

SCHOOL SOUND

SOUND ADVICE
FOR TODAY'S
SOUND OPERATOR

SCHOOL SOUND

SPRING 2010

Attention Secretary,
PLEASE ROUTE TO:

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Sound Operator Manual

A newsletter for
anyone who
wants to learn
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Sound Systems for Difficult Environments

Much of a sound system design engineer's problems deal directly with the problems the room itself creates. For example, if the room is very "live" with excessive reverberation, more directional loudspeakers are required for adequate speech intelligibility. Here are some special situations in which the sound system is located in an environment that creates unique problems.



Natorium

Okay, okay. We're talking indoor swimming pools. But I just had to use "natatorium." It's so majestic.

In some ways a natatorium is very similar to a gymnasium. The walls are usually hard, which reflect sound waves, and the water itself is naturally reflective. Also, the walls are usually smooth and painted. This increases the amount of sound reflections or reverberation in the room. In order to overcome this reverberation, highly directional loudspeakers are needed.

Swimming areas are also very humid. This environment is very hard on sound system components. The loudspeakers must be designed and built for high humidity situations. This means the housing is resistant to the effects of moisture and the loudspeakers themselves will not corrode.

The water also presents an additional barrier. When swimmers are underwater, they can't hear the sound system very well. Therefore, the coaches' instructions will be hard to understand. In the case of synchronized swimming, music and timing

cues will be difficult to follow. In these situations, underwater loudspeakers can be installed.

An additional benefit to underwater loudspeakers is their accuracy during synchronized swimming. Since sound travels faster in water than in air, the swimmers will be in much tighter sync with the music cues. These devices are specifically designed to be installed underwater in the side walls of the pool. An experienced contractor is required to install these loudspeakers correctly and safely. A health and safety inspector may be needed to approve the preinstall design and the completed project.



The second issue is functionality. The best microphone system to use for swimming areas is a wireless microphone, especially in instructional situations. This gives the instructor/coach total freedom of movement. This approach is also the best safety solution.

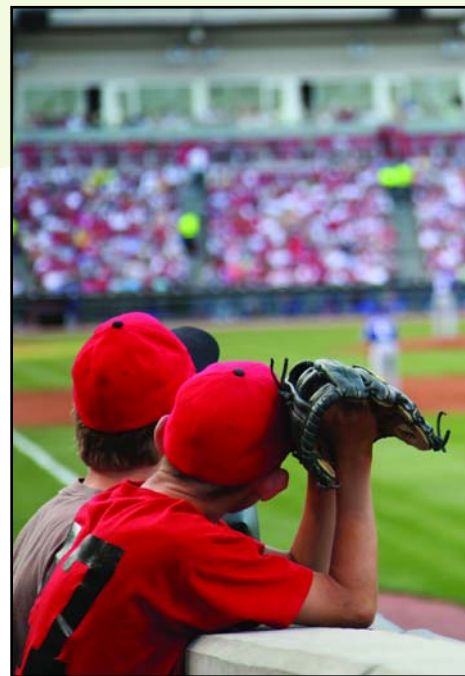
The third issue is the durability factor. Whenever possible, use dynamic microphones rather than condenser microphones. Dynamics are less susceptible to failure or damage due to high humidity environments.



Microphone Selection

Another often overlooked facet of sound systems in swimming areas is the proper selection of microphones. Three criteria must be met.

The first issue is safety and code compliance. Local authorities may not take kindly to a microphone cable being strung across the pool or wet floor. You must make certain that ALL elements of the sound system are properly grounded. Furthermore, if the electronics supply a DC voltage of 48 Volts for condenser microphones, some inspectors/local codes may consider this to be a problem. A safer bet is to use dynamic microphones rather than condenser microphones.



Ice Arenas

Sound systems must overcome the same problems in ice arenas as they do in natatorium, including humidity. In addition, they must be resistant to the occasional hockey puck or stick if the ceiling is low enough to present this possibility.

Outdoor Stadia

Similar problems affect outdoor sound systems for stadia. In addition to the drastic changes in humidity and temperature, outdoor loudspeaker systems are also subject to elements unique to the outdoors. Outdoor loudspeakers are constantly bombarded with rain, snow, ultraviolet radiation and other extremes such as wind. There's nothing more aggravating than to fire up the stadium system in the fall only to find that the loudspeaker enclosure is filled with rainwater from summer storms or that birds have nested in the loudspeaker openings.

