Expert Witness

Nathan Barrios of Australia-based The P.A. People outlines what you need to know when specifying a loudspeaker system for one specific area of application.

There are many scenarios around a modern school where the permanent distributed audio system or auditorium system is not appropriate, and a separate, portable PA system must be used.

When specifying any audio system there are a number of factors that need to be accounted for, such as audience size, coverage area, audio source style, number of sources and audio quality. In a school environment there are some additional considerations, which will refine the selection of the speakers to be used.

The goal of any truly portable PA is to be as light and compact as possible, but this is an even more critical factor when considering a school environment. Often the equipment will be moved and set up by students or teachers, not professional operators. A speaker will need to be carried from a storage location to its destination, and at that point often placed on top of a speaker stand. OHS (Occupational Health and Safety) guidelines often restrict the weight allowed to be carried by one person, so these should be taken into consideration. Another consideration is for the safety of the students, particularly younger students who could accidentally cause a speaker stand to topple over. A lighter speaker and shot bags to help anchor the stand will be a harder setup to push over than a more top-heavy, large speaker setup.

Immediately this will eliminate some speaker designs – most quality 12in and horn-style boxes, wooden boxes, some powered speakers and larger subs will exceed weight requirements. Cheaper plastic boxes may allow for larger drivers with less weight, but with poorer audio quality as a compromise. An ideal setup for a 300-capacity audience listening to pre-recorded material, performance and vocal announcements would be a setup featuring two 8in and horn top boxes on stands, or, if budget allows, extension poles on small subwoofers. The Electro-Voice ZX1A and ZXA1-SUB are a great example of this setup, and are an entry-level professional product which is light, compact, powerful and reliable.

POWERING UP

This setup, as well as those from other manufacturers, are usually powered speakers. By placing small amplifiers in each speaker – adding a small amount of weight – a heavy main central amplifier is no longer required. The system can also be expanded to include more speakers without the impedance matching consideration required in a passive speaker and amp combo system. In a powered system each speaker must be provided a line level source from the mixer as well as a mains power lead, so safety precautions when dealing with mains power should be considered, particularly when dealing with young students.

An added benefit to small powered speakers is the ability to use them on their own for even smaller applications. A PE or gym class could use one speaker with an MP3 player and microphone connected in directly, or a similar setup for a school fete, to address a smaller audience. These speakers are often also utilised in a school's larger installed PA system as convenient fold back wedges.

The other major event a PA is often required for is carnivals and school sports days. In this instance, the focus should be on selecting a speaker system to give maximum coverage and sound output. Employing a system that features many lower-powered speakers is ideal, and the speaker of choice would be a horn-style paging speaker.

A typical school oval can be covered evenly with four to six pairs of horn speakers on stands when positioned carefully, but the added benefit of this system design is in its constant voltage back bone. Constant voltage systems consist of a central amplifier with passive speakers, similar to a traditional low impedance system. In the case of constant voltage, impedance matching isn't an issue. One speaker run can be used to drive as many speakers as the selected amplifier will handle. A 250W amplifier will drive a total of 250W worth of 100V line speakers, regardless of how they are connected or their quantities. The system would deal with a single 250W speaker in the same manner as it deals with 10 25W speakers or 250 1W speakers.

Another feature of constant voltage systems is that all speakers can be driven on one speaker cable run, with each speaker or cluster of speakers connected in series, reducing setup time and complexity. This speaker run can be extremely long with minimal signal loss. For example, a typical sports oval would be 400m around on a single cable run with no loss. TOA provides a range of economical, light and robust horn speakers, such as the SC615M and SC530M, and also offers a range of 'music horns' like the CS304, which provide a smoother, higher quality audio while still functioning as a horn speaker.

In summary, a small-format portable PA system in a school environment must be lightweight, easy to set up, simple to operate and safe for students and operators. Understanding the user's needs and the style of events they intend to hold will ensure the correct equipment is selected.

Expert Witness

Nathan Barrios is showroom operations manager at The P.A. People, a specialist integrator and contractor in sound reinforcement and AV systems located in New South Wales, Australia.
www.papeople.com.au