Signal Buffer Board HOWTO
Rev 1

The Signal Buffer Board is an analog amplifier based on a rail-to-rail instrumentation op-amp. It contains two independent channels which use shared power. It is primarily used to change the impedance of input potentiometers, as higher impedance (above 5K) can cause channel-to-channel bleedover at an A-to-D converter.

The circuit can also be used to amplify pot sweep, if it is too small. Note that amplification also amplifies noise, which is undesirable in the system, so rail-to-rail pots, or pots with sweeps greater than 60% of full scale, are preferred. Surface mount resistors can be changed on the PCB to turn this board into an amplifier.

A +/-5V power supply typically powers this board. Analog ground must also supplied. There are two blocks of potentiometer interface pads, each block contains three pads for pot excitation voltage and pot signal/wiper. The pads are labeled -V, S0, +V for the first circuit, they are labled -V, S1, +V for the second circuit. Note that the excitation voltage for the two pots is common. The buffered/amplified output signals are in a block of pads labeled "OUT", "S0" is the output of the first circuit, "S1" is the output of the second circuit.

Each circuit gain can be independently configured.

Buffering :

Example where both circuits are unity gain buffers:
Don't populate R1, R4
Shunt R5, R2 with a zero ohm link.

Amplifying :

For the circuit outputting S0
$Vout = (1 + R2 / R1) \times Vin$
For the circuit outputting S1
$Vout = (1 + R5 / R4) \times Vin$
Examples:
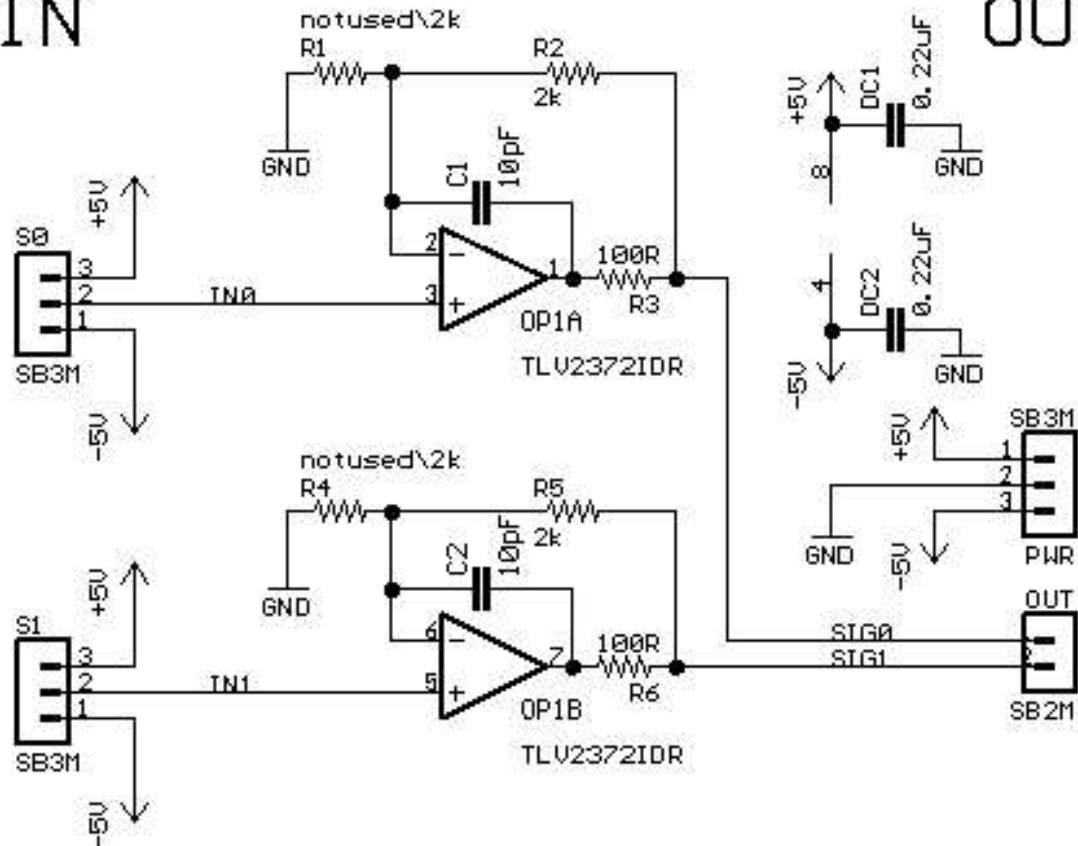Populate R1, R4 with 1.0K resistors (0805 surface mount)
For a gain of 2 , populate R5, R2 with 1.0K resistors (1206 surface mount).
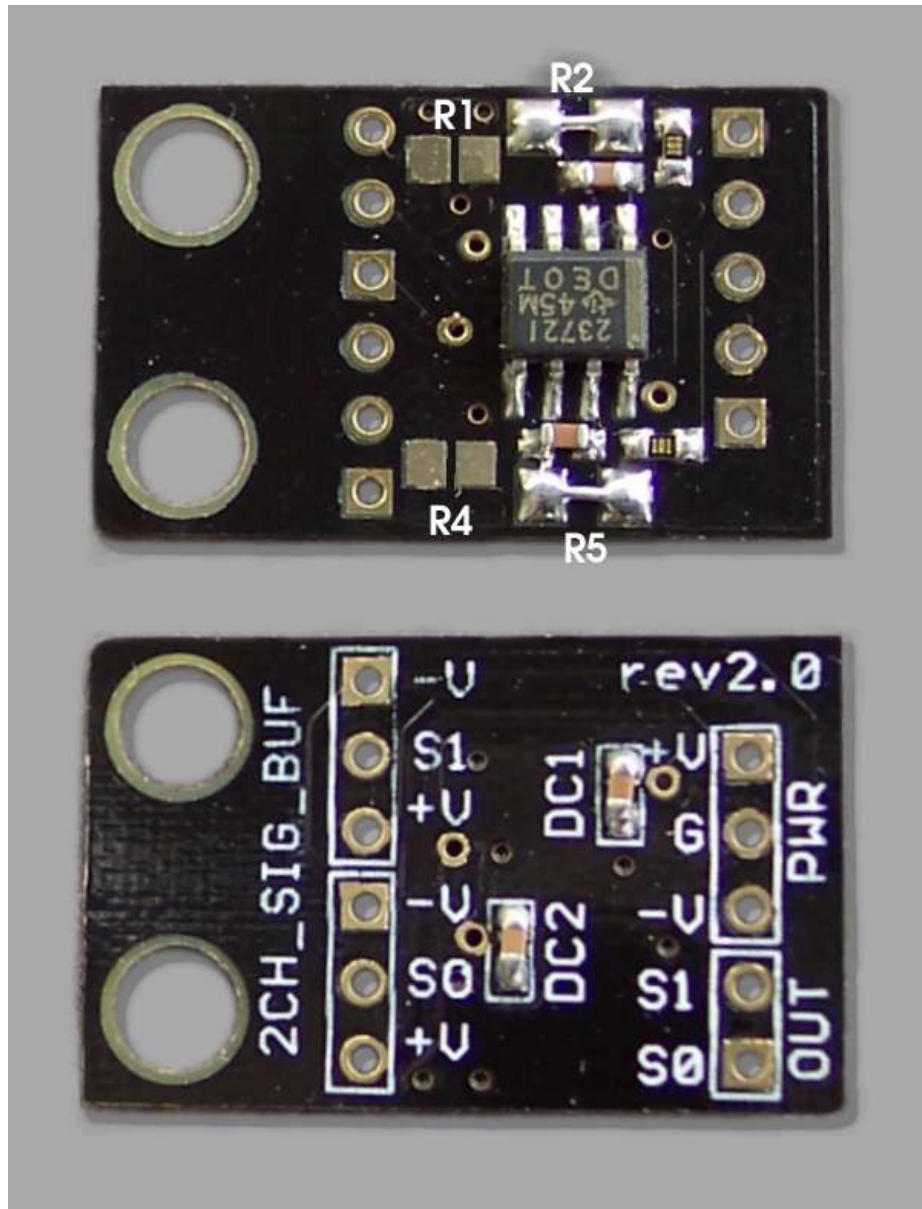For a gain of 3 , populate R5, R2 with 2.0K resistors (1206 surface mount).

Note that there is no zero offset. Signals will always be amplified with respect to analog ground.

IN   **OUT**

* For unity gain, omit R1
* For amplification: Vout = (1 + (R2/R1)) x Vin
* To minimize amplifier noise gain: set R2 x C2 = 2 x R1 x C1

Signal Buffer Board configured for unity gain.