

Motional feed back amplifier

This versatile amplifier circuit is designed and submitted by **Mr Seetharaman Subramanian** from Chennai . The full credit of this article goes to him and we are very proud to publish this fabulous circuit here.

Seetharaman's description about the circuit.

This concept has appeared long back in Practical Electronics a UK based Magazine. Based on this concept I designed this circuit during 1981 to 1986 with lots of field trials and modifications, the design was frozen in 1986. I have assembled so many amplifiers for me and for my friends based on this design with various power levels. They are still kicking in so many houses. This concept can be applied to any existing amplifier also. You must listen to believe the crystal clear thumping bass response. crystal clear mid and hi frequencies. Good transient response with very low distortion. Hope you guys will enjoy the reproduction of this amplifier.

In the art of audio sound reproduction it is well-known that the dynamic loudspeaker is more nonlinear and generates more distortion than all the other system components combined. This is particularly true at low frequencies which require large cone excursions where the stiffness of both the inner spider and the outer surround increases rapidly as the cone approaches its peak displacement, resulting in a nonlinear suspension compliance generating high distortion.

For example, in a typical high fidelity sound system at a frequency of about 35 Hz the total harmonic distortion of the amplifier might be of the order of 0.01%, whereas the distortion of the loudspeaker might range from about 3.0% to about 50.0%, depending upon the loudness. If this cone motion can be sensed and given as a feed back to the earlier stage of the amplifier, this distortion can be reduced dramatically.

Motional Feedback (MFB) was a speaker system developed in the early 1970s by Philips Holland. It introduced a feedback system to the woofers of HiFi loudspeakers, enabling them to achieve a more extended low frequency response in a relatively small enclosure. The key benefits are a very controlled bass response. Any distortion induced by the enclosure or the woofer itself is immediately corrected by the feedback. These hand-built speakers were sounding very good and were quite expensive.

As a different approach, instead of using the cone movement, the current flow through the voice can be sensed (the current is proportional to cone movement) and can be used as a cone movement feedback. This novel idea is used in this amplifier design (I don't claim any originality; this idea has appeared in Practical Electronics UK Magazine – long back – They might have even patented it).

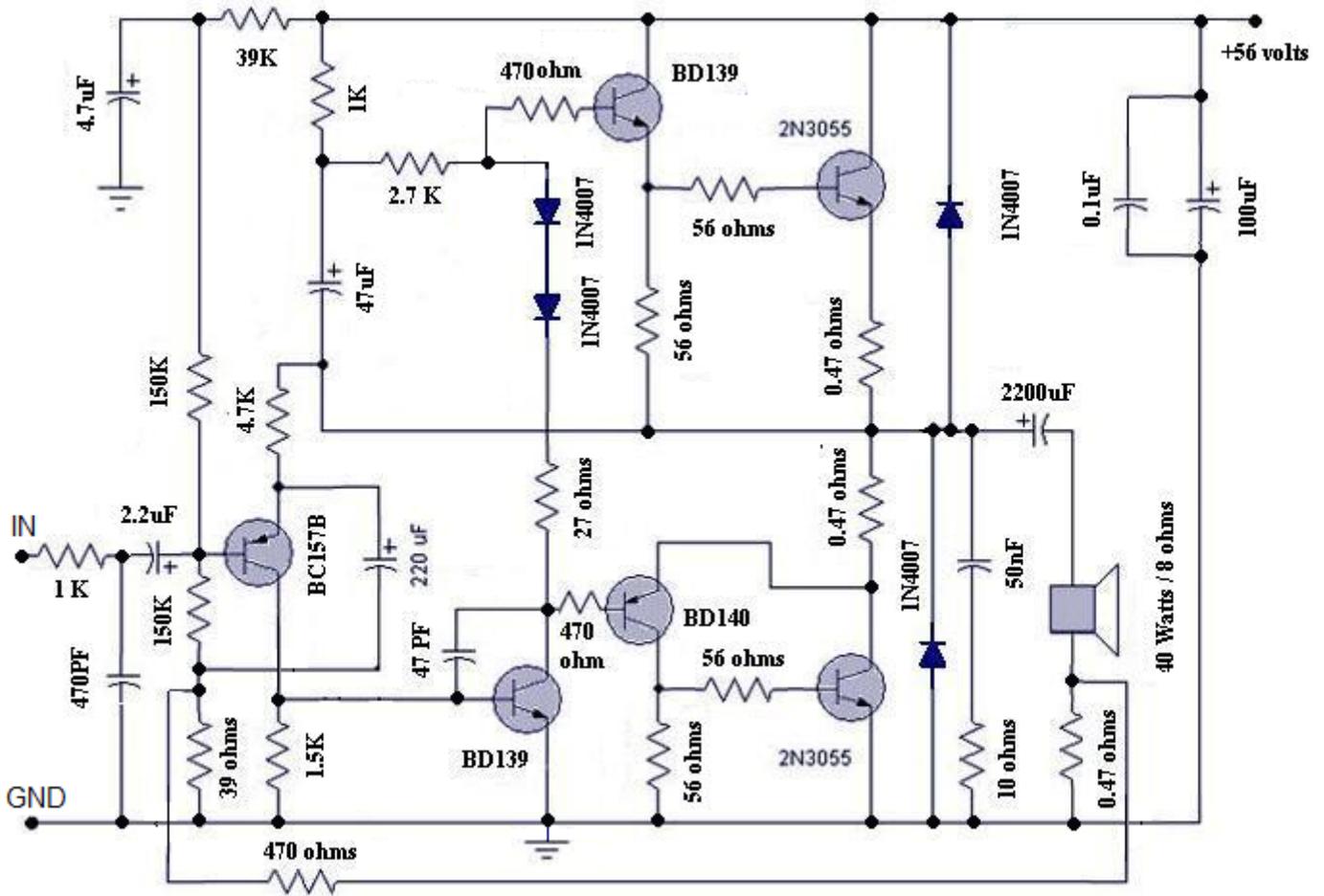
The amplifier used here is a standard Philips audio application circuit, with a specification of 40 Watt RMS @ < 0.06% Total Harmonic Distortion into 8 ohms impedance speaker and having a frequency response from 20Hz to 100 KHz, suitably modified for our application.

