

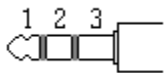
Computer microphones

From: http://www.hobby-hour.com/electronics/computer_microphone.php

Interfacing Microphones to Computer Sound Cards

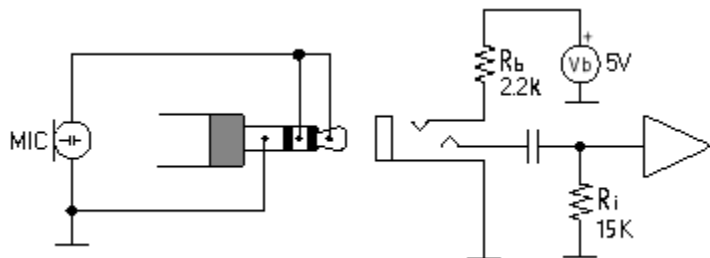
Most **sound card microphone inputs** require a minimum signal level of at least 10 millivolts, but some older 8-bit cards need as much as 100 millivolts. The typical impedance of the PC soundcard microphone input is in order of 1 to 20 kohms (can vary from card to card). The microphone type which works best with computer sound cards is the **electret microphone**.

Sound Blaster soundcards (SB16, SB32, AWE32, AWE64 or Live) from Creative Labs have a 3.5mm (1/8 inch) pink stereo jack for the microphone input, using the following wiring pinout:



1. Signal input
2. +5v bias
3. Ground

Note: Most soundcards will wire the positive DC bias voltage to the ring, but a small number of non-standard soundcards can have the bias voltage wired to the tip, and rarely to the third, shaft connector. A few cards have a jumper which enables or disables the power to the microphone jack. If the jumper is put on, the bias voltage (+5V through a few kilohm resistor) is wired to the tip. Newer mainboards with stereo microphone support will provide the bias voltage for both the tip and ring.



The approximate schematic of a Sound

Blaster microphone input circuitry shows that the +5V voltage on the connector is heavily current limited. The card's voltage might not be exactly 5V, but it is usually something between 3 and 5 volts when no microphone is connected.

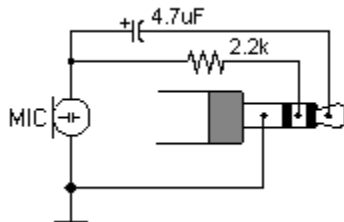
Electret microphones

The **electret microphone** is the cheapest omnidirectional microphone you can buy. Very sensitive, durable, extremely compact in size, electret microphones are used in many applications where small and inexpensive microphones with good performance characteristics are needed. You can find them in stereo equipment, in consumer video cameras, mobile phones and so on.

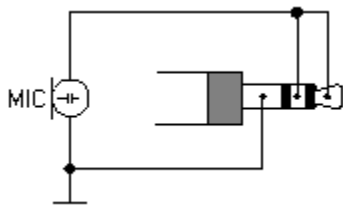


The electret is a modified version of the classic **capacitor microphone**, which exploits changes in capacitance due to mechanical vibrations to produce voltage variations proportional to sound waves. The electret does not need an applied (or phantom) voltage like the condenser microphone -- as it has a built-in charge -- but a few volts are still required to power the internal **Field Effect Transistor (FET)** buffer.

The **typical electret condenser microphone capsule** is a 2 terminal device which approximates to a current source when biased with around 1-9 volt and consumes less than half a milliamp. This power is consumed by a small **preamplifier** built into the microphone capsule which makes the conversion from the very high impedance of the electret element to the impedance of the cable which needs to be driven.



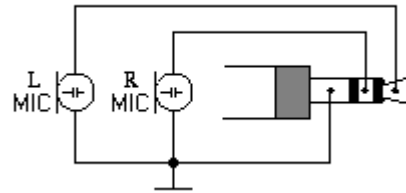
The circuit on the above is suitable for interfacing two wire electret microphone capsules to sound cards which supply a bias voltage. The component values are not critical; you can use any capacitor between 1uf and 22uf, and a resistor value from 1k to 22k. You must use a two conductor shielded cable, where one conductor will carry the audio signal and the other the bias power. The shield should be connected to the sleeve of the plug.



A **simple modification** which works with most soundcards is presented on the above. The circuit works because the power is fed to the microphone connector through a few kohm resistor inside the card. In this case you can use a simple one conductor shielded cable: the shield will be wired to the connector's sleeve; the ring and tip will be connected together.

Note: A few, recently manufactured PCs implement true **stereo microphone inputs**. High performance speech recognition and advanced noise canceling applications -- see the Andrea

Superbeam Array stereo microphone -- make good use of this new feature, providing more



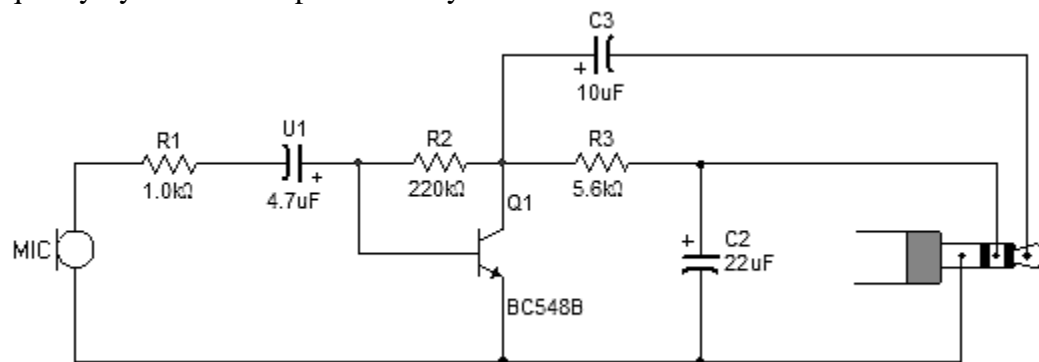
accurate and reliable signals in noisy environments.

When the *stereo mic* input mode is selected, the bias voltage will be provided for *both* the tip and the ring. The wiring for a stereo microphone is simple -- see the schematic diagram on the left -- connect the shield of both microphones to the sleeve of the plug, the left mic to the tip and the right mic to the ring. For best performance, use *unidirectional* electret microphones.

Connecting dynamic microphones

The sound card's microphone input needs **high input levels**; it's not designed to be used with any other microphone type than electret microphones. If you connect a **dynamic microphone** (with a few mV output) you will get very poor sound with lots of noise.

In order to adapt a dynamic microphone to the computer's soundcard we must amplify the signal level. Using this simple single transistor **microphone preamplifier** circuit below you can use a quality dynamic microphone with your soundcard.



The **amplification** depends on the transistor's parameters - it can vary from transistor to transistor (about 20 to 40) - but is enough to make the signals compatible with the sound card's input. The circuit does not need any external power supply because it uses the bias voltage (around +5V) of the sound card.