Answer #333

The answer is (e): the sound picked up by the microphone will be considerably softer, as heard in an mpeg video by clicking your mouse on the picture below.

Note that the video starts with the two speakers in phase. Less than one-quarter of the way through the video the switch reversing one of the speakers is flipped so the sound level drops, and about two-thirds of the way through the video it is flipped back so that the two speakers are again in phase and the sound becomes louder.

This is because the waves from the two speakers are out of phase. When the wires of ONE speaker are reversed, the phase of that speaker is reversed. The two speakers are then oscillating in opposite directions, so when one of them is creating a compression the other is creating an equal and opposite rarefaction, and they cancel each other out. In fact, the cancellation will be total if the sounds from the two speakers are exactly out of phase when they reach your ears (or the microphone). For the analysis of this experiment, the speakers are positioned very close to each other, so the cancellation will be very nearly exact at all points in the lecture hall: the wavelength of the sound is much longer than the distance between the speakers. For very low frequencies like 100 Hz, where the wavelength is about 3.5 meters and the distance between the speakers is less than 20 cm, this situation applies.

Question #334 is a follow-up for this question.

Question of the Week

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For questions and comments regarding the *Question of the Week* contact

Dr. Richard E. Berg by e-mail or using phone number or regular mail address given on the Lecture-Demonstration Home Page.