The amplifier is a conventional class B directly coupled quasi complimentary out put stage, operating with single 56Volt supply (no need for a regulated or dual power supply). BC157 is the pre-driver and half supply stabilizer. BD 139 is the driver, a BD139 and a BD140 complimentary pair out put driver stage with 2N3055 as final out put stage. The speaker voice coil current is sensed through 0.47 ohms resistance connected from speaker one end to ground. This signal is given as negative fed back to previous stage through 470 ohms. The half supply at speaker coupling capacitor can be adjusted by varying the 39K resistance (if required you may fix a 100K pre set in the place of 39K and adjust for half supply with no in put signal at junction of both 0.47 ohms of out put transistors and speaker coupling capacitor). The quiescent current through output transistors can be adjusted with 22 ohms in series with two bias diodes 1N4007. The value for 50mA quiescent current will lie between 15 to 33 ohms for a supply of 56volts. The amplifier can be protected with a simple 1.5Amp fast acting fuse in the positive power supply.

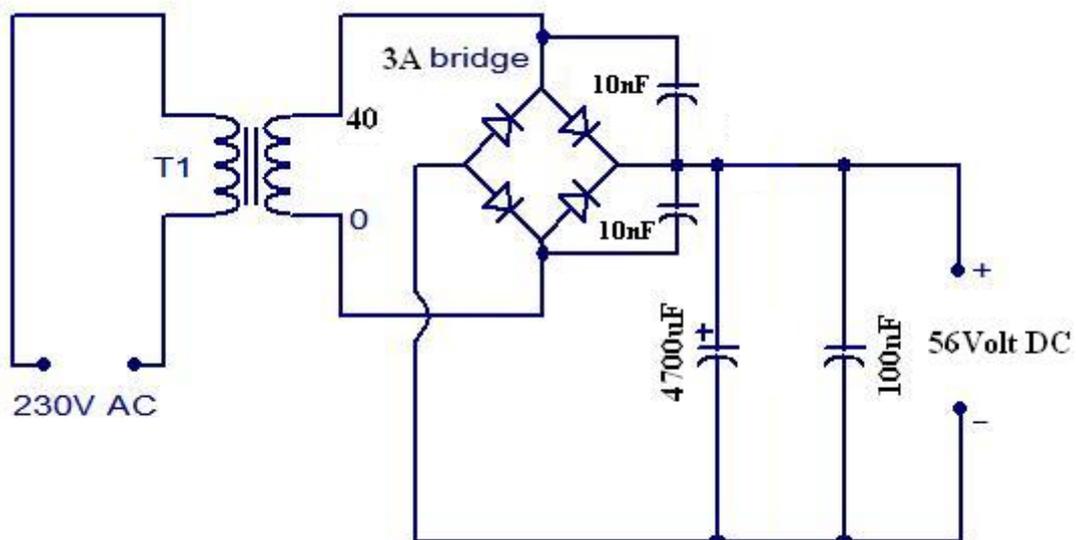
The amplifier can be assembled on 40watt Philips amplifier application board or on any standard plain straight line board. All the three driver transistors require cooling clips. (Standard TO220 casing cooling fins). Out put transistors require a good quality extruded alloy heat sink with insulating mounting kit and with a smear of silicon conductive grease, for good conductance of heat.

