LM386 Audio Amplifier

Circuit Description:

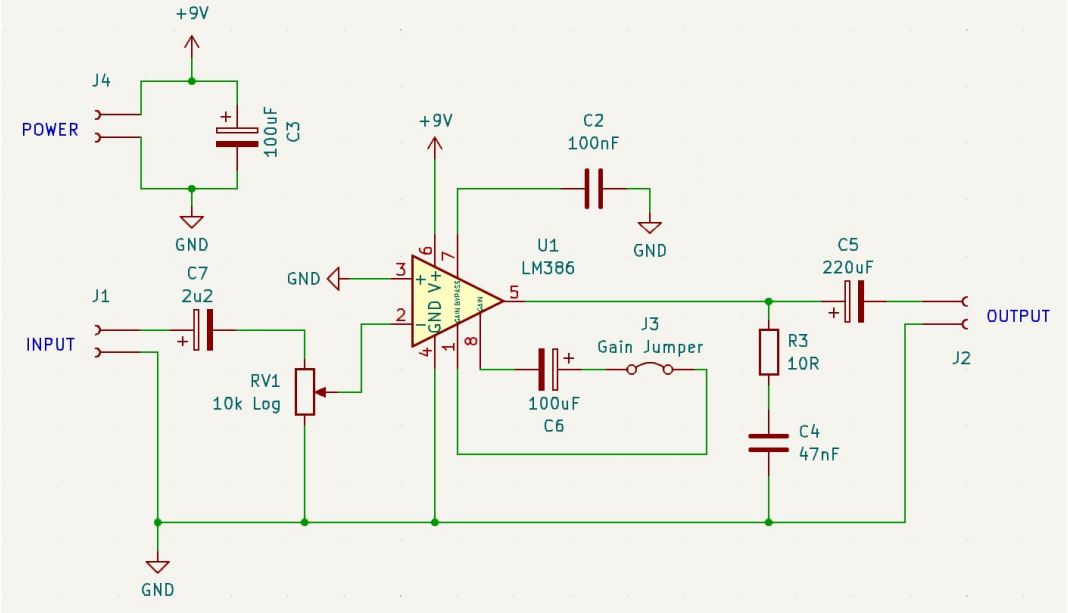
This project uses the LM386 audio amplifier IC, which needs only a few external components for operation. It can be configured to amplify the incoming signal by between 20 and 200 times and will happily run on supply voltages between 4V and 12V, making it ideal for battery use. It will accept input from low impedance sources such as auxiliary line level and headphone audiio equipment outputs.

Referring to the schematic diagram , C7 blocks any DC at the input, while allowing the AC signal to pass to the 10k pot, which acts as a volume control. The wiper of the pot is connected to the IC input (pin 3).

The gain (amplification level) is controlled by the presence, or otherwise, of the jumper. With the jumper bridging the two header pins, the gain is set to 200, or 20 with it removed. Note that if a gain between these limits is required, a resistor can be fitted in place of the header eg. 1k to 1.5k will give a gain of around 50.

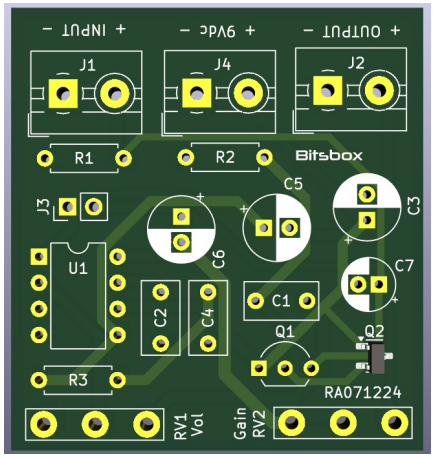
C4 and R3 help to stabilise the output at high frequencies and C5 blocks DC at the output while allowing the amplified signal to pass to the loudspeaker.

Schematic:



Assembly:

Note: The PCB is used by other projects which require additional components, so you will not be filling all of the available part locations.



Fit parts in the following order:

R3 - 10R metal film resistor.

C2 - 100nf (0.1uF) polybox capacitor.

C4 - 47nF polybox capacitor.

IC socket in position U1 - align the notch at the top with that shown on the pcb graphic.

Pin header at J3.

C6 - 100uF capacitor. Take care with the polarity.

C5 - 220uF capacitor. Take care with the polarity.

C3 - 100uF capacitor. Take care with the polarity.

C7 - 2.2uF capacitor. Take care with the polarity.

J1, J2, J4 - screw terminal blocks.

RV1 - 10k log potentiometer.

Once you are happy with your assembly, carry out a few continuity checks using a multimeter. Look for continuity between the -ve on the supply terminal block (marked 9Vdc), -ve input terminal, -ve output terminal, pin 3 on the IC socket and pin 4 on the IC socket. Check for continuity between the +ve on the supply terminal block and pin 6 on the IC socket.

Also check that there is no continuity (a short circuit) between the + and - on the supply terminal block.

Fit the IC making sure it is orientated correctly - note the notch at the top edge.

Testing:

Connect an 8 Ohm speaker to the output terminal block (it does not matter which board terminal is connected to which speaker terminal). Fit the jumper to bridge the pins of the 2-pin header, J3.

Connect a signal source , such as the output from an MP3 player, phone, etc., to the signal input terminal block .

Turn the volume control, RV1, fully anticlockwise and connect power to the terminal block marked 9Vdc. Note + and - terminals - it is important to get this polarity right to avoid damage to the circuit.

Turn the volume control clockwise and you should hear the output from your source.

Troubleshooting:

No output:

The majority of problems will be due to assembly errors.

Check, double check and triple check every component position and its connection in the circuit.

Check that the solder joints are good and that there are no solder bridges.

Check that your signal source is switched on and producing an output.

Distorted output:

•Remove the jumper from the header, J3, to reduce the gain.

•Reduce the level of the source e.g. turn down the volume on the signal source.

Help:

If you are still experiencing difficulties, email tech@bitsbox.co.uk for further help.

Developing your circuit further:

• Build a second one to provide loudspeaker stereo.

• Build it into an enclosure .

• Incorporate an ON/OFF switch in the +ve supply connection.

• Include a POWER ON led.

• Provide switchable gains .

Wherever you decide to take it, a range of components is available at www.bitsbox.co.uk to help you realise it.