Local ordinances may also require special attention to the environmental noise issues regarding sound "drifting" into residential areas.

Here are some tips for outdoor loudspeaker systems:

1. Test the system two weeks prior to the first event in the fall.
2. When first firing up the system after a seasonal lapse of use, turn on the system with all volume controls turned down. Allow the system to idle for several hours to "burn off" any moisture before hitting the system with any appreciable signal.
3. If at all possible, cover all loudspeaker enclosure openings with a weather-resistant screen such as chicken wire to prevent "creature nesting."
4. Check all loudspeaker mountings to make certain that nothing has shaken loose due to wind, etc.
5. If you're not certain about any of this, call us!

TECH TALK On-Axis, Off-Axis

If you have ever tried to wade through a spec sheet for a microphone or loudspeaker, you have seen the words *on-axis* and *off-axis*. However, for many, the terms may be very mysterious. But, if you are going to take full advantage of the features of your microphone or loudspeaker, you would be well-advised to understand these basic terms. Let's explore the term *axis*.



Figure 1 On-Axis direction for this microphone.

Webster defines *axis* as "a main line of direction." *Axis* could also be defined as "one of the reference lines of a coordinate system." Putting those definitions together, on-axis would describe the primary direction from the microphone or loudspeaker. The on-axis direction would also become the reference for other measurements.

On-axis, for most microphones, is a line in the same direction as the long dimension of the microphone (Figure 1). If the microphone has a directional pattern, it will be the most sensitive on-axis. In other words, a talker will be picked up the best if the microphone is positioned so the talker's mouth is on-axis to the microphone (Figure 2).

The Polar Chart in the specification sheet will show the directional characteristics of the microphone or loudspeaker. The Polar Chart will define the on-axis direction and then show the response of the microphone or loudspeaker at other directions in relation to the on-axis response (the other directions are called the off-axis response).

The Polar Chart in Figure 3 is a 1-dimensional graph that depicts a 3-dimensional phenomena (one

"slice" of the pick-up pattern). It represents the level a microphone will pick up at the same distance in a 360° sphere.

The Polar Chart is a good tool to use as an indicator of how well the microphone or loudspeaker will perform for a particular application.

Ron Huisinga

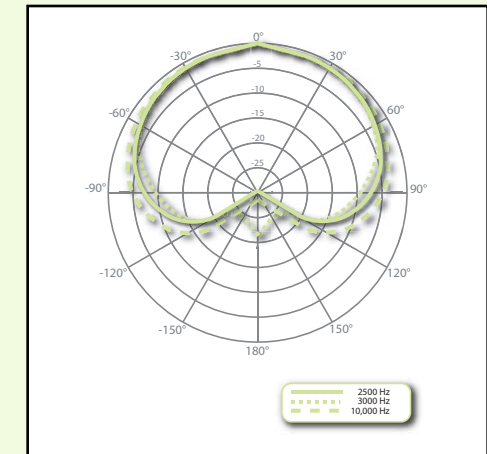


Figure 3 On-axis and off-axis polar chart for a cardioid microphone.

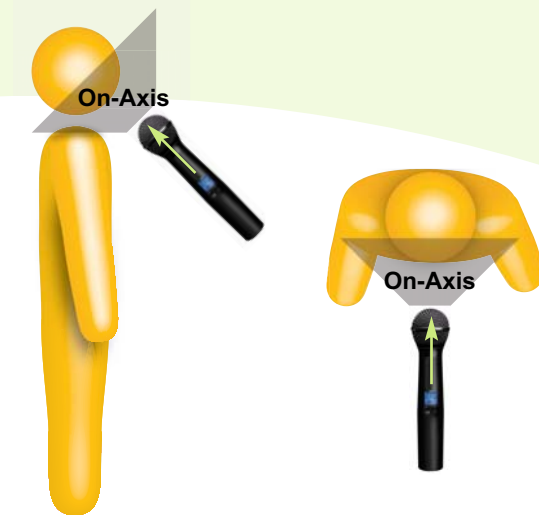


Figure 2 The microphone will pick up the best if the talker is on-axis.