The recently appeared passive Bass/Treble tone control with 12volt supply in ["Circuits Today"](#) as [Baxendall tone control circuit](#) is the most suitable preamplifier and tone control for this amplifier.

Circuit diagram



Powersupply circuit.



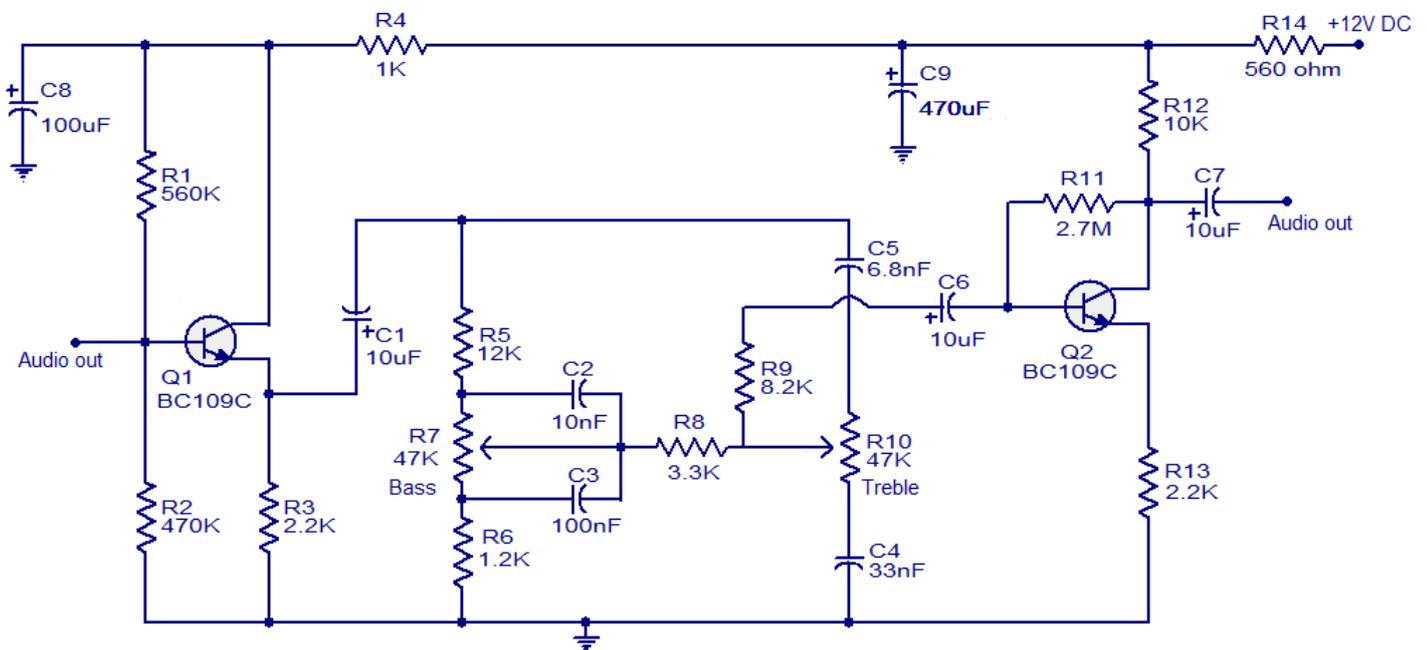
Baxendall tone control circuit

Description

This simple tone control circuit is designed based on the famous Baxendall tone control circuitry. The circuit given here can give a maximum cut or boost of around 12 dB at 10 KHz (treble) and 50Hz (bass). Also, both bass and treble can be independently adjusted.

Transistor Q1 (BC109) and its associated components (R1, R2 and R3) form an emitter follower which is the input stage. The voltage gain of this input stage is around 1 and it has an input impedance of around 225K ohms. The output of the input stage is coupled to the passive Baxendall circuitry using the capacitor C1. POT R7 can be used to adjust the bass and POT R10 can be used to adjust the treble. Transistor Q2 and associated components (R11, R12 and R13) forms the final output stage which gives an overall voltage gain of three to the system.

Circuit diagram



Notes

- Assemble the circuit on a good quality PCB.
- The circuit can be powered from 12V DC.
- POT R7 can be used to adjust the bass while R10 can be used to adjust the treble.

Read more: <http://www.circuitstoday.com/baxendall-tone-control-circuit#ixzz0mWNYL9Bn>