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Audio Amplifier

Introduction:

Out project this quarter was to build and package an amplifier capable of taking an audio input and producing an output capable of driving a speaker with minimal distortion. This report details the finished circuit, and its operation.

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Objectives:

Design and implement an audio amplifier as described in the introduction. This circuit should:

- Take sweet tunes as a signal input
- Amplify and reproduce the sweet tunes
- Drive a speaker to broadcast the sweet tunes for all to enjoy
- Not ruining the sweet tunes with distortion
- Earn me a high grade on this project

Circuit Description:

This circuit is constructed around a LM386 op-amp. Internally the LM386 is composed of four main sections: the op-amp; the bias circuitry, to balance the quiescent output voltage in the middle of the supply voltage; the gain circuitry, internal feedback resistors to give the op-amp good, controlled, gain without external components; and the push-pull current booster, so that the chip can directly drive a speaker, again with out additional external components.

The signal is passed through the voltage divider formed by the volume potentiometer to the non-inverting input at pin 3. The inverting input at pin 2 is grounded. While the LM386 has a nominal gain of 20, the Gain capacitor bridging pins 1 & 8 boosts that to 200 by bypassing the internal 1.35 k Ω resistor, some designs will include a resistor in series with the Gain capacitor to provide a gain between 20 and 200, this was omitted for design simplity. Capacitor C1 bridges the two rails connections (+V at Pin 6 and GND at pin 4), decoupling AC noise from the DC into the chip, as supply noise tends to be amplified at the output. The RC circuit connected to pin 7 serves to further decouple AC signals from the rail voltage and the RC circuit in parallel with the output from pin 5 acts to stabilize the chip from very high frequency feed back.

Conclusion:

The amplifier provides good amplification to the sweet tunes provided to its inputs, with out distortion. All in a small sleek package. I am confident I will receive a high grade on this project.

Event Log:

3MAR – 13 MAR	Research into LM741 based amplifiers
13MAR – 16MAR	Research into LM386 based amplifiers
16MAR	Parts ordered
19MAR	Parts arrived, began breadboard prototyping
19MAR – 21MAR	Prototyping and brainstorming final board layout
21MAR – 22MAR	Soldering final board, case drilling, final fit testing, final testing
22MAR	Several hours of poking, prodding, re-soldering, and head scratching to discover that the speaker was poorly impedance matched to the amplifier.

Parts & Costs List:

ABS Project Case	\$2.10
LM386	\$1.30
BTC Protoboard	\$7.89
Capacitors	KIT
Resistors	KIT
Red & Black Terminals	\$1.96
3.5mm Jack	FREE
TOTAL	\$13.25