, and LED's, use SIP (Single inline package) sockets. You simply cut the number of sockets required with an Exacto / Stanley knife or by gripping and rocking with pliers. This allows for easy changes and troubleshooting.





WIRING DIAGRAM