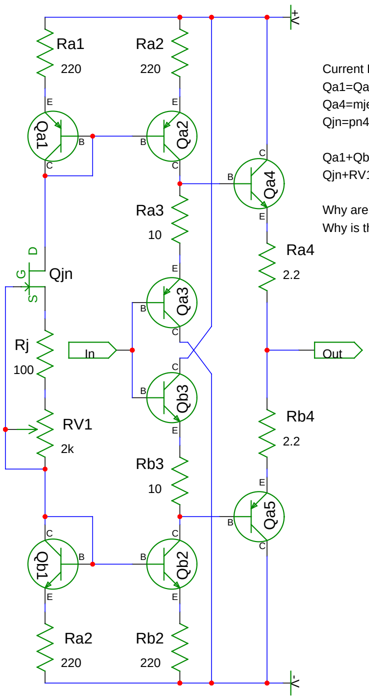
Transistor Amplifiers (3)

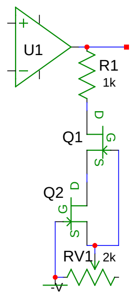
2008-07-24



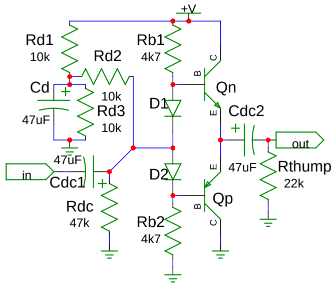
Current Boosted Output
Qa1=Qa2=Qa3=2n5087, Qb1=Qb2=Qb3=2n5088
Qa4=mje243 or bd139, Qb4=mje253 or bd140
Qjn=pn4392

Qa1+Qb1 are wired in diode mode to match their current mirrors.
Qjn+RV1 seems to fine tune the bias.

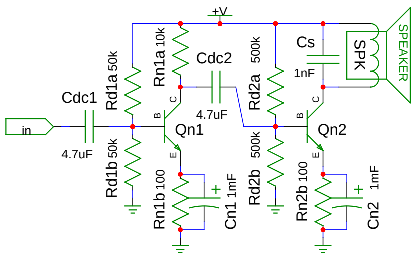
Why are the middle transistors crossed?
Why is this a 3-layer instead of the usual 2?



Class-A Op-Amp Bias
Q1=2n5486
Q2=2n5484

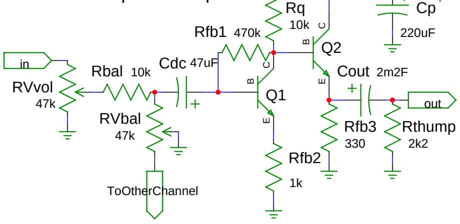


Single Supply Rail Booster.
Cd+Rd* form a voltage divider to raise the signal to half of Vsupply.
Cdc1+Rdc form a high pass filter and should be chosen carefully.
Watch polarity of Cdc1 if DC is on the signal (electric mic).
Cdc2+Rthump also form a high pass filter.
Rthump will remove the DC off the capacitor to avoid plug in thumps.
Since electrolytics don't have a very good phase respose, they can also be bypassed with a good film capacitor.

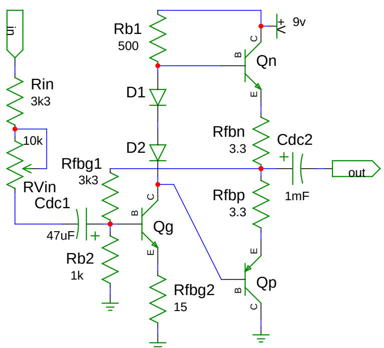


Transistor Amplifier (Single Rail, Class A Inverting).
Interesting design. Unsure if it will really work.
Seems to have maximum gain.
Change Rd* to 2/3 splits depending on Vsupply?

Discrete Headphone Amp



Headphone Amplifier, Class A, Single Supply Rail, Inverted.
Circuit is designed to be self biasing. Circuit works 6-20v.
Single channel shown. Duplicate it for stereo.
RVvol is volume control and is a dual gang pot for stereo.
Rbal provides minimum resistance for the balance control so signal isn't shorted to ground.
RVbal is balance control and connects to the same spot on the other channel.
Cdc blocks DC on the input signal. Watch polarity if DC is on the signal (electret mics).
Q1=Q2=bc549c (Vce=Vcb=30v, Veb=5v, 100mA).
Q1 provides an inverting amplifier. Q2 is the output buffer. Gain will be less than 10 as shown.
Rthump takes the DC out of Cout and prevents thumps when the headphones are plugged in.



Transistor Radio Amp (Class B Inverted, 50mW estimated, 30mA from 9v battery)
This is a somewhat tempromental design, so component values need to be close.
As with all amps like this, power rails need to be very clean to avoid adding output noise.
Input impedance is about 500ohms. Gain is about 5x with 8ohm speaker. Vp-p is about 4v.
Rin could only be a pot but will have distortion problems below 3k3.
If the signal in voltage is too high, add a 10k pot volume control before Rin.
Watch polarity of Cdc1 if DC is on the signal (electret mic).
Cdc1 and Cdc2. Watch out for RC filter calcs. A good film cap may be paralleled for better phasing.
Rfbg1 may be a pot for variable gain.
NPN=2n3053, 2n2222. PNP=2n2905, 2n4403.
D1+D2 bias Qn+Qp into conduction. Zeners could be used here for higher voltage drop.
The Rfbn+Rfbp resistors bias the voltage equally across Qn+Qp. They should be well matched.
When bias current increases, voltage between emitter and base decrease, reducing conduction.
General limits for 9v supply: Rin>3k3, Rb1=500-1k, Rfbg1<3k3.

As the positive signal swing reaches a maximum, the voltage drop across Rb1 decreases and reduces the base current to Qn. This avoids the signal from going all the way to the rail and causes a soft distortion.

Question: Is Rb2 really needed? Better impedance and signal level if removed.