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Solving Sound Card Microphone Problems

Tired of wrangling with unruly sound cards and microphones when configuring your computer for speech or sound applications—Amateur Radio included? With the secrets revealed here you'll soon be hearing the sweet sounds of success!

There are two problems you're likely to face the first time you try to use a microphone with your computer's sound card. First, many microphones don't work—at all! Second, even if you get the microphone working properly, speech recognition software (already widely available and soon to be bundled into Microsoft *Windows*) and other applications may fail to "hear" you talking.

Both problems stem from the fact that sound cards are designed for use with *electret* microphones that contain their own preamplifiers. Even with the proper amplified microphone element the sound card expects a rather strong signal.

A typical tape recorder or PA system microphone puts out about 1 mV RMS. Sound cards expect about 15 mV. That vast gulf is spanned by the built-in preamp.

When recognizing speech, your sound card probably expects an even stronger signal to separate voice information from background noise. The cure is simple: Use a headset microphone placed about four inches from your mouth. Your spoken speech sounds are 20 dB louder there than they are only three feet away.

But don't put the microphone right in front of your mouth—put it to the side, instead. Otherwise, the puff of air that accompanies consonant sounds (such as P and T) will produce an annoying pop (broadcasters call this a "plosive"). You can verify the sound quality by using the *Windows* Sound Recorder to record and play back your voice.

Why doesn't an *ordinary* microphone work when you plug it into a sound card? Mainly because its output is too low, but also because the sound card uses the three conductors of the stereo plug in an unexpected way.

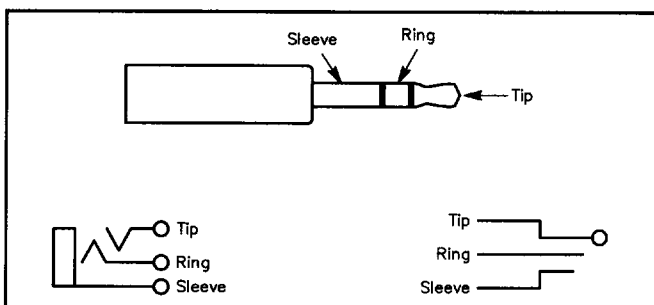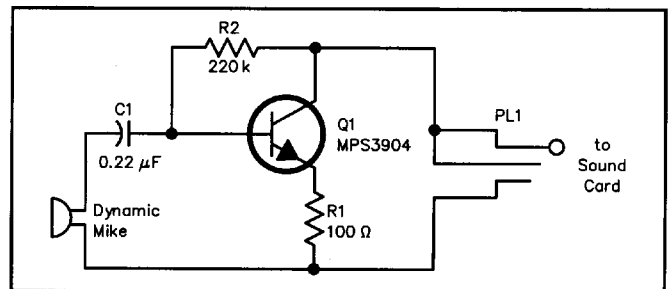Figure 1 shows how a typical miniature stereo plug is configured.

Figure 2—Schematic diagram of a simple microphone preamplifier for use with sound cards. RadioShack part numbers are shown in parentheses.
Q1—MPS3904 (276-2016)
R1—100-Ω, 1/4-W resistor (271-1311)
R2—220 kΩ, 1/4-W resistor (271-1350)
C1—0.22 µF, 50-V capacitor (272-1070)
PL1—Miniature stereo phone plug configured to match sound card input
Microphone—Dynamic microphone suitable for tape recorder or PA system
Other—Microphone input connector (if needed); enclosure (film can or the like); shielded cable as needed

The three conductors are called "tip," "ring," and "sleeve," and normally carry left channel audio, right channel audio, and ground, respectively. But the microphone input is different, and there's a lot of variation among different sound cards. The sleeve is still ground—and that's the only thing you can rely on. The ring usually isn't an audio input at all; it's the power supply for the electret microphone, delivered through a resistor. The tip is usually the audio input, and it may have a power-supply resistor, too.

Fortunately, you can add, to any ordinary microphone, a one-transistor amplifier that will boost its signal, taking power from the sound card and using the sound card's built-in resistor as its load. Figure 2 shows how. I've obtained excellent results with this circuit and a RadioShack 600-Ω dynamic microphone. Higher-impedance microphones from tape recorders also work well. With some sound cards you may need to change the 220 kΩ resistor to a smaller or larger value. Try everything from 100 kΩ to 1 MΩ and see what gives the best results. The whole circuit can be built on a tiny scrap of perfboard and enclosed in a 35-mm film can.

Figure 1—A stereo plug has three conductors: tip, ring and sleeve.

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