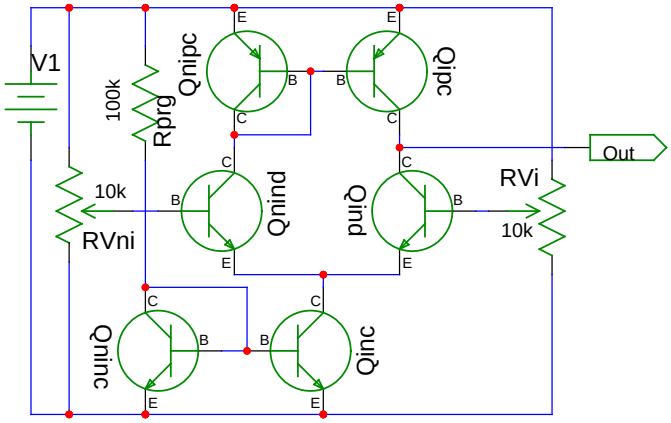
Transistor Based Op-Amps

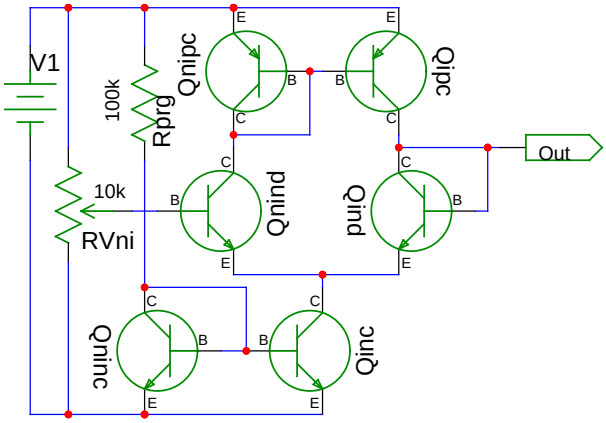
2008-07-24

Simple Transistor OpAmp



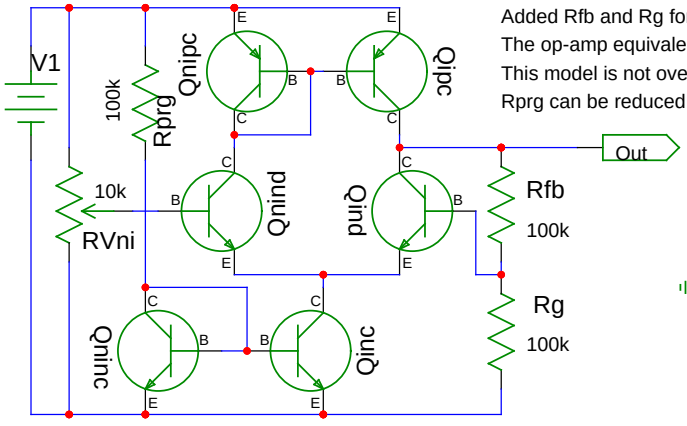
Rather than using resistors to drop voltage, this one uses a current mirror allowing for higher voltage gain and more predictible performance.
Qnipc+Qipc for a PNP current mirror. Qninc+Qinc for an NPN current mirror.
Qnind+Qind form a differential pair. The PNP and NPN current mirrors keep the current split equally between the differential pair.
The total differential pair current is set by Rprg.
VRx are used to change the output voltage in this test configuration.

Simple Voltage Follower (Buffer)



This is the same as above except the output connects directly to the inverting input forming a buffer.
This is much more precise than a single common-collector transistor follower.

Non-Inverting Amplifier



Added Rfb and Rg for feedback gain of 2 shown.
The op-amp equivalent diagram is also shown.
This model is not overly accurate as shown.
Rprg can be reduced for better stability. Do not go below 10k, though.